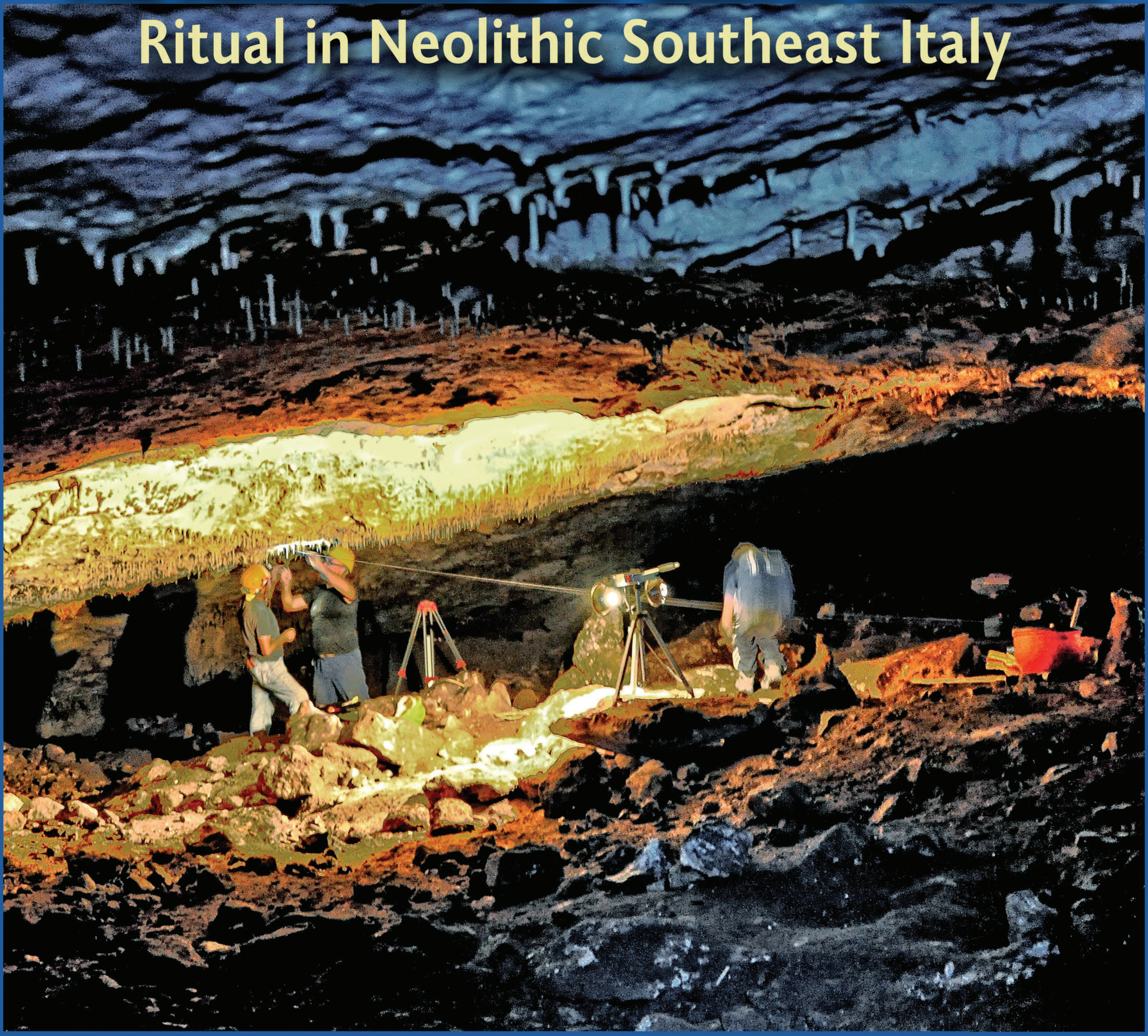
The Archaeology of Grotta Scaloria

Ritual in Neolithic Southeast Italy



Edited by

Ernestine S. Elster • Eugenia Isetti
John Robb • Antonella Traverso

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Archaeology of Grotta Scaloria: Ritual in Neolithic Southeast Italy

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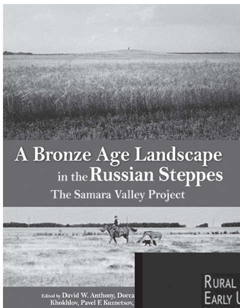

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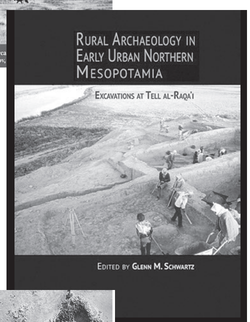

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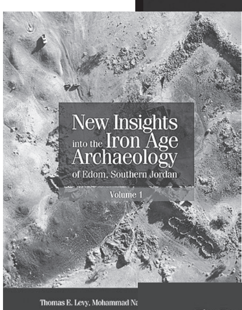

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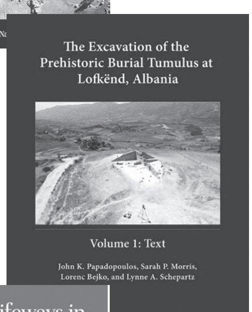

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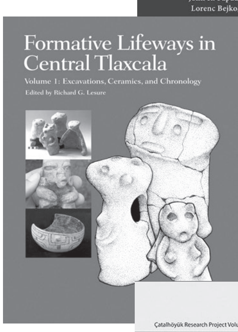

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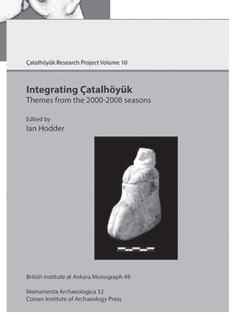

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Archaeology of Grotta Scaloria:
Ritual in Neolithic Southeast Italy

Edited by Ernestine S. Elster
Eugenia Isetti • John Robb
Antonella Traverso

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The Cotsen Institute of Archaeology Press is the publishing unit of the Cotsen Institute of Archaeology at UCLA. The Cotsen Institute is a premier research organization dedicated to the creation, dissemination, and conservation of archaeological knowledge and heritage. It is home to both the Interdepartmental Archaeology Graduate Program and the UCLA/Getty Master's Program in the Conservation of Archaeological and Ethnographic Materials. The Cotsen Institute provides a forum for innovative faculty research, graduate education, and public programs at UCLA in an effort to positively impact the academic, local and global communities. Established in 1973, the Cotsen Institute is at the forefront of archaeological research, education, conservation and publication and is an active contributor to interdisciplinary research at UCLA.

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Back cover: Marija Gimbutas, 1979: *photo by Linda Mount-Williams;* Santo Tiné, 1978: *photo by Shan Winn.*

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Dedication

Ernestine S. Elster, John Robb, Eugenia Isetti, and Antonella Traverso

This volume is dedicated to the two principal co-investigators of Scaloria, both highly respected scholars of prehistory and now sadly deceased: Marija Gimbutas of the Cotsen Institute of Archaeology and Professor of European Archaeology at the University of California at Los Angeles (UCLA), and Santo Tiné, Istituto Italiano per l'Archeologia Sperimentale, Professor of Prehistory, University of Genoa. Their collaboration brought valuable excavation and research experience to the exploration and study (1978–1980) of Scaloria Cave. Their commitment to understanding the use of Scaloria Cave inspired us to bring together a collaborative team of scholars to finish the research they started and to publish *Grotta Scaloria* in their honor.

We four editors named on the title page thank most deeply the scholars whose research we proudly present in this monograph and whose work brought to life the men, women, and children of ancient Scaloria who used the cave for daily and/or ritual activity. Their dedication allowed this Dedication to become a reality.

Marija Gimbutas

Santo Tiné

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Prefazione

L'edizione di questo atteso volume segna un passaggio importante nella storia delle ricerche a Grotta Scaloria, in quanto esito di una maturazione degli studi e degli approfondimenti relativi ad uno dei maggiori complessi neolitici del Mediterraneo, sito chiave della preistoria non solo pugliese.

Scoperta casualmente nel 1931 in occasione della costruzione di un tratto dell'Acquedotto Pugliese da Quintino Quagliati, la cavità situata alla periferia di Manfredonia è dunque nota alla comunità scientifica da oltre ottanta anni. L'articolato complesso carsico formato dalle contigue cavità di Scaloria e 0cchiopinto è stato oggetto di indagini negli anni '70 e '80 da parte di Marija Gimbutas e Santo Tiné, i cui successivi contributi scientifici hanno contribuito alla conoscenza preliminare della complessa ritualità delle comunità neolitiche del Tavoliere.

L'esplorazione sistematica della parte bassa della cavità portò infatti alla scoperta di uno stretto passaggio a forma di galleria e di un ambiente più profondo. Vi si rinvennero svariati raggruppamenti di vasi, tanto lungo la galleria quanto, soprattutto, nella parte finale di essa, accanto ad un piccolo specchio d'acqua dove le ceramiche erano collocate in corrispondenza di concentrazioni stalattitiche e stalagmitiche. Si trattava dei resti di un cerimoniale religioso ipogeico riferibile al Neolitico medio, collegato ad un particolare rituale strutturalmente connesso alle formazioni calcaree presenti nella grotta e allo stillicidio dell'acqua raccolta all'interno di contenitori fittili di pregevole fattura.

Contestualmente alla frequentazione per scopi cultuali dell'area bassa, la parte alta della cavità venne utilizzata come luogo di sepoltura per buona parte del Neolitico medio e recente. Una parte dei vasi rituali rinvenuti nella grotta, che ha dato il nome agli stili vascolari omonimi della ceramica dipinta (Scaloria Bassa e Scaloria Alta), sono oggi esposti presso il Museo Nazionale Archeologico di Manfredonia in un'apposita sezione della mostra "Venti del Neolitico,, intitolata "Il buio e l'acqua."

La storia degli studi su questo sito si intreccia dunque con la storia stessa della Paletnologia italiana e con le diverse scuole di pensiero in relazione alla ricostruzione della vita delle antiche comunità e del loro background ideologico.

Il volume, integrando le ricerche recenti con i materiali rinvenuti in passato, vede per la prima volta riuniti i contributi degli studiosi che per anni ed a vario titolo si sono confrontati con questo sito, in collaborazione con gli specialisti della Soprintendenza per i Beni Archeologici della Puglia impegnati anche nella non sempre semplice attività di tutela del contesto archeologico. I dati che fino ad oggi erano stati solo oggetto di note preliminari, trovano qui una veste finalmente organica e completa, da oggi a disposizione della comunità scientifica e di quanti vorranno conoscere più da vicino lo straordinario palinsesto di vicende e di civiltà che Scaloria custodisce.

Per coloro che hanno portato avanti negli anni le ricerche svolte da insuperati maestri, nel momento in cui si riavviano le attività di ricerca nella grotta, un banco di prova stimolante e una sfida forse vinta.

Luigi La Rocca
Soprintendente per i Beni Archeologici della Puglia
(Received November 28, 2013)

Preface

The publication of this volume marks an important milestone in the history of research at Scaloria Cave. It is the outcome of a mature study providing a deeper knowledge of one of the most important Neolithic complexes in the Mediterranean—a key site for prehistory well beyond that of Puglia.

Discovered unexpectedly by Dottore Quintino Quagliati in 1931 during the construction of a section of the Puglian Aquaduct, the cave is in the outskirts of Manfredonia and has been known to the scientific community for more than eighty years. The complex carstic system formed by the adjacent caves of Scaloria and Occhiopinto was the object of investigations in the 1970s and 1980s by Marija Gimbutas and Santo Tiné, whose successive scientific contributions have added to the preliminary knowledge of the complex ritual life of the Neolithic communities in the Tavoliere.

The systematic exploration of the lower part of the cave led to discovery of a narrow tunnel-like passage and of a yet deeper chamber. Here numerous groupings of pots were found, both along the gallery and above all in the deepest part, placed next to a small mirror of water, where the pots were concentrated near clusters of stalactites and stalagmites. It represented the remains of an underground religious ceremony from the Middle Neolithic, related to a ritual structurally connected to the calcareous formations in the cave and to the stillicide waters collected inside these finely made pottery vessels.

At the same time as the cult use of the Lower Cave, the Upper Cave came to be used as a burial place for a good part of the Middle and Recent Neolithic. Some of the ritual vessels found in the cave, which has given its name to two styles of painted pottery (Scaloria Bassa and Scaloria Alta) are displayed today in the Museo Nazionale Archeologico di Manfredonia in a section of the exhibit "Winds of the Neolithic" appropriately titled "Darkness and Water."

The history of research on this site is interwoven thus with the history of Italian prehistory itself, and with various schools of thought about reconstructing the life of ancient communities and their ideological background.

This volume, integrating up-to-date research with materials found in the past, offers the contributions of scholars who have studied this site for many years, brought together for the first time, in collaboration with the specialists of the Soprintendenza per i Beni Archeologici della Puglia engaged as well in the delicate and complex activity of caring for archaeological resources. The data which, up until now, were known only through preliminary notes, here find a presentation finally organic and complete. Henceforth, these data are available to the scientific community and to all who would like to know better the extraordinary palimpsest of events and of civilization guarded by Scaloria Cave.

For those outstanding scholars who, through the years, have carried forward this research, the moment in which we present these investigations provides a stimulating challenge and one over which their work will surely triumph.

Luigi La Rocca
Soprintendente per i Beni Archeologici della Puglia

Acknowledgments

Ernestine S. Elster

In recognizing the many people who contributed to the Scaloria project, we first acknowledge those who worked thirty years ago with Professors Marija Gimbutas and Santo Tiné at the 1978–1979 cave excavation. Chief among the participants, serving as overall field director for both seasons, was the late Dr. Shan Winn (Professor, Department of Anthropology, University of Southern Mississippi), whom we salute with sincere thanks. He had extensive field experience in Turkey, Greece, and the Near East. We further note, with appreciation, the following archaeologists, scholars, students, and volunteers: Dr. Dan Shimabuku, 1978 assistant field director (University of Southern Mississippi and, later, St. Mary's University, Halifax, Nova Scotia, Canada); Dr. Robert Gilbert, physical anthropologist (1978), University of Southern Mississippi; Linda Mount-Williams, photographer and draftswoman (UCLA); the late faunal specialist Dr. Sándor Bökönyi, lecturer in archaeo-zoology, Etvös Loránd University, Budapest; the late paleo-anthropologist Dr. János Nemeskéri, professor of physical anthropology, Debrecen University, Hungary; Eugenia Isetti, Guido Rossi, Monica Chesi, Paola Riballa (Genoa), Nicola Leone (speleology); in 1979, student volunteers Molly Irulli, Nancy Kidd, and Nadia Campo, and the University of California Research Expedition (UREP) volunteers, Shirley V. Cassinelli, Juliette Dunham, Marian Edison, Elizabeth Hageman, Virginia Ingham, Alban Katz, M.D., Kurt Steckbeck, Heather Thomas, and Jean Wood.

The 1980 study season of the materials recovered in 1979 was held in the Museo Archeologico di Manfredonia and was supervised by Professor Gimbutas and Dr. Ernestine S. Elster; we acknowledge the UREP volunteers, Dr. Wolfgang Götte, Marian Rozger, Briggs Ackert, and representing the Archaeological Associates of Greenwich, Connecticut, Nancy Bernard and Joan Schiele. Sincere thanks to all of the excavation and study participants, and with apologies and thanks to those inadvertently omitted.

Almost thirty years have passed since the excavation at Scaloria was abandoned after 1980. The work has been rescued from an ignominious fate by the formation in 2006 of the Save Scaloria Project (SSP). The SSP is the collaboration of four scholars: Dr. John Robb (Cambridge), Dr. Eugenia Isetti (Genoa), Dr. Antonella Traverso (Genoa), and myself (UCLA), led by Professor Santo Tiné (Genoa) before his untimely death. We committed to this enterprise—a search for Scaloria's documentation and the people involved from thirty years ago—with the goal of publishing a long-dormant excavation. Now in 2016, as the goal is reached and the challenges overcome, we offer sincere salutations to this intrepid team and the contributions of an army of scholars.

Dr. Dan Shimabuku, whose unwavering interest and assistance has been critical, was working in 2002 in Manila (as head of information with the Asian Development Bank). He and Shan Winn had published a preliminary report on the 1978 field season (Winn and Shimabuku 1980; Appendix 2), and I consulted with him as to the participants and likely location of documentation. He found and donated his notes, drawings, photos, and other documents, and these were brought to us (with thanks) from San Jose by his daughter, then UCLA student Ashley Shimabuku. Subsequently, when Shimabuku was in the United States (and well beyond the call of duty), he flew to Florida after Shan Winn's sad, untimely death (2008), bringing back to us Winn's Scaloria slides.

Very special thanks and recognition go to Linda Mount-Williams, now a rancher in Southern California, who generously copied all her 1979 photos, drawings, and notebooks, and spent hours with us at UCLA helping to identify artifacts and correlate these to the 1979 catalogue (Appendix 5). Both Linda Mount-Williams and Dan Shimabuku, former students of Marija Gimbutas and graduates of UCLA, had expressed a sincere interest in, and have been very active in helping us gather, the Scaloria excavation data.

Dr. Vicenzo Tiné of the Museo Pigorini, Rome, played a key role, for he introduced me, via email, to his father, Professor Santo Tiné, and we arranged a meeting in Genoa in 2006. Together with Professors Giorgio Buccellati and Marilyn Kelly Buccellati, who acted as informal facilitators, I was welcomed to the Tiné home and met Dr. Eugenia Isetti, whose involvement in the SSP has been central. Santo and his gracious wife, Fernanda, hosted us at what was a memorable, and for the future of Scaloria, a crucial and successful afternoon.

In Los Angeles, Dr. Živile Gimbutas played an exceedingly significant role by locating her mother's papers in the Pacifica Graduate Institute (Montecito, California), and introducing us to Dr. R. Buchen, then director of the Joseph Campbell and Marija Gimbutas Archive. We thank Živile Gimbutas for giving us the "key" and Dr. Buchen and the Pacifica Graduate Institute most heartily for permission to borrow, on long-term loan, the Scaloria files. Marija Gimbutas's papers are an important part of Pacifica's OPUS Archive, and I thank Dr. Safran Rossi, the current director, whose assistance has been truly invaluable.

Very special recognition is owed to Professor Charles Stanish, director of the Cotsen Institute of Archaeology at UCLA, who approved the "inaugural" Cotsen pilot grant to the SSP in 2007. We gratefully acknowledge his commitment to saving Scaloria Cave from obscurity and patiently supporting and hosting us over these years at the Cotsen.

The number of students and colleagues and volunteers who worked/consulted on Scaloria in the lab as we searched for the data, and collected, edited, and wrote these chapters is legion: I thank work-study students Linda Vera, Stephani Downey, and Diana Garcia; students Emmett Rosenbaum and Mariah Roesseler; technology specialists Abhishek Goel (without whom this manuscript would still be floundering) and Lyssa Stapleton (also our web designer); editors Dr. Helen Wells, Nancy Bernard, Pat Oliansky, and Dr. Terisa Green; advisors and consultants here and abroad, Dr. Tara Carter, Helle Girey, Dr. Ruth Whitehouse, Dr. Barbara Voytek, Dr. James Sackett, Dr. Charles Stanish, Dr. Tom Wake, Paul Lippe, Dr. Susan Skomal, and most recently Dr. Andrea Ricci, and, of course, the many unnamed but appreciated persons who facilitated the SSP in England, Italy, and Hungary. To Carol Leyba, developmental editor and book designer, we extend our sincere thanks; also to Barbara Kohl for superb copyediting, and to Randi Danforth, Cotsen Publications Director for efforts above and beyond the usual editing issues. Each of the separate analyses was also assisted and encouraged by many people, who are thanked in the relevant chapters throughout this monograph.

It is an honor to name and salute the institutions and their directors whose scholars joined us: the Cotsen Institute of Archaeology at UCLA; Istituto Italiano per l'Archeologia Sperimentale and the Department of Earth Sciences of the University of Genoa; the University of Salento-Lecce; the University of Rome "La Sapienza"; the University of Florence; Cambridge University; the University of Exeter; the Institute of Archaeological Sciences, Etvös Loránd University, Budapest; the Museo Archeologico di Manfredonia, and the museums of Foggia, Liguria, Taranto, and the Museo degli Origini-University in Rome.

Finally, we are grateful to the National Endowment for the Humanities (NEH) for their financial support via an NEH Collaborative Grant which enabled the project, and we offer a special word of thanks to Dr. Lydia Medici of the NEH, Washington, DC, who responded to our need to extend the grant's closing by two extra years. We gratefully acknowledge a grant from the Oxford Radiocarbon Accelerator Unit (ORAU), which funded new radiocarbon dates. As this is being written (March 2015), an unexpected contribution, through the effort of Dr. John Papadopoulos, brought us, with many thanks, the generous support of the Malcolm Hewitt Wiener Foundation and a most welcome subvention for the *Grotta Scaloria* publication. This allows us to publish a well-illustrated volume, one which I hope will bring to life the Neolithic men and women who used the *Grotta* in ways both profane and quotidian—almost 7,000 years ago.

About the Editors

Ernestine S. Elster is Visiting Assistant Professor at the Cotsen Institute of Archaeology at UCLA. Her work focuses on the technology and economy of early Neolithic villages in southeast Europe. She has done fieldwork in Greece, Italy, Yugoslavia, Israel, and Malta; her publications include *Excavations at Sitagroi: A Prehistoric Village in Northeast Greece*, Colin Renfrew, Marija Gimbutas, and Ernestine S. Elster, editors (Cotsen Institute of Archaeology Press, 1986); and *Prehistoric Sitagroi: Excavations in Northeast Greece, 1968–1970*, Ernestine S. Elster and Colin Renfrew, editors (Cotsen Institute of Archaeology Press, 2003).

John E. Robb is Professor in the Department of Archaeology at Cambridge University. His work focuses on anthropological and archaeological theory, European and Mediterranean prehistory, cultural life, symbolism and historic process; prehistoric art; burial topics, especially ritual, taphonomy, and osteoarchaeology. His fieldwork is in Italy, where he is co-director of excavations at Bova Marina (Calabria). His publications include *The Early Mediterranean Village: Agency, Material Culture, and Social Change in Neolithic Italy* (Cambridge University Press, 2007).

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Antonella Traverso is with the Ministero per i Beni e le Attività Culturali and Soprintendenza per i Beni Archeologici della Liguria. Her work focuses on museology, prehistory and neolithization of southern Italy, Sicily, and Sardinia. She has done fieldwork in Italy, Greece, and Turkey, and continues work at Scaloria Cave. Her publications include "Neolitico Antico: strati 15–14," in S. Tiné, ed., *Il Neolitico nella Caverna della Arene Candide (scavi 1972–1977)* (Istituto Internazionale Studi Liguri, 1999); and *The Sanctuary of Monte Prenuragico Accodi* with S. Tiné (Perugia, 2000).

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Chapter 1

Grotta Scaloria: An Archaeological History

By Ernestine S. Elster

Introduction

Grotta Scaloria[1] is known as little more than a name to most European prehistorians, but this volume aims to rectify that lacuna. Here we publish the history of the cave's discovery and subsequent explorations and present much of the earlier unpublished excavation data. We add our own research, "pouring new wine into old bottles," but with great admiration and respect for what has come before. Three discoveries form the background to Scaloria research, and are later discussed in detail, but bear noting herewith.

The first is the cave's accidental discovery in 1931 by workmen excavating for a pipeline to bring water from Manfredonia to the remote villages on the Gargano Peninsula. Explosives were placed to move huge boulders and, when the smoke cleared, a deep *crévasse* exposed the Upper Chamber of the cave, itself a natural grotto located where the flat Tavoliere Plain gently rises to meet the Gargano massif (Figure 1.1). The underground grotto was immediately inspected, and limited excavation took place under the direction of Quintino Quagliati, director of antiquities for Puglia. The artifacts collected, including prehistoric pottery and stone and bone tools, were stored in the Taranto Museum (see Chapter 5.7), and a summary of this work is included in Quagliati's publication that appeared after his untimely death (Appendix 1; Quagliati 1936).[2]

The second discovery resulted from examination of the aerial photos taken of the Tavoliere Plain by the British Royal Air Force during World War II (Bradford 1949). These photos exposed numerous circles that further investigation revealed to surround uncounted and unexplored Neolithic villages. These were the Neolithic *villaggi trincerati* of the Tavoliere. Before the Gimbutas-Tiné 1978–1979 excavations, several of these villages had been explored, some within a day's walk to the cave, which itself was a destination undoubtedly visited/used by some of these villagers.

Almost three decades later, in 1967, the Cave's Lower Chamber, Scaloria Bassa, previously unknown, was entered by a local group of young amateur cavers. Santo Tiné, an active archaeologist with the Soprintendenza Archeologica at Foggia, responded with alacrity, organizing a team of speleologists and archaeologists, including a very young Eugenia Isetti who later collaborated with Tiné on the report of that excavation (Appendix 3 [online]; Tiné and Isetti 1975–1980).

[1] Throughout these chapters we use Grotta Scaloria and Scaloria Cave interchangeably, and for the pottery, Scaloria Alta and Scaloria Bassa and Upper Chamber and Lower Chamber.

[2] Appendices are available online at www.dig.ucla.edu.

Fig. 1.1. Map of the region: (1) Tavoliere Plain. (2) Grotta Scaloria.

We, of the "Save Scaloria" Project (SSP), focus on the last exploration in the history of Grotta Scaloria, the University of Genoa-University of California Los Angeles excavations of 1978–1979, but we also incorporate—as much as possible—the data from these earlier explorations and excavations. We locate the cave in its Tavoliere landscape and evaluate a likely link between the *villaggi trincerati* and the cave by evaluating what may have been both quotidian and ritual uses of the cave, in terms of the how, when, why, and who.

The Gimbutas/Tiné Collaboration

Marija Gimbutas (1921–1994) was born and trained in Lithuania under a culture history model for teaching prehistory with emphasis on data, comparanda, proposed influences, the establishment and comparisons of chronologies, and essentialism. She and her family fled across Europe during World War II and at its end were in Tübingen, Germany, where the university offered both prehistory and Baltic studies. Marija defended her PhD thesis on the prehistory of Lithuania and was awarded a graduate degree. Arriving in Boston in 1949, Marija Gimbutas presented her portfolio and vita at Harvard and was assigned a desk in the Peabody Museum. As her research developed and publications began appearing,[3] she was appointed as Peabody Museum research fellow (1955–1963) and lecturer in the Department of Anthropology (1962–1963). During these years, she traveled yearly to Europe, expanding her focus with firsthand knowledge of sites, meeting archaeologists and other scholars, and visiting museums in Western and Eastern Europe, participating in conferences, and, as is well known, publishing widely.

UCLA welcomed her in 1964 as professor of European archaeology. At that time, U.S. Counterpart Funds, frozen in eastern Europe after World War II, were available for cultural research by application to the Foreign Currency Program, administered by the Smithsonian Institution. Funding led to collaboration with host-country scholars.

[3] For Gimbutas's biography, see E. S. Elster, "Marija Gimbutas, Setting the Agenda," in *Archaeology and Women*, edited by S. Hamilton et al., pp. 83–120 (University College, London, and Left Coast Press, Walnut Creek, California, 2007); E. S. Elster, "Le nuove scoperte dell' archeologia neolitica," *Prometeo* 31, no. 121, 2013 (Rome), 44–57.

Gimbutas had a wide correspondence with, and knew personally, many Eastern European prehistorians. Awarded counterpart funds, she undertook her first excavation, collaborating with Dr. Alojz Benac (1967– 1969) at Obre in Bosnia and subsequently with Drs. Milutin and Draga Garašanin (1969–1970) at Anzabegovo in Yugoslavian Macedonia (Gimbutas 1976). The goal of Marija's UCLA team at Obre was to recover a quantitative sample of archaeological material, employing methods from "New Archaeology" such as controlled sampling and sieving. Its field director was one of Marija's students, Eugene Sterud, an anthropology graduate student with considerable field experience. Benac, however, was interested in a macro-investigation of house structures. Thus, separate but equal, side-by-side excavation areas were established, and two excavation reports were published (Gimbutas 1974; Benac 1973).

This was not a model repeated at Scaloria, nor at either of Gimbutas's excavations in Greece (Sitagroi [Renfrew et al. 1986; Elster and Renfrew 2003] and Achilleion [Gimbutas et al. 1989b]). Gimbutas and Tiné's correspondence outlines a jointly excavated project to which both partners contributed plans, goals, and funds. Tiné was hands-on in the field; Gimbutas was not a field archaeologist, though eager for results and a synthesis. There was no conflict concerning excavation methods. However, the excavation was largely in Gimbutas's hands, with Tiné occupied on other sites on the Tavoliere; Gimbutas, not primarily a field worker, appointed as field directors Shan Winn (1978 and also 1979) and Dan Shimabuku (1979).

Santo Tiné (1926–2010), born in the province of Siracusa, worked first in the Soprintendenza of Sicily (1952–1965) in collaboration with Luigi Bernabò Brea as photographer and excavation assistant. With a scholarship from Harvard's Peabody Museum in 1958 to 1961, he received an MA in anthropology, and during this period he became acquainted with Marija Gimbutas. Returning to Italy, he joined the Soprintendenza of Reggio Calabria (1962–1964); and from 1964–1967 the Soprintendenza of Puglia (Foggia office) where he began excavations on the Tavoliere. The University of Florence awarded him the *libera docenza* (a credential based on publications and equivalent to a doctoral degree) in 1967, and thus he began teaching in 1968 at the University of Genoa, where he remained until his stroke in 2002. Tiné had an extraordinary career; he excavated at many important Neolithic sites in southern Italy and Sicily and at a wide range of sites and periods outside Italy and in the Aegean.

At the time Tiné collaborated with Gimbutas, he was director of the Institute of Archaeological Sciences, University of Genoa, where he established the Istituto Italiano per l'Archeologia Sperimentale (IIAS). He published reports and prepared monographs on a number of excavations, including the magisterial publication of Passo di Corvo (Tiné 1983); and planned and opened museum exhibitions and was an honored participant at countless national and international conferences. No one understood southern Italian prehistory as did Santo Tiné; Marija Gimbutas fully recognized his rich experience in excavation and with Italy's archaeological bureaucracy.

In September 1972, Gimbutas and Tiné both presented papers in Italy at the symposium, Les Réligions de la Préhistoire. They were two among 170 scholars representing 35 nations at the Centro Camuno di Studi Preistorici, Capo di Ponte, Val Camonica. By then, Tiné had explored the Lower Chamber at Grotta Scaloria, first discovered in 1967. There, under difficult conditions, Tiné and his team collected, recorded, and especially noted some 40 Neolithic pots placed to capture the stillicide water dripping from the stalagtites. It is a silent, dark grotto reached only by a tortuous low-ceiling passage, and it seemed to have left a deep impression on Tiné, which he expressed at Capo di Ponte in 1972.

On the first full day of the Centro's week-long meeting, in the session "Protonéolithique, Néolithique et Enéolithique," Marija Gimbutas offered "European Neolithic Figurines: What Do They Represent?" and Santo Tiné, "Culto neolitico delle acque nella grotta Scaloria (Puglia, Italia)." Their presentations were followed by long discussions and debate, all reproduced in the proceedings of the symposium (Anati et al. 1975: 117–142, 185–190).

They had a concentrated week to focus on prehistoric religion and ritual, topics in which she was deeply invested and he was moving toward. Among his other projects, Tiné had been directing excavations since 1966 at one of the largest *villaggi trincerati* on the Tavoliere Plain, Passo di Corvo. At the symposium, Tiné presented the Tavoliere's Grotta Scaloria, its Upper Chamber littered with human skeletal remains, and introduced his Centro audience to the hidden, mysterious Lower Chamber with its pottery, stalactites, stalagmites, and pools of water as a place for a "cult of sacred waters." I can well imagine Marija's rising interest in the vast and early Italian Neolithic of

the Tavoliere, especially because of the types of pottery, with both impresso and painted decorations, and ritualistic use of the vases to capture the stillicide liquid. Tiné would have noted the formal similarity of figurines from Passo di Corvo (Tiné 1975: Tav. 128, 129) to those Marija illustrated in her Centro talk and described as "semi-schematic, female, masked, and marked with symbolic incisions" (Gimbutas 1975: 123–124, figs. 63, 64A, B).

Their interests differed but were complementary. Gimbutas became more and more focused on the repeated motifs on pottery and figurines as representative of a system of symbols connected to prehistoric cults that she was confidently decoding. Professor Tiné, however, was the consummate archaeologist whose life had been devoted to excavation. In his many publications, his interpretations of the remains in the ground were based on rigorous excavation and study—on typology, chronology, technology, and collaboration with specialists. He made only a brief foray into interpretation, as when he described the figurines excavated at Passo di Corvo as "probabile raffigurazione della dea Madre" (Tiné 1975:98, Tav. 127). For Grotta Scaloria, their meeting at Capo di Ponte was serendipitous. It is likely that their joint Scaloria project gestated during the intense discussions concerning prehistoric cults, symbolism, and religion at the Centro in 1972. No doubt Tiné invited her to visit Passo di Corvo and she did. By the time of her visit to Puglia, her excavations at Sitagroi, jointly undertaken with Colin Renfrew between 1968 and 1970 with a British School permit, and Achilleion (1973–1974) in *synergasia*—that is, in cooperation and jointly with Demetrios Theocharis—were in preparation for publication. Thus, in the 1977 application to the NSF she wrote:

> The idea of cooperation between UCLA and the University of Genoa was conceived about five years ago when [I] . . . came to Tavoliere and Materano to study excavations at Passo di Corvo. The final decision for a joint research project was reached during the International Congress of Pre- and Protohistoric Sciences in Nice, September 1976. (Gimbutas NSF application 1977)

History of Grotta Scaloria Excavations, 1978–1979

The original plan as outlined in the National Science Foundation (NSF) application—one part of which was the excavation of Grotta Scaloria—was a five-year project entitled, "The Prehistory of Southeast Italy," with survey, testing, and excavation in the Tavoliere and Materano. Tiné and Gimbutas's goals were stated in the NSF application:

> The principal goal of this project is to scientifically establish the chain of events in southeastern Italy during the change from food gathering to food production. Hypotheses will be formulated on the causal factors leading to plant and animal domestication, i.e., what conditions may have generated a selective advantage for increased productivity? The Tavoliere area is ideal for an in-depth investigation of the shift to food production because of the large number of Neolithic sites confirmed by aerial photography. . . . A three-part program is scheduled for the initial phase of research. Aerial photographs of Neolithic villages and towns will be investigated; the most promising sites will be tested by sample trenches and pits; and a systematic excavation will be started at Grotta Scaloria in order to reconstruct ecological conditions and chronology during the initial stage of food production. (Gimbutas 1977:17)

A copy of the official agreement between the two universities and the two scholars is dated May 23, 1977, and was signed by Gimbutas and Tiné at UCLA, which he visited that spring. The document states that Professor Tiné is the "legal holder of the research concession given by the Italian Ministero dei Beni Culturali e Ambientali." As a part of the project, James Mallory, soon to be on the faculty of The Queen's University, Belfast, Northern Ireland, and a former student of Marija's, was invited to undertake a survey and surface collection on the Tavoliere with a limited excavation at Lagnano da Piede, one of the *villaggi trincerati*. He wrote that he wished to "thank Prof. S. Tiné for providing the financial support for the excavation at Lagnano. . . . Thanks also to Prof. M. Gimbutas . . . for assistance during the excavation" (Mallory 1989:193).

Funding was a significant issue. There were high expectations for the NSF application that, Tiné explained, would be tied to a Gimbutas-Tiné project for support by the Italian C.N.R. (Consiglio Nazionale delle Ricerche). Furthermore, at that time, for American funding to be accepted by the Italian bureaucracy, it also had to receive approval from a "mediating governmental office for international projects," the US/

Italy Cooperative Scientific Program, Office of International Programs in Washington, DC. This latter agency did provide approval, dated 1977. Although the NSF application was not funded—certainly a great disappointment—all of the permissions were intact. Professors Gimbutas and Tiné found other sources for support (the Ahmanson Foundation in Los Angeles, the University of Southern Mississippi, and the Italian government), and the excavation was underway.

Both were on hand when the first season's work began at Grotta Scaloria in 1978, with students, former students then teaching elsewhere, and specialists from their respective universities. Marija had appointed Shan Winn as field director; other members of the team (with apologies and thanks to those not mentioned) included Robert Gilbert, Dan Shimabuku, Sándor Bökönyi, János Nemeskéri, and Linda Mount-Williams, plus the Genoa team, and volunteers named in the acknowledgments.

Both field seasons (1978, 1979) and one study season (1980) were held; these are fully described below by Eugenia Isetti (see Chapter 2.1). It must be noted that the excavation data available are limited; detailed floral data and draftsman's drawings of the cave stratigraphy and of each trench are absent. Winn and Shimabuku's preliminary report on the 1978 excavations (1980; see Appendix 2 [online]), however, provides a fair account of the challenges encountered in the excavations inside a dark grotto with electrical lights powered by a generator outside the cave interrupted by frequent storms. This report allows the reader to understand the excavation methodology (trowel, shovel, mechanical earth mover for areas outside the cave mouth, sieving); artifactual materials collected/tabulated (human skeletal remains, pottery, bone and stone tools, faunal and shell remains, clay daub, etc.) and recorded (see Appendix 8, Field Catalogue 1979); and introduces the physical conditions encountered. The following is reproduced from Winn and Shimabuku (1980:1–3; see Appendix 2 [online]):

> The decision to initiate thorough investigations of Scaloria cave was based on several factors:
>
> 1. Pottery sherds spanning several chronological horizons from the Early Neolithic (Impresso phase) to the Late Neolithic (Diana phase) are present on the site; thus the cave offers possibilities for obtaining a good stratigraphic sequence for the entire Neolithic period in Southeastern Italy.
> 2. Study of the burials in the cave cemetery may yield important information for physical anthropological studies of diet and disease. The grave goods, which are generally whole and intact, not only will provide a good inventory of at least certain categories of artifacts, but furthermore may aid in the reconstruction of certain aspects of social structure.
> 3. Additional caverns accessible only by difficult passageways extending into the lower regions of the cave may well be ceremonial in nature and thus may afford insights into "cultic" practices of the Neolithic period. Large painted vessels placed on or near stalagmites hewn into pedestals have been discovered in these caverns. Tiné has interpreted this extraordinary complex of pottery and passages into the lower cave as a sanctuary for a water cult (Tiné 1972a).

Excavations at Scaloria in 1978 began at the surface, outside the cave, rather than in the cave. This was partially due to the difficulties of starting excavations inside the cave. That is, access to the cemetery was then through a low narrow passage; both excavators and tools entered prone through a horizontal gap of about 80 cm beneath the original 1930s aqueduct pipes. Second, an adequate lighting system required to excavate in the pitch-dark cave was costly and logistically complex to set up. Finally, since a primary purpose of the 1978 excavations was to obtain good stratigraphy, it was felt better results would be first obtained outside the cave. If indeed the cave had served as a cemetery and religious shrine, then stratified habitation levels most probably would be found outside the cave or near the original entrance. Discovery and excavation of the original entrance would yield the additional advantage of providing easier access for work inside the cave. Hence a first priority was to locate the original, now-collapsed, Neolithic entrance to the cave.

Various methods were utilized to aid in locating the Neolithic entrance:

1. Crop marks were observed. This was done in early July, before the fields were burned following the harvest. The field under which the cave lies contained yellow-brown vegetation, but a patch of greener vegetation was noted in what seemed to be a very slight depression when observed from a distance or from higher ground. Since bedrock is

believed to lie generally close to the surface of the field, the green vegetation seemed to identify an area where greater soil depth allowed deeper water and plant root penetration.

2. Magnetometer studies were contributed by the Lerici Foundation. Readings revealed a pronounced anomaly about 10 m wide and 20 m long that was centered precisely in the area of greener vegetation. Although the anomaly displayed a longer southward extension than the observed green area, it disappeared rapidly as one exceeded the boundaries of that area.

3. A probe was used to test the depth of the bedrock, which would indicate the roof of the cave. The bedrock was found to lie increasingly deeper as one entered the greener area, until finally the probe penetrated to its full length without reaching bedrock. Elsewhere bedrock was encountered very near the surface.

4. The interior surface of the cave slopes sharply upward to the north, so that the passage between roof and surface becomes very restricted. Geological studies indicate that the cave was formed by separation of strata rather than by erosion (see Rellini et al., Chapter 3.1). A massive rock and earth slide was discovered inside the cave that contained habitation debris; significantly, no stalactites were found here. The debris included boulders and an accumulation of soil to a depth that, together with evidence of plant roots, suggested a point not far below the exterior field surface. Calculations regarding the location of this mound of debris indicated that it was located approximately underneath the green patch demarcated as an anomaly by the magnetometer study.

The above observations were sufficient to warrant excavation in the area where green vegetation, anomaly, and deepest probes coincided. As systematic testing of the surface layers produced no significant artifacts, and since it appeared to consist of deposited soil washed down from higher elevations, it was decided to remove the topsoil mechanically. No evidence of habitation debris was recovered until approximately 60 cm of soil had been removed. Once a large area was cleared of this surface wash, a 4×6-meter trench was surveyed and marked for excavation. Careful excavation proceeded with hand trowels and brushes. Twenty-four consecutive levels were designated (cf. Chapter 2.1).

Once the original entrance was located and reopened, excavations within the cave could proceed, and finds within them could now be correlated with what was found outside the cave. Much of the material found in the cave is unstratified. The difficulties of interpreting materials found in the cave are explained below. Three trenches were excavated within the cave in 1978.

The 1979 season was again directed by Winn; trenches 4 through 10 were excavated inside the Upper Chamber. Trench 13 was located outside the cave near the "ancient" entrance. Participants included volunteers from UCLA's field school program (University Research Expeditions Program, UREP), the University of Genoa, and the University of Southern Mississippi. The excavation results were not published (see Appendix 8, Field Catalogue 1979). In 1980, a study season was held; materials from the 1979 excavation were studied at the Museo di Manfredonia, with Marija Gimbutas and Ernestine S. Elster directing. Participants included volunteers from UREP and Archaeological Associates, Greenwich, Connecticut, and students from UCLA and Budapest. These study season results were not published, but some of this research was identified among Gimbutas's papers in the OPUS Archives at Pacifica Graduate Institute, Montecito, and have been key in preparing this monograph. Similarly, the faunal analysis (Bartosiewicz and Nyerges, Chapter 3.3) is based on the extensive archived data of the late Professor Sándor Bökönyi stored in Budapest.

Gimbutas's reports of each of the field seasons and the 1980 study period were submitted to the Italian officials; copies were found in her archive at OPUS (Appendix 4). In an application to the National Endowment for the Humanities (NEH), with Gimbutas and Tiné, as co-principal investigators, entitled "The Neolithic of Southeast Italy: Excavations in Scaloria and Passo di Corvo," she summarizes:

> Cooperation between UCLA and the University of Genoa.… During the summer of 1977, a survey was sponsored by the Italian government, in 1978 by the Italian Government and the University of Southern Mississippi, and in 1979, by the Italian Government and the University Expeditions Program, UC Berkeley, California [UREP]. (Gimbutas 1980:8)

This application was never submitted, but Susan Skomal, one of Gimbutas's graduate students who worked with Jim Mallory at Lagnano da Piede, at Scaloria, and Passo di Corvo between 1977 and 1979, indi-

cated that Gimbutas's illness (which later took her life) was first manifest in 1979.[4] Skomal presented a report for her graduate seminar at UCLA after the survey of Puglian sites, titled "The Neolithic Ceramics of the Tavoliere, Italy" (Skomal 1977). Eugenia Isetti submitted her *tesi di laurea* at the University of Genoa during the academic year 1978–1979, entitled "Nuovi Scavi nella Grotta Scaloria."

In 1980, Gimbutas wrote to the Italian C.N.R. that she was turning over the direction of Scaloria to her field supervisor, Shan Winn, giving no reason. Correspondence between Tiné and Gimbutas on this important decision was not in her archive, but we can imagine what caused her to remove herself from the excavation. She was active at the Museo di Manfredonia study season in 1980—my first direct contact with the Grotta materials. After the 1980 study season, there was a long hiatus in attention focused on Scaloria. The only active research on Scaloria between 1980 and the onset of "SSP" in 2006 seems to have been John Robb's study of the human bone. After receiving permission from both Gimbutas and Tiné, Robb studied the human remains then available in the Museum of Manfredonia in 1990 (Robb 1991).

UCLA Cotsen Institute of Archaeology - Cambridge-Genoa Save Scaloria Project

In 1998, John Robb presented a talk at UCLA on economy and social relations in Neolithic Italy. Later he visited my lab and, although I knew that he was working in southern Italy, I was surprised when he asked about Scaloria. All I had were two banker's boxes from Marija where I stored part of my notes from the 1980 study of the 1979 chipped stone assemblage, slides, and a notebook, and copies of Marija's preliminary reports. Sadly, she had passed away after a long illness in 1994, but toward the end, she asked me "to see Scaloria published," and turned over to me those banker's boxes. Years passed, during which I was working on the second and final volume of the Sitagroi excavations, another aging project (Elster and Renfrew 2003). Robb expressed hope that I would publish Scaloria: "Grotta Scaloria is a very important site and I'll help you in any way I can." John's words were prescient.

He had an interest in Scaloria, since Gimbutas and Tiné had given him permission to examine and publish his study of the cave's human skeletal remains stored in the Manfredonia Museum (Robb 1991). Thus, he knew very well that this cave had one of the largest assemblages of human remains in Neolithic Italy.

We parted and I agreed to think about Scaloria, its participants, and where Gimbutas's Scaloria papers and notes could be. A few years later, in 2002, Sitagroi was at last in the publisher's hands (Elster and Renfrew 2003) and I had located Dan Shimabuku and Shan Winn. I wrote to John Robb that I would commit if we could obtain Santo Tiné's cooperation. Together with John, who had consulted with his colleagues on the importance of a Scaloria publication, I first considered the idea of publishing an "as-is" aging report if we could find the data. We could not have known how widely scattered and limited was the documentation. The excavation of an excavation began.

Over a period of three years, we located drawings and photos with Dan Shimabuku in Manila, San Jose, and San Francisco; excavation slides with Shan Winn in Florida; the 1979 field catalogue, drawings, and photos with Linda Mount-Williams in Fallbrook, California; human skeletal remains with Robert Gilbert in Memphis, Tennessee (officially returned to Italy in 2010); the faunal report in Latin and Hungarian with the late Sándor Bökönyi's papers in Budapest; and Marija Gimbutas's Scaloria notes, correspondence, papers, slides, and drawings in the Marija Gimbutas-Joseph Campbell Archive at OPUS, Pacifica Graduate Institute, Montecito. All of these materials were added slowly to the banker's boxes with the original 1979 data on chipped stone tools that I compiled in 1980.

The year 2005 was decisive. Dr. Živile Gimbutas, Marija's daughter, arranged for the first of many visits to the Marija Gimbutas-Joseph Campbell Archive at Pacifica Graduate Institute, Montecito, where we examined Marija's Scaloria materials and were generously allowed to borrow them on long-term loan. It was also the year Robb contacted archaeologist Vincenzo Tiné, who kindly made the link for me with his parents, Fernanda and Santo Tiné.

The next year in Genoa, with Drs. Giorgio and Marilyn Buccellati, I met Professor Tiné, Signora Tiné, and Eugenia Isetti and was graciously welcomed to the Tiné home.[5] At this seminal meeting in 2006, I agreed

[4] E-mail from S. Skomal to E. Elster, May 11, 2007.

[5] Personal thanks to Profs. Marilyn Kelly-Buccellati and Giorgio Buccellati (Cotsen Institute of Archaeology, UCLA), both dear friends and informal facilitators at the two Genoa meetings in 2006 and 2008.

to initiate an effort, led by Santo Tiné together with Eugenia Isetti and John Robb, to publish the forgotten Scaloria excavations. We began to plan who to contact and involve, and how to begin. Soon after, Santo Tiné invited Dr. Antonella Traverso, then director of the IIAS (Istituto Italiano Archeologico Sperimentale), a close colleague of Eugenia's, a respected prehistorian and experienced excavator, to join the leadership of the "Save Scaloria" Project (SSP), and our team was complete.

In 2007, with Tiné involved, I applied for and was awarded a Cotsen Pilot Grant. Tiné contacted Dott. Giuseppe Andreassi, Soprintendente of the Soprintendenza Archeologica della Puglia (which includes the Museums of Taranto, Foggia, and the Castello of Manfredonia) and received permission for the many study trips by almost a dozen scholars to the Grotta itself and to the three museum storerooms, depots, and exhibit cases holding Scaloria materials. In March 2007, a crucial date, Tiné sent a detailed and strategic e-mail outlining what research was missing, needed, and necessary in order for Scaloria Cave to be published. He was correct, and the idea of an "as-is" publication was replaced by another to include newly commissioned studies by geologists, geomorphologists, ceramic technologists, bone and ground stone specialists, malacologists, pottery specialists, and more. The respect in which Santo Tiné was held was surely responsible for the collaboration that SSP received from many outstanding Italian scholars and the *soprintendenti* whose cooperation was essential. That, plus the energy and commitment of the leadership team (Elster, Isetti, Robb, and Traverso) produced the outstanding Italian, British, American, and Hungarian scholar-participants whose names appear in the table of contents.[56]

In 2007, the NEH announced a grant application deadline for collaborative work with scholars in diverse institutions in the United States and abroad. I applied, and Grant RZ-50924-08 was awarded in 2008. My budget included two editorial meetings (Genoa and Cambridge) and honoraria and support for the scientists and archaeologists to revisit (or visit for the first time) the data and/or the site.[7] Thus, over two dozen researchers were able to make nearly one hundred excursions for the sake of the project. The first editorial meeting in Genoa for all collaborators was superbly organized by Isetti and Traverso, no doubt with wise direction from Tiné and hosted by the University of Genoa and the IIAS with support from UCLA's Cotsen Institute of Archaeology and our NEH grant. Santo Tiné welcomed the attendees, although, sadly, Signora Tiné, known as an especially gifted ethnographer, had passed away the summer before. The second (and final) Scaloria editorial meeting was held in 2012 at Cambridge (Figure 1.2), organized by John Robb, and hosted by the Department of Archaeology, University of Cambridge, with support from the NEH grant.

In the spring of 2010, we were deeply saddened by the news that Santo Tiné had passed away. Of small comfort was that he knew Scaloria Cave would be published, as he had outlined in 2007 and with some augmentation, of which he would certainly have approved. In the end, we did not simply catalogue Scaloria's aging data, but put forward careful reevaluations and new analyses to take advantage of a new century's methodologies. Prof. Tiné's remarks at the Scaloria Day meeting in Genoa show both how the restudy program was already yielding results, and how deeply engaged Prof. Tiné remained in the Scaloria research, with a flexible

[6] Special mention must be made of Prof. László Bartosiewicz, who devoted many, many hours to a search for the late Sándor Bökönyi's faunal report. I personally had spent time with Sándor at the 1980 study season and knew that he had finished tabulating all the animal bones. Indeed, László, together with his graduate student, now Dr. Éva Ágnes Nygeres, translated the Hungarian, prepared a database, and wrote a thorough chapter analyzing the animals kept and hunted at Scaloria (Chapter 3.3).

[7] Tiné and Isetti searched in Genoa for pottery, photos, drawings, and documents, and in the depots, stores, and exhibit halls of the Museums of Manfredonia, Taranto, and Foggia for pottery and documentation; Mary Anne Tafuri visited the Museo di Manfredonia to search for human skeletal remains; Garibaldi, Pian, and Rossi searched for artifacts of bone, and ground stone; the 1978 chipped stone assemblage was sent to Cecilia Conati Barbaro at the Museo d'Origini, University of Rome; shells were sent to David Reese, Yale University; and Robb put together his team to look at the paleopathology and basic demography of the human bone remains, including Mary Anne Tafuri (Rome and Cambridge); Chris Knüsel (Exeter and Bordeaux), Tamsin O'Connell (Cambridge), and Ellon Souter and Paul Fullagar (North Carolina). Bartosiewicz and Nygeres reanalyzed Bökönyi's faunal data stored in Budapest and produced a new report; the cave was opened for John Robb and Chris Knüsel; for the geographers and geomorphologists; for Eugenia Isetti and Antonella Traverso; the Marija Gimbutas Archive was visited three times in Montecito by Ernestine S. Elster, Helle Girey, Živile Gimbutas, and Lyssa Stapleton; and Isetti and Traverso traveled to Trieste to interview Duda and Perotti of Trieste's E. Boegan Speleological Group.

Fig. 1.2. *Top, left to right:* Ernestine S. Elster, Eugenia Isetti, John Robb, Christopher Knüsel, and Donatella Pian. *Bottom, left to right*: Patrizia Garibaldi, Mary Anne Tafuri, Antonella Traverso, and Tamsin O'Connell.

intellect integrating new results. His remarks at the Scaloria Day meeting are included at the end of this chapter as an important historical source on the evolving interpretation of the site.

Using Legacy Data: "New Wine in Old Bottles"

Our goal was to take the aging data of a twentieth-century excavation and bring it up to date by using twenty-first-century scholarship and, if the data were missing, to fill the lacunae with the most appropriate twenty-first-century research. The process itself was interesting as an example of how old data and collections can be harnessed to new research questions.

In the process, we were all active on the Internet. When summarizing the history of SSP, I reviewed e-mails, now replacing correspondence of 1978–1979. The difficulties involved in gathering legacy daybooks, notes, drawings, and photos are problems that have always plagued excavators, editors, and publishers. Our task was complicated by the international nature of the effort and a race against time to contact some of the original investigators. Simple management plans were adjusted as time passed, by John Robb and myself, to keep track of what was expected, had arrived, been edited and returned, and so on from the authors. We used a file hosting service (Dropbox) to handle large files, including photos, and to transfer them to authors (and editors), be they local or overseas. The programs used by all the collaborators (Word, Excel, etc.) were commonly accessible but would not have been in 1978, 1979, or 1980, nor was the scanner that we used regularly when copying Marija Gimbutas's data from the OPUS archival records or scanning the 30-year-old slides from Shan Winn, Dan Shimabuku, Linda Mount-Williams, Nancy Bernard, and myself. Portfolio (Appendix 10 [online]), an image management program, was recommended to us by a data specialist for its robust search capability (thousands of images with keywords that included artifact types and subtypes, provenance, etc.). This volume has seven chapters and ten appendices—the culmination of a dozen years of effort.

At the outset, we recognized that Eugenia Isetti, who herself was a veteran of excavation seasons 1967, 1978 and 1979, should review the Scaloria Cave materials and available reports to provide a synthesis of its history and what is currently known about the cave (Chapter 2.1). The connected Occhiopinto cave and the history of its limited investigation, described by Nicoletta Bianchi, Eugenia Isetti, and Antonella Traverso (Chapter 2.2), reflects on the question of the contemporaneity of the cave system. Isetti and Traverso conducted interviews with Luigi Coppolecchia, Santo Tiné, Giulio Perotti, and S. Duda, all participants in the history of Scaloria research (Appendix 5 [online]) along with Davanzo's letter to Tiné (Appendix 6 [online]). Robb's report (Chapter 2.3) augments Isetti and Traverso's narratives above by including all the radiocarbon dates and synthesizing these with new calibrations on bone collagen. (It must be noted that "Mesolithic" is used in several chapters, but the relevant contexts have been redated to the Late Upper Paleolithic; see Chapter 2.3).

Chapter 3 provides information on the ancient cave, its formation and human use, and the many questions about the formation of the cave and of the archaeology inside and out. This material really is "new wine." Included are geological and geomorphological studies that provide information on climate such as the "drought at the end of the Middle Neolithic," on earth movements causing cave ceiling collapse, and with

micromorphology delivering evidence of hearths, domestic deposits, and more (Ivano Rellini et al., Chapter 3.1). A paleoenvironmental analysis, based on somewhat limited data, nevertheless identifies tree species and changes in the landscape over time (Girolamo Fiorentino and Cosimo D'Oronzo, Chapter 3.2). Also the late Sándor Bökönyi's considerable faunal data was located after an extensive search in the Institute of Archaeology, Budapest, by Lázló Bartosiewicz, who, with Éva Ágnes Nyerges (Chapter 3.3), undertook a thorough reanalysis. Furthermore, we add a report on the sensory landscape surrounding Scaloria Cave (Sue Hamilton, Mike Seager Thomas, and Ruth Whitehouse, Chapter 3.4) with Whitehouse's personal tribute to Santo Tiné; and a review of the evidence for cults and ritual in the context of the cave findings (Eugenia Isetti, Antonella Traverso, and Anna Maria Tunzi Sisto, Chapter 3.5).

Chapter 4, "The Cave's Occupants in Life and Death, presents a series of studies using the human skeletal remains by John Robb's team from Cambridge, Exeter, Rome, and North Carolina (John Robb, Mary Anne Tafuri, Tamsin O'Connell, Christopher Knüsel, Paul Fullagar, Ellon Souter, and Nunzia Libianchi). None of this research was entertained in 1978–1979 or 1980. The paleopathology and burial taphonomy required detailed examinations providing information on age and possible perimortem treatment (Chapters 4.1 and 4.4). Analysis of the ratios of stable isotopes revealed information on the diet of these long-gone folk (Chapter 4.2) and allowed inferences concerning their origins and movements on the Tavoliere (Chapter 4.3). Thus, Chapter 4 is an excellent example of how fresh questions and new technology and methodology expand the potential information to be gleaned from legacy data.

"New wine" brought Eugenia Isetti and Antonella Traverso to the archives and storerooms in the Museo Castello di Manfredonia and Museums of Taranto and Foggia time and again to locate, clean, sort, type, tabulate, weigh, draw, photograph, and re-bag pottery from both seasons of the excavations and from both the Upper and Lower Chambers. Their exhaustive research appears in Chapter 5, focused on pottery studies, typology, decoration, and distribution (Chapters 5.1 through 5.4). Marija Gimbutas's preliminary study of the Scaloria pottery (summarized and edited by Ernestine S. Elster, Chapter 5.5) includes her notes and drawings and offers the reader some insight into Gimbutas's approach to the Scaloria data, illustrating her interest in and enormous background to the Neolithic world of Old Europe (Appendix 4 [online]). Pottery samples were provided to Italo Muntoni and Giacamo Eramo for thin section and archaeometric studies, leading to discussion of clay sources and what this infers for the Scaloria potters (Italo Muntoni and Giacomo Eramo, Chapter 5.6). Chapter 5.7 presents an illustrated catalogue of Scaloria pottery collected in the 1930s by the Quagliati and Drago teams, long housed in the Taranto Museum, with an introduction by Mariantonia Gorgoglione (museum director), Eugenia Isetti, and Antonella Traverso.

Among the most ubiquitous artifacts recovered from prehistoric sites are chipped stones; the 1978 assemblage is reported by Cecilia Conati Barbaro (Chapter 6.1) and the 1979 corpus by Ernestine S. Elster (Chapter 6.2). Only the 1979 assemblage was available to examine during the 1980 study season in the Museo di Manfredonia; the 1978 assemblage was ultimately located in 2009 and then sent to Cecilia Conati Barbaro for study. These two accounts offer differing approaches but considerable information on raw material choices, manufacturing processes, and the quotidian use of chipped stone.

"Material culture" is further explored by studies of the tools and artifacts of bone and antler (Donatella Pian, Chapter 6.4); descriptions of polished and ground stone (Patrizia Garibaldi, Eugenia Isetti, I. Molinari, and Guido Rossi (Chapter 6.3); and that of shells (David S. Reese, Chapter 6.5). The bone tools were counted and carefully characterized, and their taxa identified to infer animal habitat and human behavior. Similarly, shell from marsh, sea, or stream environments provides ideas about collecting habits as well as an estimate of food value. The stone tools and their typologies reflect technology, trade and exchange, and use intensity. Tools of the Scaloria folk were in daily use, and their manufacture indicated that among the Neolithic group were specialists whose stone tools were skillfully produced. The raw material of the axes suggested that these Neolithic folk had an interest in a greenstone, and the manufacturing of chipped stone tools of flint demonstrated a link to prehistoric miners working that raw material on the Gargano Peninsula. To conclude the volume, we review the human use of the cave in all of its aspects (Robb et al., Chapter 7).

We have worked under the moral obligation incumbent on all archaeologists to publish what has been excavated. Perhaps that responsibility is even greater when the site is as significant as Scaloria Cave. Nevertheless, excavation is destruction, and without publication (electronic or otherwise) the research is lost. In

this instance, and because Scaloria Cave was excavated by UCLA and the University of Genoa so many decades ago, its approach in the 1970s typifies a joint archaeological project of its era. Thus, the SSP provides an opportunity to enter into the context of that time and even glimpse its historiography; indeed, the archaeological history of Scaloria Cave reveals a great diversity of archaeologies over some 80 years and several national traditions. To that end, not the least important feature of this publication is the historical documentation reproduced in the appendices. This includes the observations of many of the explorative teams who first ventured into the cave's depths. It is included both because it is the original and often the only record of important firsthand observations on the cave, and because it gives a sense of how each generation of archaeologists explored, observed, and understood the cave. A rich visual archive, hundreds of photographic images of 1978–1980, is also accessible (Appendix 10, Portfolio [online]). Although focused on a site worthy of excavation and publication in its own right, the longevity of the project enables Scaloria Cave to contribute not only to a better comprehension of the variability in European Neolithic life but to the history of archaeology as a discipline as well.

Riassunto

Questo capitolo illustra i retroscena e il contesto del progetto, i cui risultati sono presentati in questo volume. Il progetto è nato per salvare grotta Scaloria dall'oblio e raccogliere le attuali conoscenze sul sito.

Scaloria Cave fu scoperta per caso nel 1931; la parte superiore della grotta fu esplorata per la prima volta da Quagliati nello stesso anno. Nel 1967, Santo Tiné, all'epoca funzionario della Soprintendenza Archeologica di Foggia, esplorò insieme ad un gruppo di speleologi locali la parte inferiore della grotta, riconoscendovi un luogo di culto (Appendix 3; Tiné and Isetti 1975–1980). Questo volume pone l'attenzione sugli scavi condotti dall'Università di Genova e dall'Università di California-Los Angeles negli anni 1978–79.

Marija Gimbutas (1921–1994) è stata un'archeologa lituana formata in Germania che divenne un'eminente Professore di Preistoria europea presso l'Università di Harvard e in seguito presso l' Università di California-Los Angeles (UCLA), dopo aver condotto ampi ed importanti scavi a Obre in Bosnia, a Anzabegovo in Macedonia e a Sitagroi and Achilleion in Grecia.

Santo Tinè (1926–2010) è stato un archeologo siciliano che incontrò la Gimbutas durante il suo Master ad Harvard (1958–1961). Dal 1968 ha insegnato presso l' Università di Genova e ha condotto una serie di scavi innovativi in importanti siti del Sud Italia. Nel 1972, i due studiosi si incontrarono ad un convegno in Italia dove la Gimbutas fu messa al corrente del lavoro di Tiné su Grotta Scaloria e decisero di intraprendere lo scavo del sito insieme.

Gli scavi a Grotta Scaloria furono condotti negli anni 1978 e 1979; ad essi seguì una fase di studio nel 1980.

Nel 1978 lo scavo fu condotto all'esterno della grotta per rintracciare una sequenza stratigrafica e l'ingresso originale della grotta stessa, in un' area indicata dalla presenza di "crop marks", dall'analisi magnetometrica e da altri tipi di esplorazioni. Tre piccole trincee preliminari furono scavate all'interno nella camera superiore della grotta.

Durante gli scavi del 1979 furono aperte nella parte superiore della grotta le trincee 4–10.

Nel 1980 i materiali provenienti dagli scavi del 1979, furono studiati presso il Museo di Manfredonia. Benché questi studi non venissero pubblicati, sono inclusi in questo volume i risultati di queste ricerche che si trovano negli OPUS Archives del Pacifica Graduate Research Center, Montecito e nella banca dati del defunto Professor Sándor Bökönyi a Budapest.

La Gimbutas smise di lavorare alla grotta nel 1980: l'unica lavoro tra il 1980 e il 2006 è stato lo studio di Robb sulle ossa umane presso il Museo di Manfredonia (Robb 1991).

Dal 1998 in poi Elster cominciò a pensare come pubblicare gli scavi della Gimbutas e raccogliere i dati degli scavi provenienti dai vari archivi, sparsi fino a quel momento. I suoi sforzi durarono più di un decennio e inclusero ricerche dalla California, Tennessee, Florida, a Manfredonia e Taranto, fino a Singapore. Questo lavoro preliminare è continuato fino al 2012 quando il progetto trovò un cospicuo finanziamento da parte del National Endowment for the Humanities per lo studio successivo allo scavo e per i costi editoriali e di pubblicazione.

Eugenia Isetti and Antonella Traverso hanno condotto un lavoro faticoso mettendo insieme le collezioni dei vari musei italiani e gli studi dei colleghi italiani. Elster ha riunito tutti gli elementi, e Robb l'ha aiutata ad organizzare un gruppo di lavoro, coinvolgente americani, italiani e altre comunità archeologiche, così come un nuovo studio completo delle ossa umane.

I risultati di questo lavoro sono gli studi raccolti in questo libro.

Comments, Scaloria Day, Genoa, 2008

Dear colleagues and friends,

While I thank you again for accepting our invitation to discuss the state of our research and the results obtained from the various surveys at the site of Scaloria Cave, I must add my deepest apologies for my physical condition (no longer what it was when I descended twice a day into the depths of Scaloria Cave), which forces me to remove myself from the task, as listed in the program, of providing some conclusive observations on today's efforts, which I have found to be not just interesting, but also quite revealing of what the content of Scaloria must signify for our understanding of the sequence of Neolithic cultures of the Tavoliere, and of the Italian peninsula in general. Today's papers prompt some observations that I would like to relay to you with this letter of mine, in the hopes that they may be useful for the definitive edition of your contributions. As you know, the papers will then be sent to the Cotsen Institute at the University of California, Los Angeles, where our Ernestine Elster will oversee the final form of the publication. I will take this opportunity to thank Ernestine publicly for the energy and dedication she has given to this project. Without her enthusiasm, the publication of the excavations of Scaloria Cave would never have been realized.

Here are the observations to which I was referring: before the turmoil caused by the tremendous collapses at the end of the Neolithic, there must have been, in the vicinity of the original entrance to Scaloria, a stratified deposit that contained evidence of the constant occupation of this part of the cave during the Neolithic period. This sequence is confirmed by the study of the ceramics found there, starting with the work of Shan Winn and Dan Shimabuku, as well as the presentation by Gorgoglione of the assortment of pots collected by Quintino Quagliati and preserved at the Archaeological Museum of Taranto. I have just seen these ceramics for the first time today, albeit only in photos, as I had sought in vain to see them before leaving Puglia.

The existence of this stratification must be considered more than hypothetical and may be discovered if research is resumed in the area opened by Shan Winn. But this eventuality can only be verified in the future, and thus constitutes a publication for another time, when it may be possible to reconstruct the original layout of the entrance to Scaloria. Such verification could be significant, as the documentation of this stratification, for now only hypothesized, may come to represent an exceptional stratigraphic confirmation of what I surmised regarding the sequence of Neolithic cultures of the Tavoliere and the Italian peninsula upon the publication of the excavations of the Neolithic village of Passo di Corvo, and regarding the presence or absence of various ceramic styles discovered in the various surveys of the surface in the nearly one thousand villages that aerial photography has brought to light in the whole area of the Tavoliere.

We might also clarify the presence of ceramics typical of the Bronze Age, whether at Scaloria or at the nearby Occhiopinto, now evident from the data furnished by the Quagliati collections. I rather agree with John Robb regarding the mass burial identified by M. Gimbutas and Winn in 1979, the contents of which were studied on site by János Nemeskéri, who communicated to me the existence of at least twenty-four skeletons of young women, all with skulls that presented signs of cribra orbitalia at the rear of the orbit, symptoms of malarial pathology, which may be linked to the abandonment of the Tavoliere by the Neolithic populations in conjunction with the Tavoliere's dry climate, and their subsequent migration to the adjacent regions of Abruzzo, Basilicata, and Calabria. Now, in the light of all that John Robb proposes, it seems to me possible that that interpretation should be revised, and take into account the result of the unearthing of these tombs. This last reading is also in line with the fact that mass burial does not enter into the modalities of Neolithic populations, but is instead a concept that appears in the following Chalcolithic Age.

Finally, I would also like to thank, in your name, the Department of Classical Archaeology and Philology and Their Traditions, and the School of Specialization in Archaeology that has hosted us in this prestigious location.

Genoa, November 17, 2008
Santo Tiné

Cari colleghi e amici,

Mentre Vi ringrazio ancora per avere accolto il nostro invito a comunicare lo stato del nostro studio e i risultati conseguiti dalle varie ricerche nel sito della grotta Scaloria, Vi debbo aggiungere le mie più profonde scuse per essere costretto dal mio stato fisico (che non è più quello di quando scendevo anche due volte al giorno nel fondo della grotta Scaloria) a sottrarmi al mio compito che era quello previsto nel programma di accennare a qualche considerazione conclusiva sui lavori di questa giornata che per me è stata oltre che di grande interesse anche illuminante su quello che doveva significare il contenuto della Scaloria per la conoscenza della successione delle culture del Neolitico del Tavoliere e dell'Italia peninsulare in generale. I lavori di oggi mi hanno suggerito alcune considerazioni che vorrei comunicarVi con questa mia lettera nella speranza che esse possano riuscire utili in vista della redazione definitiva dei Vostri contributi. Come sapete, i lavori poi dovranno esser trasmessi al Cotsen Institute dell'Università di Los Angeles dove la nostra Ernestine Elster curerà la veste finale della pubblicazione. Colgo l'occasione per ringraziare pubblicamente Ernestine dell'energia e dedizione profusi in questo progetto. Senza il suo entusiasmo l'edizione degli scavi a Grotta Scaloria non avrebbe mai potuto esser realizzata.

Ed ecco le considerazioni cui accennavo: prima degli sconvolgimenti operati dai giganteschi crolli avvenuti alla fine del Neolitico, doveva esserci nei pressi dell'ingresso originario della Scaloria un deposito stratificato che conteneva testimonianza di tutta l'assidua frequentazione di questa parte della grotta durante il periodo Neolitico. Questa successione è confermata dallo studio fatto delle ceramiche trovate, a partire dal lavoro di Shan Winn e Dan Shimabuku e anche dalla presentazione a cura di Gorgoglione del complesso di vasi raccolti da Quintino Quagliati e conservati al Museo Archeologico di Taranto, ceramiche queste ultime, che ho oggi visto per la prima volta, sia pure solo in immagine in quanto io avevo cercato di visionarle invano prima di lasciare la Puglia.

L'esistenza di questa stratificazione è da considerarsi più che ipotetica e può essere ritrovata qualora si dovessero riprendere le ricerche proprio in prossimità di quel saggio aperto da Shan Winn. Ma questa eventualità potrà essere verificata solo in futuro e quindi costituire oggetto di pubblicazione in altra sede dove potrebbe esser possibile ricostruire quello che era l'assetto originario dell'ingresso della Scaloria. Tale verifica potrebbe esser significativa poichè la documentazione di questa stratificazione, per ora solo ipotizzata, verrebbe a costituire un'eccezzionale conferma stratigrafica a quanto avevo supposto a proposito della successione delle culture del Neolitico del Tavoliere e dell'Italia peninsulare in occasione della pubblicazione degli scavi del villaggio neolitico di Passo di Corvo e della presenza/assenza dei vari stili ceramici riscontrata nelle varie ricognizioni di superficie nei circa 1000 villaggi che la fotografia aerea aveva messo in evidenza in tutta l'area del Tavoliere.

Si potrebbe inoltre chiarire la presenza di ceramiche tipicamente dell'età del bronzo sia alla Scaloria sia nella vicina Occhiopinto, ora evidenti dai dati forniti dalle raccolte Quagliati. Sono invece d'accordo con John Robb per quanto riguarda quella sepoltura multipla che sarebbe stata identificata da M. Gimbutas e Winn nel 1979, il cui contenuto era stato studiato in posto da Janos Nemeskeri che mi aveva comunicato l'esistenza di almeno 24 scheletri di giovani donne tutte con crani che presentavano sul fondo delle orbite tracce di cribra orbitalia, simbolo di patologia malarica, ipotesi collegabile all'abbandono del Tavoliere da parte delle popolazioni neolitiche in concomitanza con un clima di siccità del Tavoliere e con il conseguente trasferimento in regioni limitrofe come l'Abruzzo, la Basilicata e la Calabria. Ora alla luce di quanto sostenuto da John Robb mi sembra possibile che quella interpretazione debba esser rivista e trattarsi invece del risultato di sconvolgimenti di parecchie tombe. Quest'ultima lettura per altro si accorda con il fatto che una sepoltura multipla non rientra nelle modalità delle popolazioni neolitiche ma piuttosto un concetto che si affermerà nella successiva età calcolitica. Vorrei infine anche a nome vostro ringraziare il Dipartimento di Archeologia e Filologia Classica e loro Tradizioni e la Scuola di Specializzazione in Archeologia che ci hanno ospitato in questa prestigiosa sede.

Genova, 17 novembre 2008
Santo Tiné

Chapter 2

Introduction to Scaloria Cave

2.1. Discovery and Explorations of the Cave, 1931–2013

By Eugenia Isetti

> *[A]long the road to Monte Scaloria the detonation of an explosive accidentally split open the rock between the outer wall and the ceiling of an unknown underground cave.* (Quagliati 1936:119)

Introduction

Scaloria Cave has a history of archaeological research and interpretation spanning more than 80 years. Primary documents on the cave are reproduced in full in the appendices, including Winn and Shimabuku 1980 (see Appendix 2 [online])[1] and Tiné and Isetti 1975 (see Appendix 3 [online]); the present chapter summarizes them here, both to present primary information on the cave and for historiographic purposes. It is only to be expected that many interpretations of the cave proposed by earlier researchers, while containing valuable first-hand information, reflect both the limited information available to them and the archaeological concepts of their time, and cannot be taken at face value today.

Discovery

This "unknown underground cave"—Grotta Scaloria, or Scaloria Cave—was discovered in 1931 during construction of the Apulian aqueduct to convey water from the southeastern coastal city of Manfredonia (Puglia) to the Gargano (Figure 2.1.1). The cave entry as it appears today (Figure 2.1.2) was unknown to local inhabitants because there was no visible opening, but a construction blast created a fissure at the intersection of the ceiling and a sidewall and revealed the cave. Quintino Quagliati, the Superintendent of Apulian Antiquities at the time, first investigated the underground cavern between September and November of the same year.

Quagliati Exploration

The cave was accessible only through an 80-cm opening (Figure 2.1.3). Due to interest in the archaeological deposit, Quagliati undertook a preliminary reconnaissance but postponed "the necessary exploration of the stratigraphic deposit" (Quagliati 1936:120) because of the difficult entrance. Unfortunately, due to Quagliati's untimely death from malaria in 1936, research was discontinued and the excavated materials he had collected were never fully published. The information available from this first exploration is his chapter, "Il cavernicolo di Via della Scaloria a Manfredonia," published posthumously in his *La Puglia Preistorica* (Quagliati 1936:119–144), in which he discusses excavations of the upper meter of the Upper Chamber sediments. The Lower Chamber was yet to be discovered (Figures 2.1.4 and 2.1.5).

[1] Appendices are available online at www.dig.ucla.edu.

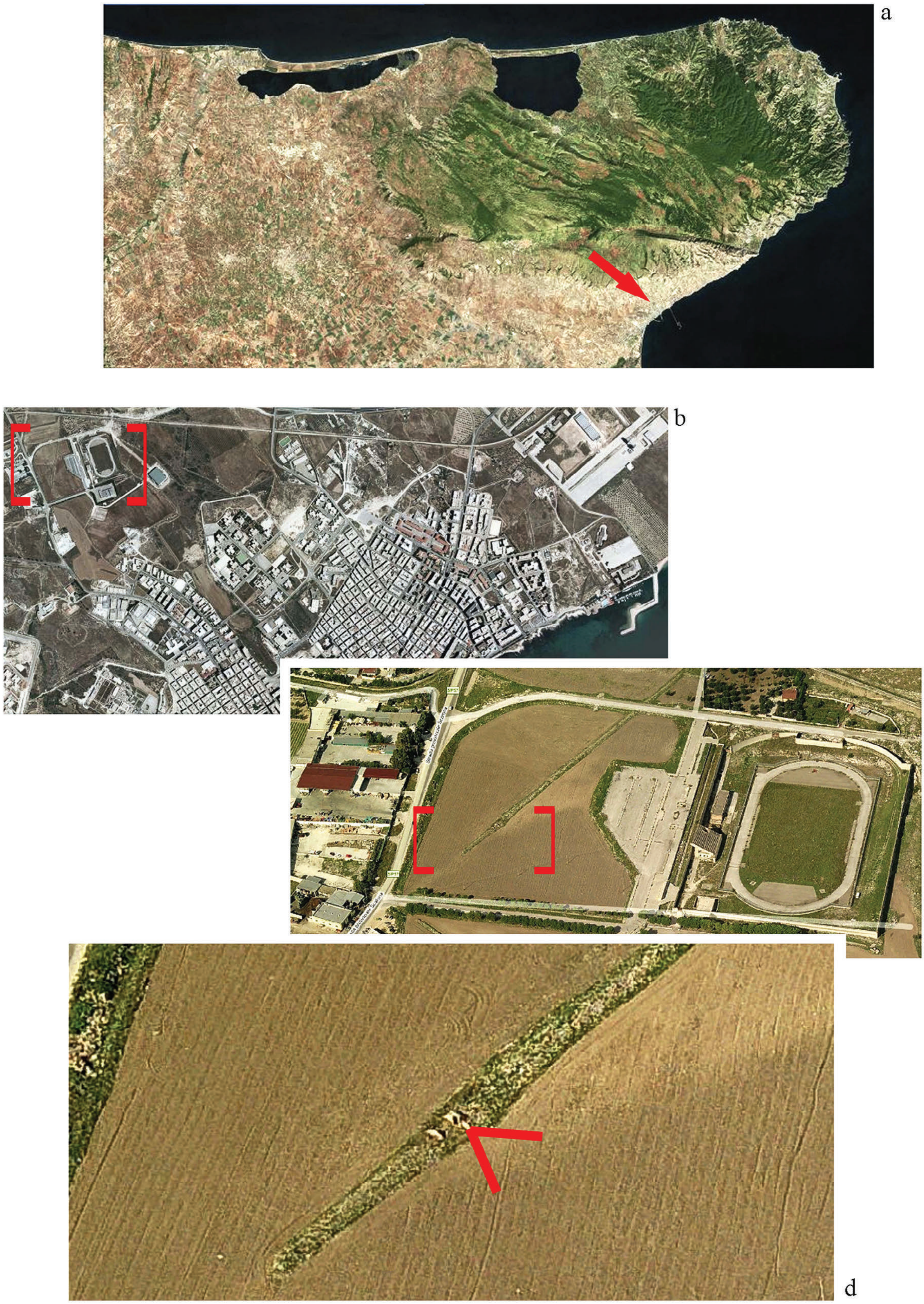


Fig. 2.1.1. Satellite views. (a) Gargano. (b) Manfredonia (Province of Foggia) and Grotta Scaloria area, aqueduct at left. (c, d) Aqueduct details.

Fig. 2.1.2. Current surroundings near Grotta Scaloria on outskirts of Manfredonia, with Gargano Mountains in background; aqueduct entrance with access underground, cave discovered by accident during construction of Apulian Aqueduct in 1931.

Fig. 2.1.3. Detail of cavern entrance beneath pipes.

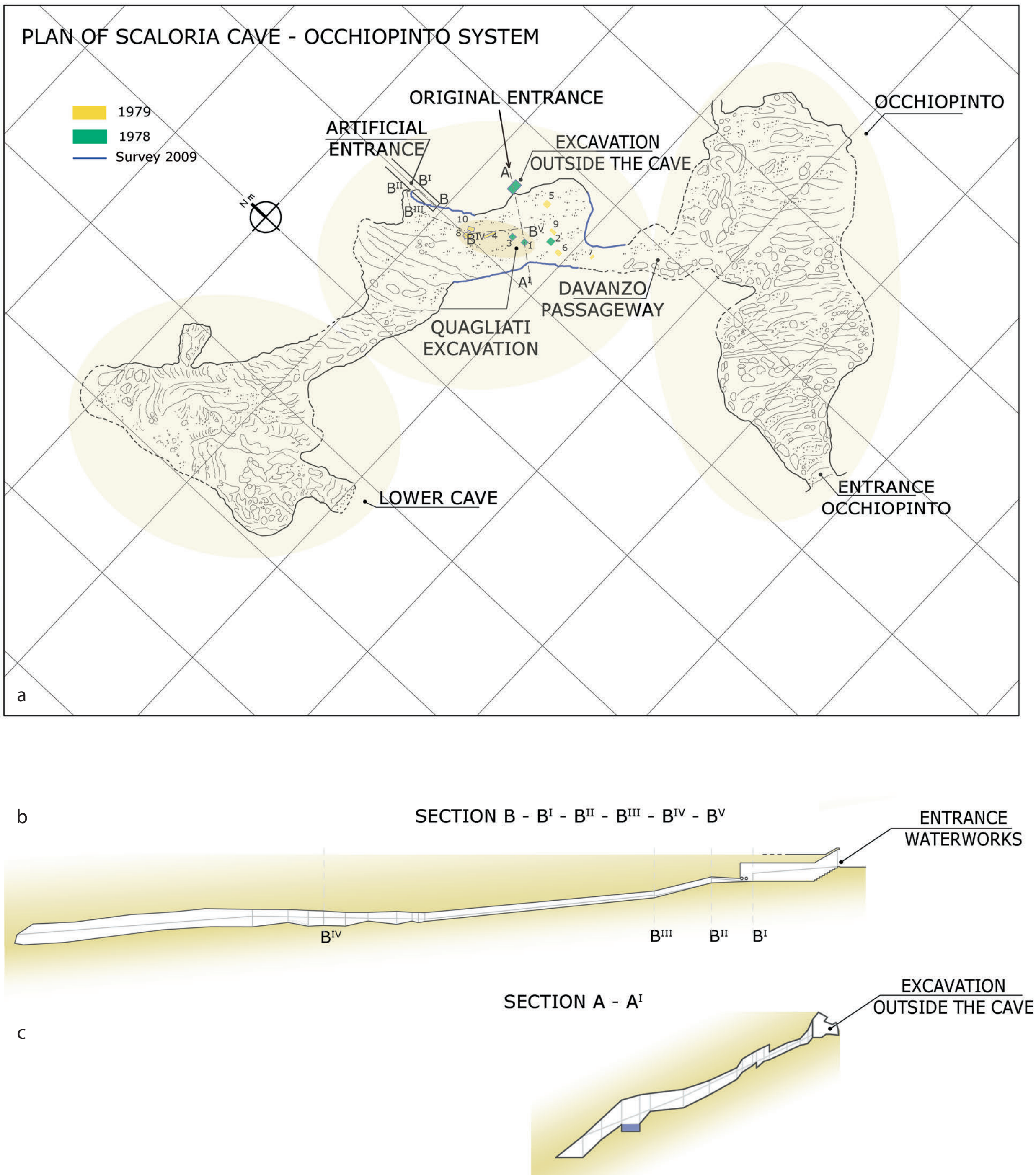


Fig. 2.1.4. Plan of Scaloria-Occhiopinto Cave complex. (a) Grotta Scaloria, Upper and Lower Chambers, with location of all excavation trenches and areas. (b, c) Grotta Scaloria section views.

Fig. 2.1.5. Grotta Scaloria today showing deposit inside Lower Chamber (photo by N. Leone).

Quagliati (Figure 2.1.6) described the great importance of the discovery[2] and wrote that the cave of Scaloria Road, as this outlying neighborhood of Manfredonia was named, was a very important monument of the cave-dwellers' life and funerary habits during the expansion of the Neolithic in this region. Quagliati inferred that the cave had been used as a living space and also for burying the dead in accordance with a ritual of tightly flexed burials. Quagliati wrote that the results of this first general reconnaissance of the cave, difficult to reach and completely dark, were very important from a paleoethnological point of view because of the abundance and variety of flint tools, polished stones, bones, and pottery, mostly related to all phases of the Neolithic as well as the Early Bronze Age (Figure 2.1.7a–c). Quagliati recognized numerous human bone fragments and reported evidence of many burials in the deposit. One undisturbed, tightly flexed burial was discovered "in a place where the rock goes up at about a meter at its top" (Quagliati 1936:143). Considerable lithic debitage led him to speculate that the cave was used as a workshop for lithic tool production from the Early Neolithic to the beginning of the Eneolithic. Unfortunately, we cannot reconstruct the original stratigraphic position of the materials (for Scaloria ceramics archived in the Taranto Museum, see Chapter 5.7) because, as is often the case with aging excavation projects, Quagliati's excavation notes have yet to be located.

[2] "La grotta di 'Via della Scaloria,' come si intitola la contrada, è di eccezionale importanza quale monumento della vita e del costume funerario del troglodita garganico nel pieno sviluppo della età neolitica. Fu usata per abitazione ed anche per seppellirvi i defunti col rito del rannicchiamento. I risultati di una prima ricognizione generale dell'antro, difficile a praticarsi e interamente buio, [non essendosi ancora trovato l'ingresso naturale,] sono del più alto valore paletnologico per ricchezza e tipi dei manufatti di piromaca, di pietre dure, di osso e di argilla" (Quagliati 1936:119–120).

Fig. 2.1.6. Quintino Quagliati, the first cave explorer in the 1930s (Soprintendenza della Puglia Archives).

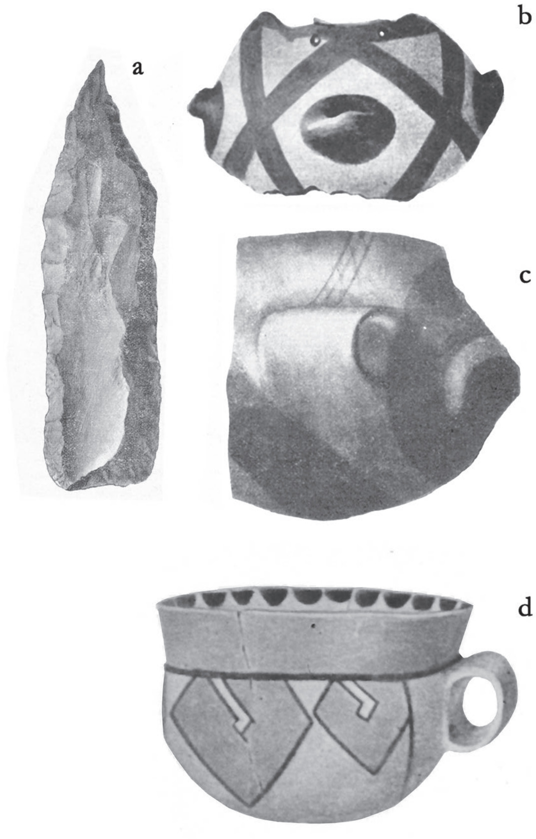


Fig. 2.1.7. (a–c) Selected sketches of ceramic and lithic finds from Quagliati collection; from *La Puglia Preistorica*, 1936. (d) Painted pottery named by Rellini "Upper Scaloria Style," in his publication "La più antica ceramica dipinta," 1934.

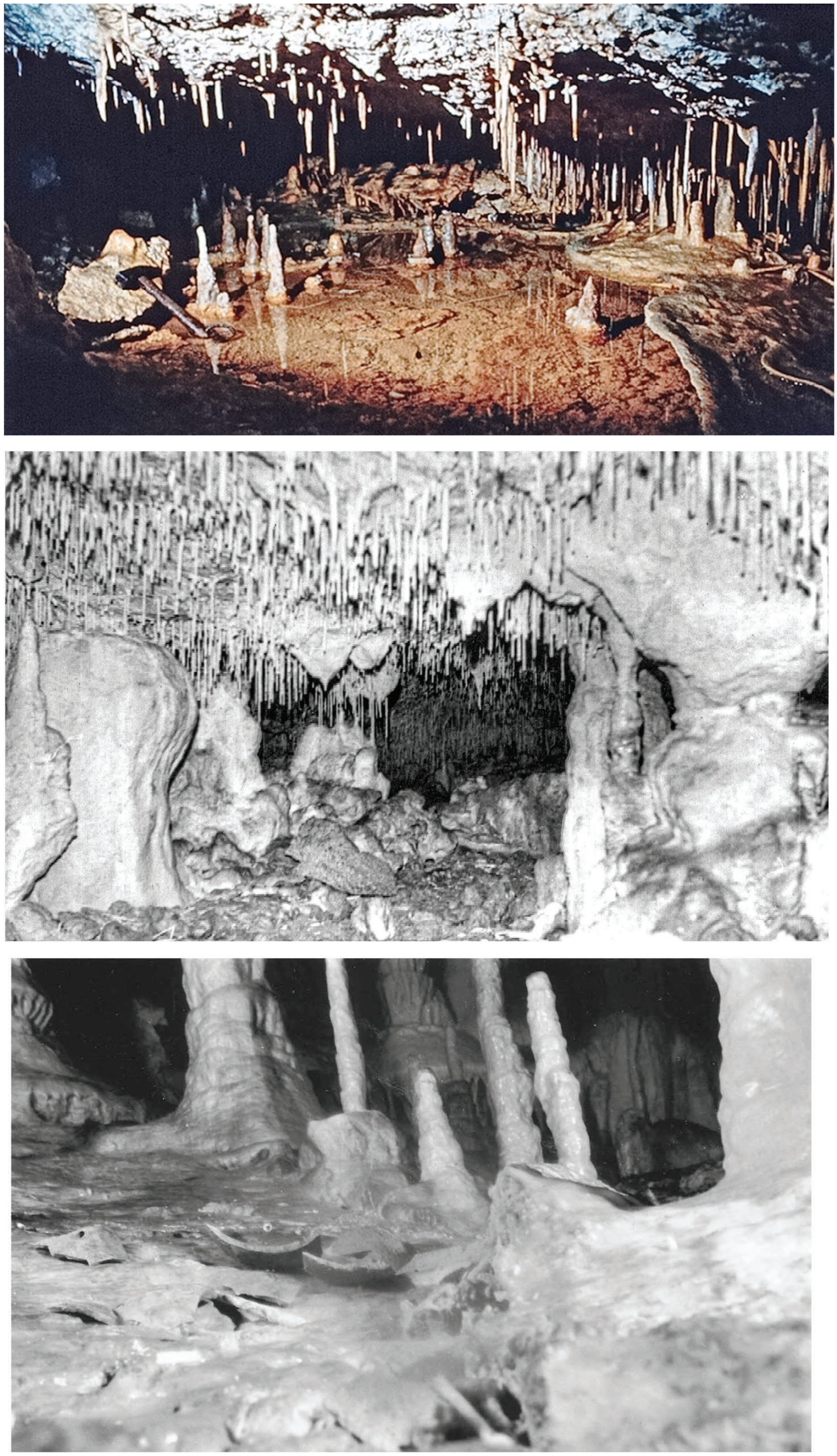
Ugo Rellini, who studied Quagliati's materials (Rellini 1934:75–80), described the bichrome (red and black) style of pottery, typified by a line with parallel bands of contrasting color, a style now referred to as "Upper Scaloria" (Scaloria Alta) (Figure 2.1.7d). A later reconnaissance, lasting a few days, was undertaken in 1936 by Ciro Drago, the subsequent superintendent of Apulian Antiquities, who collected additional materials (see Chapter 5.7) and burial remains in the same area where Quagliati had excavated.

Interest in the cave was renewed in the 1960s when several young amateur cavers discovered a passageway, large enough for a man to crawl through, leading to Scaloria's Lower Chamber (Figure 2.1.8a–c).

DISCOVERY OF THE LOWER CHAMBER

In September 1967, young members of a local caving group reported a discovery to Santo Tiné of the Apulian Archaeological Superintendency's Foggia Office. Their explorations had led them to the Lower Chamber in Scaloria Cave, and, during their frequent surveys, they observed several prehistoric vessels (a few of which they moved). Tiné assessed the find as exceptional and organized the systematic exploration of this deepest part of the cave. He included the young discoverers along with highly professional speleologists, the E. Boegan Speleological Group from Trieste (with whom he had previously worked in Sicily), in his efforts to map the upper and lower parts of the cave (Figure 2.1.9a, b). In addition, with the cavers' help, Tiné tried to reconstruct the group of vessels the young explorers had discovered and soon realized that most of the vessels were still in place, either concreted on the rocky floor or amalgamated into the stalagmitic formations.

Vessels were located in different parts of the Lower Chamber, but their maximum concentration lay at the end of it, especially in a flat area at the center of which was cut a small, rectangular basin (90 × 50 × 15 cm) still collecting the dripping waters from the roof (Figure 2.1.10a–c). Close to the basin, there was a large hearth with partially burned animal bones. Tiné interpreted the find as the remains of a meal and was convinced that a Neolithic population had frequented this



a

b

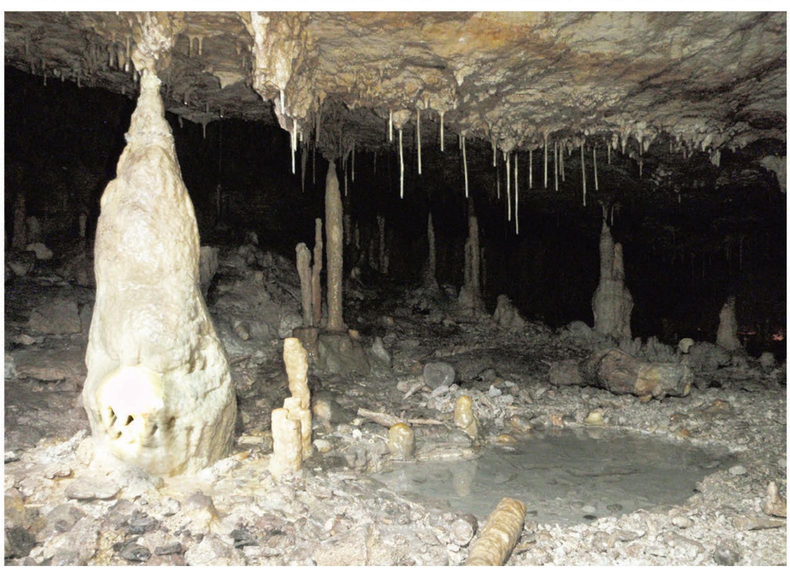
c

Fig. 2.1.8. 1967. The Lower Chamber. (a) View of chamber from passage. (b) View of passage. (c) View of floor with broken pottery (from archives of S. Tiné, photo by E. Davanzo).

Fig. 2.1.9. (a) Map of the Scaloria Cave system. (b) Enlargement of the Lower Chamber (the area circled in red in [a] above). The numbers in the circles represent individual pot locations, but do not link with the Scaloria pottery inventory in the Taranto Museum (see Chapter 5.7).

a

b

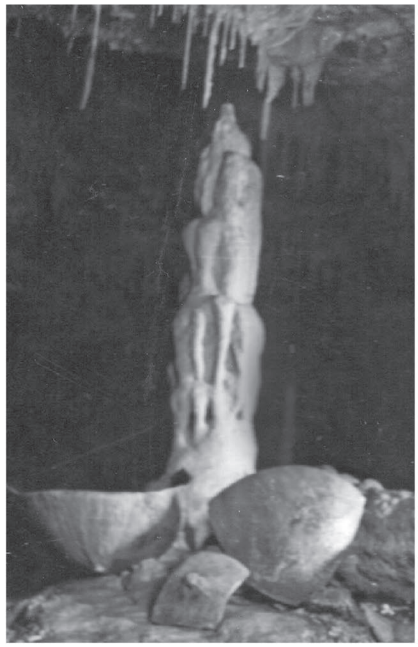


c

Fig. 2.1.10. 1967. (a) Lower cave passage, view of flat area with basin set in rock (archives of S. Tiné, photo by E. Davanzo). (b) Basin collecting water, located in a central position relative to ritual vessels found in association with it (archives of S. Tiné, photo by E. Davanzo). (c) Basin as it appeared in 2008 (photo by N. Leone).

part of the cave. Charcoal collected from the hearth was radiocarbon dated to 5480 BP ± 70 or 3530 BCE (Rome, R-349: Alessio et al. 1969:485).

Tiné noted that vessel groups were often placed around a stalagmite broken in antiquity, the tip of which lay discarded on the floor of the cave (Figure 2.1.11b). A vessel was then placed on the broken stump, where water would have dripped into it. A new stalagmite eventually formed in the bowl, probably after that part of the cave had been abandoned (Figure 2.1.12c). The



a

b

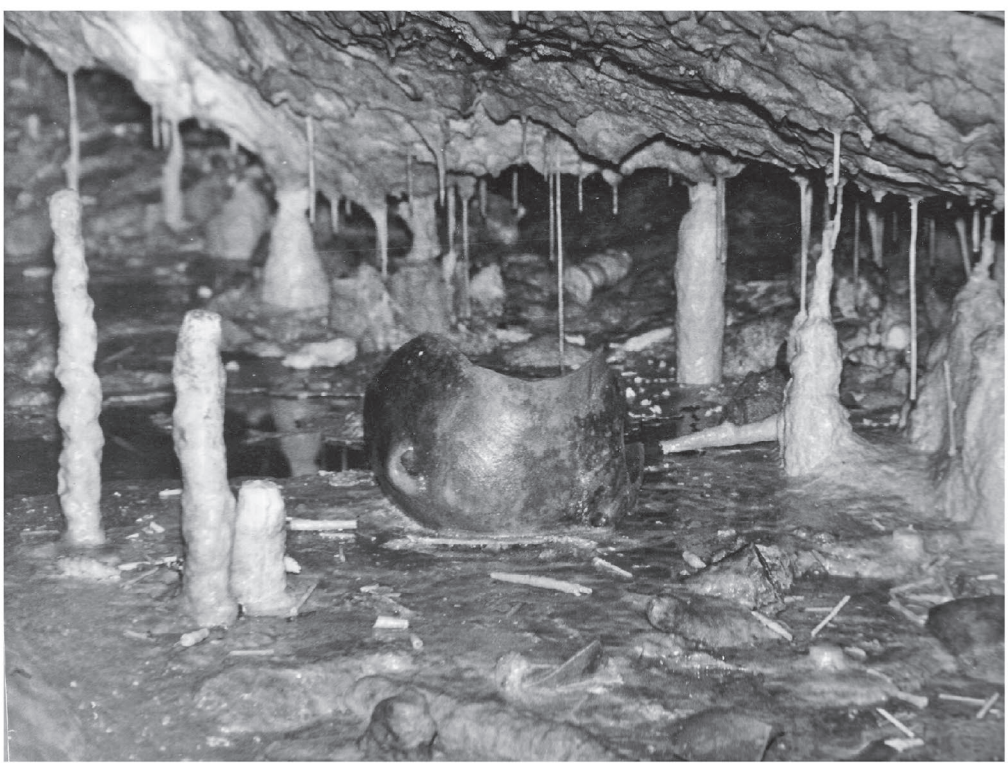


Fig. 2.1.11. 1967. Lower Chamber. "Water cult" details: (a) Pottery vessels beside broken stalagmite. (b) Vessel embedded in stalagmitic deposit (archives of S. Tiné, photo by E. Davanzo).

remaining vessels of the group were found within a distance of 2 m, often broken and scattered around the stalagmite stump (Figure 2.1.12a, b). When found embedded in stalagmitic deposit, as was often the case, fragments indicated the original shape and position of the vessels (Figure 2.1.11b). Although some fragments had been moved, perhaps by the cave explorers, there was no doubt that three or four more vessels had been

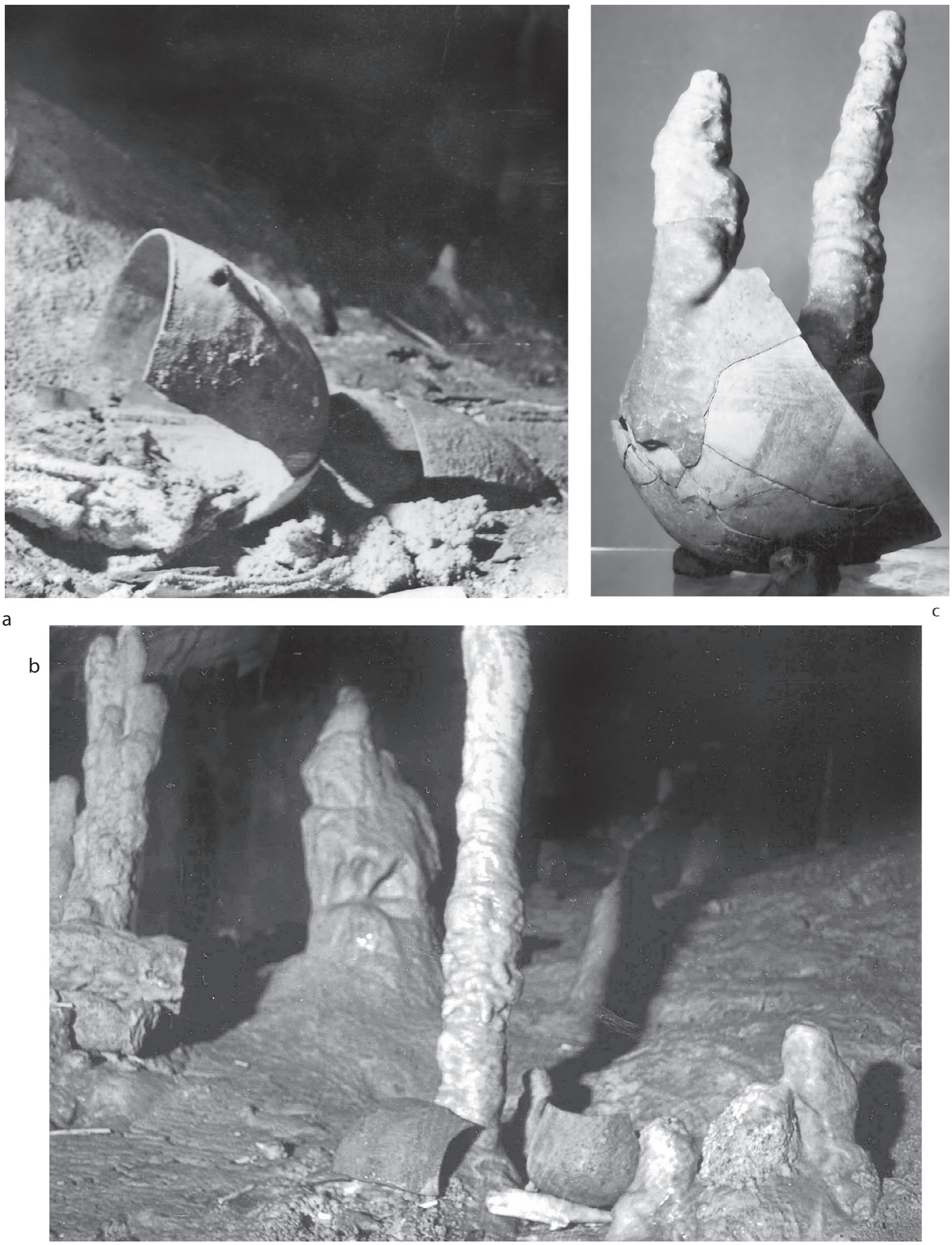
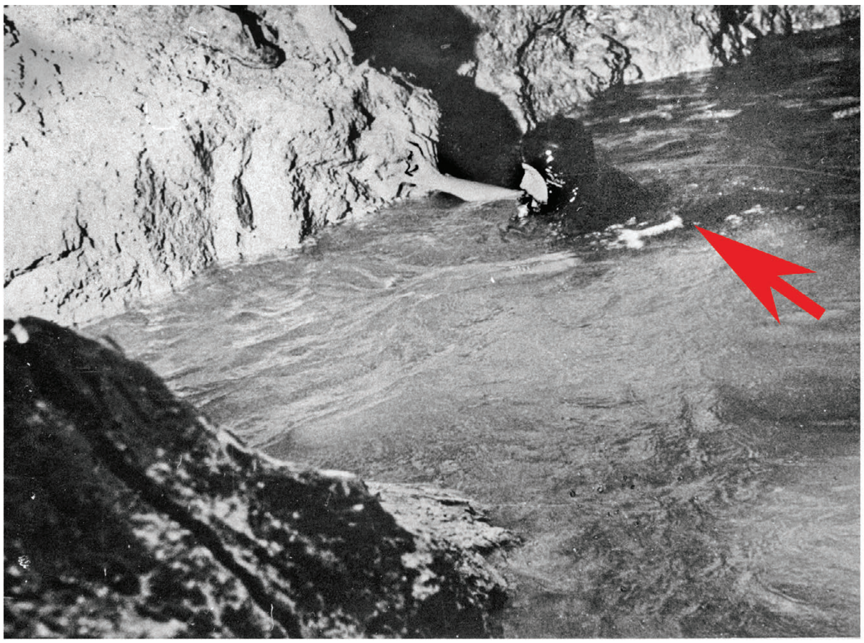


Fig. 2.1.12. 1967. Lower cave passages and Lower Chamber, "water cult" details. (a) Sample of vessels embedded in stalagmitic deposit. (b) Vessels placed next to stalagmite. (c) Vessel with a newly formed stalagmite (archives of S. Tiné, photo by E. Davanzo).

set on the rocky floor, around the vessel found on the stump. The stalagmite/vessel groupings along the gallery and on the bottom of the cave prompted Tiné to posit the existence of a Neolithic religious ritual linked to a cult of water.

Tiné commissioned a plan of the cave, in which over three dozen groups of whole and fragmentary vessels were located in different parts of the gallery, and completed the related photographic documentation. Much attention was given to ascertaining a possible relationship between the ritual groups of vessels and the pools (*laghetti*) in the Lower Chamber. Although divers explored the circular pool of clear water at the bottom of the cave, they found nothing of interest (Figure 2.1.13a, b). The evidence of possible Neolithic activity found closest to the lakes was a human skeleton, found in a ravine, seemingly seated with legs outstretched, within approximately 15 m of



a

b

Fig. 2.1.13. 1967. (a) Diver exploring natural pool of water, approximately 3 m deep, in lower part of cave (archives of S. Tiné). (b) One of the lakes today (photo by N. Leone).

the largest pool. One of its femurs seems to have been broken. Tiné inferred that he or she may have been the victim of an accident, and perhaps this injury prevented him/her from crawling through the difficult passages to the Upper Chamber (Figure 2.1.14). (See Chapter 3.5 for further critical discussion of these remains.) In 1978, a human mandible was found next to the basin (Figure 2.1.15), possibly an intentional deposit and in marked contrast to the "accident victim."

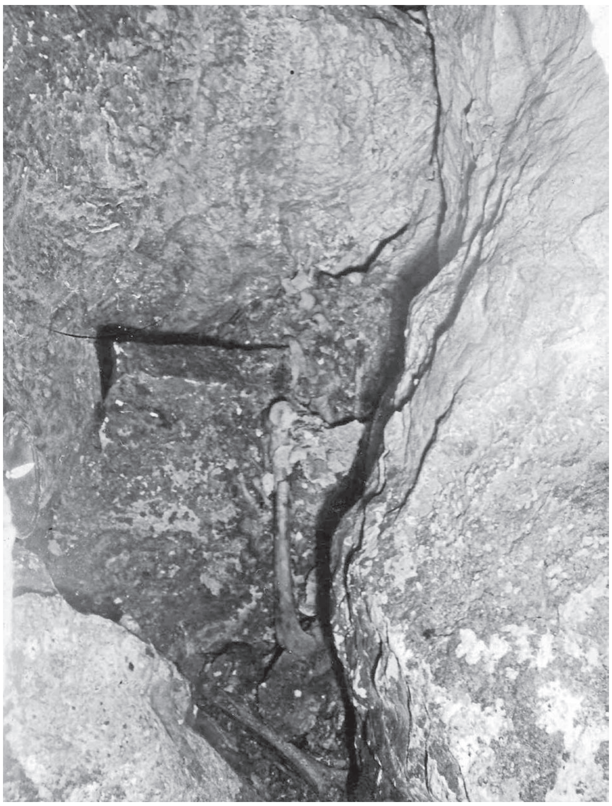


Fig. 2.1.14. 1967. Skeletal remains found close to lake on cave bottom (archives of S. Tiné, photo by E. Davanzo).

Although Quagliati collected various styles of pottery from the Upper Chamber, the Lower Chamber yielded only one type, from a single phase. These vessels have a red band bordered by black motifs, quite distinct from the Upper Scaloria style, and dubbed "Lower Scaloria" (Scaloria Bassa) by Tiné (1972, 1975).[3] Because all these vessels belong to a fine class of period pottery, the painted "figulina ware," Tiné was prompted to link them with ritual. The few artifacts seemingly without color could originally have had the red band decoration, later covered by the stalagtitic calcareous concretion.

In his analysis, Tiné (1975) made the following observations and conclusions:

> The consistent utilization of the finest pottery precluded an exclusively functional use of the vessels (to collect water), even if the water had been considered healthy or purified.

[3] This technique has been named the "canceled technique" (Tiné 1972), but after the discovery of Catignano village in Abruzzo, where it is widely represented, it was termed "reserved technique" (Pitti and Tozzi 1976) and has been confirmed experimentally. Animal fat is applied to the surface of the vessel in areas that will not receive coloring. Later, the entire area to be decorated is covered with black pigment. The underlying fat combusts during the firing phase, revealing the underlying and uncolored surface of the vessel. The final decoration is that reserved earlier by the fat layer, hence the terms "canceled," "negative," or "reserved" decoration (Tiné 1972, 1975).

Fig. 2.1.15. Ritual deposition of human skeletal remains near basin (photo by S. Winn).

> The ritual pottery groupings were concentrated solely in areas with dripping water where stalagmites (approximately 1 m in height, with bases about 20 cm in diameter) had developed.
>
> The only pool ("lake") that existed when the cave was in use was approximately 3 m deep and did not contain any artifacts. If it was kept pristine because it was sacred, perhaps the small, rectangular basin may have served as a reflection of it and an acceptable location for ceremonial activity.
>
> The stylistic similarity of the vessels, the presence of only one hearth, and the limited amount of charred animal bone (possibly the remains of a ritual meal) indicated a short occupation.

There may have been a connection between the cave's proposed water cult and the exceptionally poor climatic conditions in the Tavoliere at the time Tiné inferred that the Lower Cave was in use, around the middle of the fourth millennium BCE, which resulted in the region's abandonment (for a more recent view of chronology, see this volume, Robb, Chapter 2.3; and for the environment, Rellini et al., Chapter 3.1, and Fiorentino et al., Chapter 3.2).

Tiné concluded that the upper part of the cave was used as a cemetery during the Middle Neolithic phase, Scaloria IVb (Tiné 1975), based on these observations:

1. The height of the vault was inadequate for a living space, allowing movement inside only by crawling.
2. The vessels collected by Quagliati were whole and perfectly preserved.
3. A flexed skeleton was found in situ in a pit (left by Quagliati).

To preserve the context of materials in the Lower Chamber area, Tiné collected only the vessels that could easily be removed while still preserving the unity of the ritual groups (31 vessels in this first phase). These groups were noted in the survey. The intention was to bring the vessels back together later, either in situ or in the museum. Sadly, the vessels left in situ were stolen sometime before 1975 by *tombaroli* (grave robbers). In the plan view of the Upper and Lower Chambers of the cave (created by the E. Boegan Speleological Group, Figure 2.1.9a, b), the vessel groups are numbered in small circles from 1 to 40, starting at the bottom of the cave. However, this pottery (see Chapter 5.7) has lost these numbers but still can be linked to the main areas of the cave: Diaclasi, Gallery toward small lake, Crossroad, Basin, and Lower Chamber.

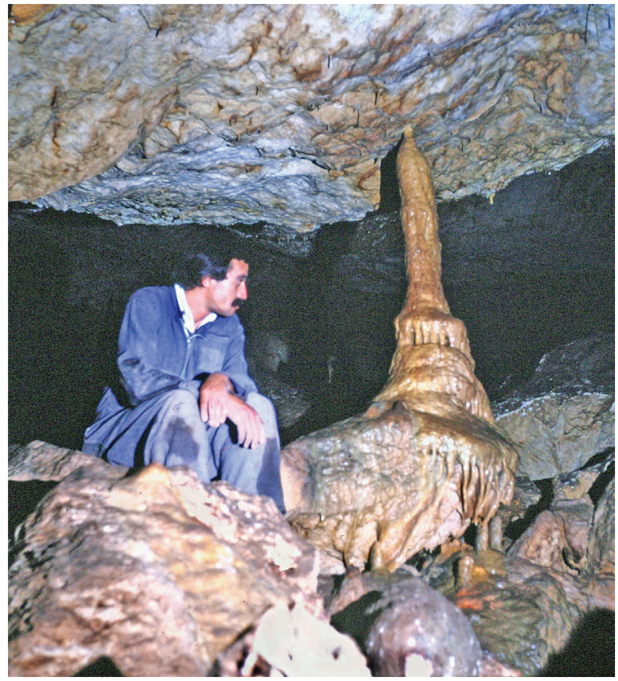


Fig. 2.1.16. 1978. Nicola Leone at bottom of Lower Chamber (photo by S. Winn).

Subsequently, in 1973, on the southwest side of the Upper Chamber, Luigi Coppolecchia, of the local speleological group, discovered another passageway leading to the deepest part of the neighboring Occhiopinto Cave. Since then, Coppolecchia and Nicola Leone have been involved in cave maintenance and in supporting related research (Figure 2.1.16). Geomorphological investigations and the 2007 survey made clear that Scaloria and Occhiopinto belonged to a single underground system but appeared separate due to collapse of the vault (Figure 2.1.4). For a report on the explorations of Occhiopinto, see this volume, Chapter 2.2.

Excavations by the University of Genoa and the Cotsen Institute of Archaeology at UCLA

Systematic excavations at Scaloria Cave were undertaken in 1978 and 1979 by Santo Tiné (University of Genoa) and Marija Gimbutas (University of California at Los Angeles) in a joint project entitled "The Neolithic of Southeast Italy." This project was launched with James Mallory's work at the Tavoliere village site, Lagnano da Piede (Mallory 1989). Gimbutas initiated

the Scaloria Cave excavations in summer 1978, directed in the field by Shan Winn (University of Southern Mississippi) and assisted by Daniel Shimabuku (then at UCLA). The excavations closed after a second season of intensive fieldwork in 1979, followed in 1980 by a study season in the museum in Manfredonia. Shortly thereafter, a preliminary report of the 1978 findings appeared (Winn and Shimabuku 1980; Appendix 2 [online]).

Excavations in 1978

Information regarding the 1978 field season relies on generous quotes from Winn and Shimabuku's preliminary report (1980), summarized below, and the author's (E. Isetti) firsthand knowledge as a member of the excavation team. To this is added the published radiocarbon determinations, references, and excavators' comments that accompanied the samples. Excavations began at the surface, outside the cave.

This summary reflects the situation as viewed by Winn and Shimabuku following their excavations in 1978. While their excavations were carefully conducted and analyzed, in several places further information has led to a reassessment of some of their views since that time, and this summary should be viewed as a historically situated interpretation.

Outside the Cave

As noted previously, Tiné interpreted the cave as a cemetery and location for ritual, based on his earlier research (1975). To discover whether occupation levels and archaeological materials associated with the original entrance could be located and correlated to undisturbed interior deposits, initial research in 1978 concentrated on the cave's exterior.

One important goal of the 1978 excavation was to find the cave's original entrance. Based on Tiné's 1967 plan, as well as some preliminary survey, research, and analysis, the excavators hypothesized a probable location close to the entry created by the water system. They hoped that by reopening the original entrance, the archaeologists would have easier access than that provided by the small fissures below the aqueduct pipes. A magnetometer study performed by the Lerici Foundation revealed a pronounced anomaly "about 10 meters wide and 20 meters long," centered in the proposed location of the original entry. A 4×6–m trench was opened, divided into contiguous 2×2–m squares (Figure 2.1.17a, b). Excavation was conducted in 10-cm arbitrary levels. Later, the excavation area was divided into halves, and reduced further, after the first 20-cm deposit, in order to reach the rocky bottom. Only two areas could be continued, eventually reaching a depth of 2.4 m and terminating in large boulders, which were interpreted as a roof collapse that may have closed the cave's opening.

The sedimentary sequence for the deposits outside the cave was divided into three strata, as follows:

- The upper stratum (Figure 2.1.18a), Stratum III, began with 60 cm of sterile deposit followed by 40 cm of deposits (levels 7 to 10 in the 10-cm spits employed during the excavation) that contained small, tumbled, and heavily encrusted ceramic sherds, likely a result of material washed in towards the cave's entrance.
- The middle stratum, Stratum II (levels 11 to 15, a total thickness of 50 cm), contained dark soil, including ash and stones. There were numerous ceramic sherds, lithics, and, for the first time, large animal bones. This loose stratum may represent an intentional deposition, possibly after a collapse of the cave wall or as the cave was abandoned over time.
- The lowest stratum, Stratum I (including levels 16 to 19, a total thickness of 40 cm, and levels 20 to 24, a total thickness of 50 cm and much the same as levels 16 to 19 except for the presence of huge boulders), contained numerous large sherds, long lithic blades, large animal bones, as well as querns, pounders, and wattle-and-daub rubble (Figure 2.1.18b). Thus, Stratum I contains clear habitation debris and should be correlated with the rock- and earth-filled occupation debris found in the interior of the cave and related to the Lower Scaloria phase—that is, contemporary with the ritual use of the Lower Chamber.

Inside the Cave

Three trenches, numbered 1, 2, and 3 (each 2×2 m), were opened inside the cave near the closed entrance in order to establish a stratigraphic relationship between the inside and outside (Figures 2.1.4a, 2.1.5).

The deposit inside was approximately 1 m thick; it had been disturbed by extensive looting in the cemetery area and also by some material washing away as a result of an incline in the substratum. Despite these problems, the 1978 trench excavations confirmed the use of the area as a cemetery during the final period of cave occupation, before a collapse sealed the cave entrance. Many scattered human bones were recovered, in addition to a simple pit burial containing a tightly flexed human skeleton. Further evidence of ritual was

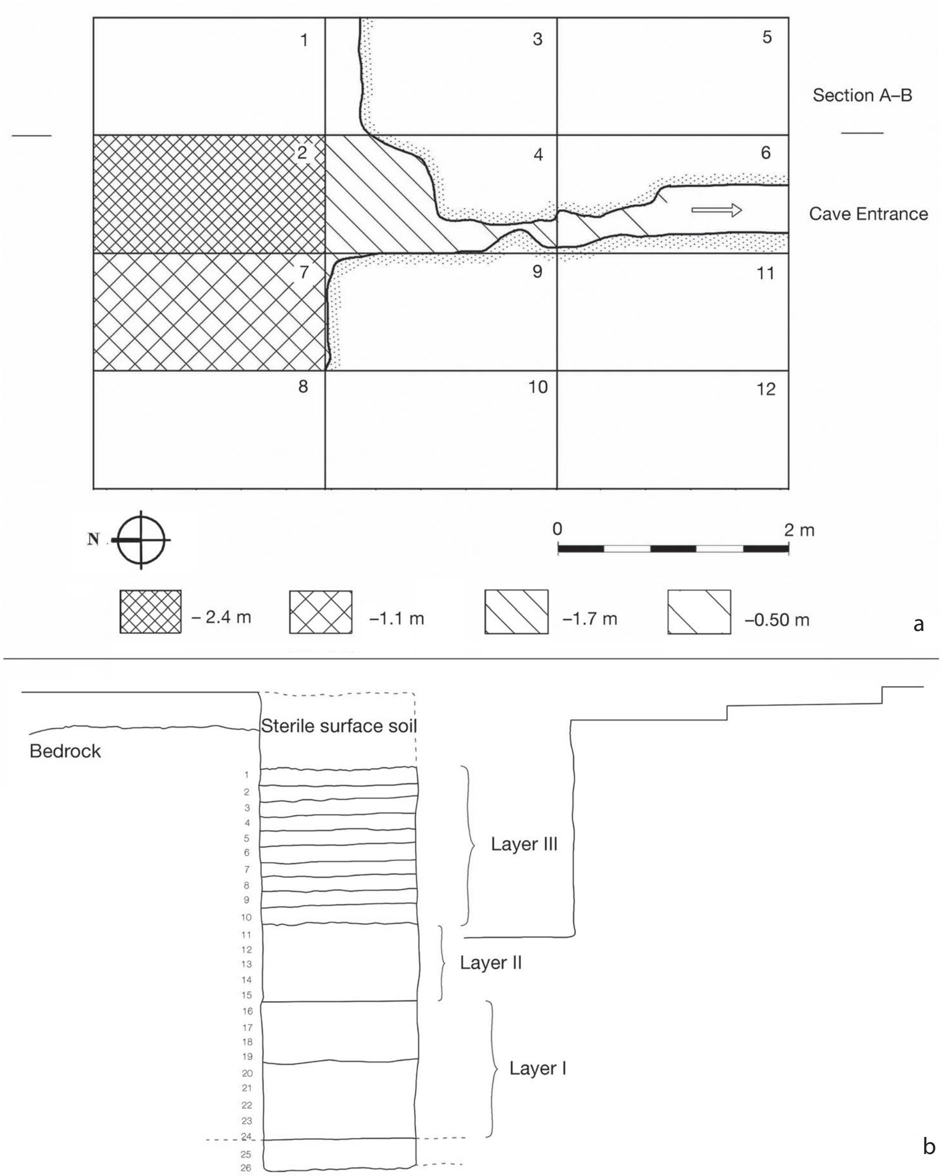


Fig. 2.1.17. Reconstruction of excavation outside cave. (a) Plan. (b) Section (based on Winn and Shimabuku excavation report).

discovered in the form of animal vertebrae and tools deposited in small cavities bordered by flat stones. The principal finds in each trench are noted below.

Trench 1: Trench 1 was positioned where a human skull was found exposed by water action (Figure 2.1.19). Quantitative analysis of the pottery from this trench (Winn and Shimabuku 1980:8) determined that Upper Scaloria pottery was found in the uppermost layers, while Masseria la Quercia and Passo di Corvo types were found in the middle levels; the deepest level produced a preponderance of impresso sherds. Winn and Shimabuku wrote:

> However, the stratigraphic context of the skull is uncertain because no pottery was found associated with it. The skull was in a strange position at one end of a rectangular tomblike trench in the bedrock. Although probably a natural formation, this tomblike trench could have been intentionally selected as a suitable burial place; curiously, no other bones were found in it. An

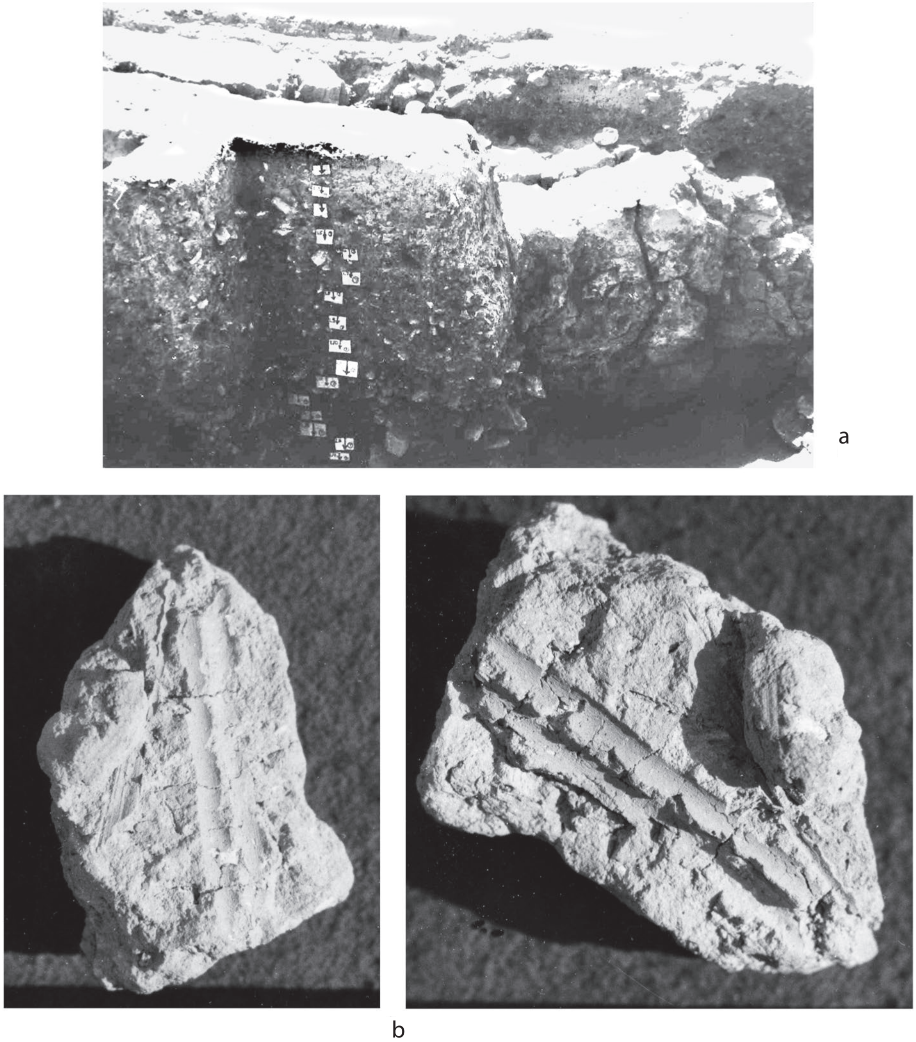


Fig. 2.1.18. 1978. (a) Excavation outside cave: Area 2 stratigraphic section at left, rock wall of cave at right (from Winn and Shimabuku 1980; photo by S. Winn). (b) Wattle-and-daub building rubble (two views).

> alternative explanation is that the skull is all that remains of a burial placed in a pit which has been washed away by the adjacent channel. The skull might have been washed out of some burial on the upper slope (the cemetery area is located on a notable incline).

Long, fragile, tubular shells, found on the skull itself, indicate that it was undisturbed for a time. In addition, charring on the shells suggests a funerary rite. Charcoal collected around the skull produced radiocarbon dates corresponding to the second half of the sixth millennium BCE. From the [LJ-4651] radiocarbon report, "charcoal on and around the skull yielded a date of 6,490 ± 140 BP [LJ-4650]; charcoal from the vicinity of the skull gave a date of 6,330 ± 90 BP" (Linick 1984:99) (see Robb, Chapter 2.3, for calibration of these dates). Winn and Shimabuku (1980:9) wrote:

> Over the right temporal bone was placed a dark-colored flint blade, a well-made type commonly found at Neolithic village sites of the Tavoliere. The skull, tentatively determined to be that of a female, was cradled by stones.

Near the skull was a small circular pit with hundreds of tubular shells and figulina ware. However, the pit was in a level sealed by mud deposits and not associated with the skull. None of these shells were found in trench 2 or 3. Scattered human mandibles

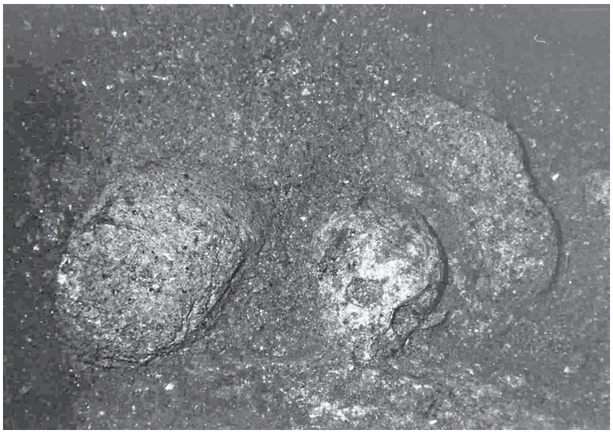


Fig. 2.1.19. 1978. Trench 1 excavation inside cave: human skull, bordered by stones.

were found in trench 1 (and in trench 2) together with splintered shafts of long bones without epiphyses. According to Winn and Shimabuku (1980:10), "Secondary burial may be indicated by these finds, or perhaps earlier unmarked graves have been unearthed and shoved aside during a later horizon by individuals randomly digging burial pits for their dead." Two caches of three animal vertebrae, one found with an ax and both with Campignian tools (Winn and Shimabuku 1980:pl. XI-J) were interpreted as ritual deposits, possibly related to fostering hunting success.

Trench 2: Trench 2 was over 1 m deep and contained an undisturbed burial (Figure 2.1.20a). Winn and Shimabuku (1980:10) wrote:

> After an initial 30 cm of water-borne material, important discoveries were made of undisturbed burial and cultic deposits at various levels, providing some evidence of stratigraphy. Many examples of late Scaloria pottery, including frequent meander motifs, were found in Trench 2. While numerous cardium shells were found, no tubular shells were discovered.

Trench 2 revealed animal vertebrae and tools deposited into small cavities, as in trench 1. In one instance, the cavity was bordered by small, flat, slab-like stones and held three animal vertebrae and Campignian tools, including a pick-ax, a broad blade, and a polished stone ax (Figure 2.1.20b). A bone awl was also associated with this group. In another cavity were located Campignian tools, including a spearhead and a tranchet, and two animal vertebrae. Another cavity held evidence of a different ritual practice: the distal end of a humerus was found in association with an obsidian blade, and, near the lowest level, a human mandible lay near long flint blades. A long, one-edged knife was found near another human bone. This association of artifacts with human bones was posited as a "farming villager's tool kit," while the association of wild animal vertebrae with an entirely different set of tools was related to the "hunter's tool kit." The major find in trench 2, however, was a complete, tightly flexed burial. This was believed to be the skeleton of a 20-year-old male, though it has since been reassessed as an adult female (see Robb et al., this volume, Chapter 4.1). It was laid on the right side, with the arms under the jaw and head bent forward (Figure 2.1.20a). The left temporal bone had a narrow

a

b

Fig. 2.1.20. 1978. Trench 2. (a) Burial. (b) Ritual cache from cavity containing animal vertebrae, Campignian tools, and bone awl (from Winn and Shimabuku 1980; photos by S. Winn).

flint blade below it, while an antler was placed behind the head. Adjacent to the pelvis was a large bovine vertebra. Large, flattish stones were found near the knees and in front of the head, though not in direct association with the burial. Sherds from the Upper Scaloria phase were found in the overlying strata.

Trench 3: Trench 3 was excavated in a flattened area protected by backdirt left behind by grave robbers. The shallow deposit contained "a beautiful bone ornament, perforated at both ends for hanging around the neck or wrist. The practice of burying [animal] vertebrae together with tools was also noted" (Winn and Shimabuku 1980:11, pl. XI, g; Pian, this volume, Chapter 6.4). The upper levels contained considerable charcoal, overlying sterile, loamy soil, and an intrusive circular pit, about 1 m in diameter. This pit showed evidence of fire, two left-side mandibles, and numerous other fragments of broken and splintered human bone that "may represent secondary burials or some other funerary practices such as ritual cannibalism" (Winn and Shimabuku 1980:12). The pottery from the pit was not characteristic of Upper Scaloria (as in trench 2), nor could the sherds be identified as Lower Scaloria. As for the radiocarbon dating results, "Charcoal collected near a mandible in the burial pit provided a slightly earlier date than for Trench 2: calibrated to approximately the middle of the sixth millennium BCE (LJ-4649: 6,720 ± 100 BP)" (Linick 1984:99).

The Preliminary Report Summary: Winn and Shimabuku's Interpretations

The preliminary report (Winn and Shimabuku 1980) summarized the results of the 1978 excavations as follows:

> Outside the cave, Stratum I, the lowest stratigraphic level, contained figulina ware of the Lower Scaloria style, while pottery of Upper Scaloria was absent, thus suggesting an external habitation horizon contemporary with a ritual use of the lower part of the cave.

Regarding the inside of the cave, Winn and Shimabuku (1980:28) wrote:

> The unusual motifs of the late Scaloria phase are virtually restricted to the cemetery. This indicates that the use of the cave exclusively as a burial place began later than the habitation horizon of Level I and later than the usage of the lower passages for ceremonial purposes. Impressed ware is scattered throughout the upper cave floor, but it is not associated with burials nor is it found in "cultic" deposits.

If the Upper Chamber was exclusively used as a cemetery during the Upper Scaloria phase, or during a slightly previous one, this use may have been connected to the cave entrance collapse. Winn and Shimabuku (1980:29) wrote:

> It is also possible that, after the collapse of the cave entrance, settlement in the vicinity became more intermittent until perhaps the site eventually became a sacred spot for ritual observances, presumably directed to the dead in the cave cemetery, or an ancestral site, periodically visited for sentimental or shamanistic purposes.

Note that this conclusion—that all the burials in the Upper Cave were later than the cult use of the Lower Cave—has since been reassessed on other grounds (see Chapter 2.3).

As also posited by Tiné (Tiné and Isetti 1975–1980), Winn and Shimabuku argued that the presence of a water cult, with ceremonies in the lower cave passages, might be linked to increasing drought in the Tavoliere.

> The resulting difficulties in agricultural conditions might have forced a broader subsistence base which may be inferred by the hunter's tool kit and "cultic" deposits of vertebrae of wild animals. Thus, abandonment of the cave may have been linked with changes in subsistence activities—a devolution from food production to food collection. Thereafter, the cave was used as a cemetery, but not lived at permanently. (Winn and Shimabuku 1980:29)

This interpretation, while plausible given the information available to Winn and Shimabuku and the theoretical orientation of the times, has not been confirmed by subsequent research.

Excavations of 1979

The 1979 archaeological season at Scaloria Cave, organized by Marija Gimbutas with Shan Winn as field director, lasted six weeks from July 27 to September 6. Although section and plan drawings are unavailable, Gimbutas's preliminary report is reproduced in Appendix 4 [online]. Unfortunately, photographic documentation of the excavations is patchy, and the following is a summary of observations from the excavation

daybooks. The comments attached to radiocarbon calibrations relating to specific trenches are also quoted below, including the specific notes that were fastened to the samples by the excavators.

During the first week of the excavation, the original entrance to the cave was relocated, and an irregular entry among the boulders of collapse was opened to allow passage (Figures 2.1.21, 2.1.22). The entrance fill from the outside and interior of the cave was removed and sieved, as were the crevices on top of the entrance. Seven test trenches of various sizes, numbered from 4 through 10, were opened in the Upper Chamber (Figure 2.1.23). These trenches were generally about 1×2 m in size, and their purpose was to find a less disturbed area for a larger excavation (Figure 2.1.4).

Schematic drawings from the 1979 excavation daybooks[4] show that the excavations took place in arbitrary levels of 10 cm. The final depth of each trench was determined by the sloping bedrock underlying it. Some sketches (Figure 2.1.24) note features that likely indicate a long-term occupation inside the cave, and this is also suggested by an abundance of pottery, lithic tools, human remains, and animal bone, as well as by recent micromorphological analysis (see Rellini et al., Chapter 3.1, this volume). However, the spatial and chronological articulation of the events that produced the artifacts is still to be determined.

Fig. 2.1.21. 1979. Original entrance of cave (Gimbutas Archives).

[4] We thank OPUS archivist Dr. Safron Rossi at Pacifica Graduate Institute (California) for permission to study the daybooks and other documents relating to Scaloria Cave in the Marija Gimbutas Archive.

Fig. 2.1.22. 1979. Aperture opened of original cave entrance (Gimbutas Archives).

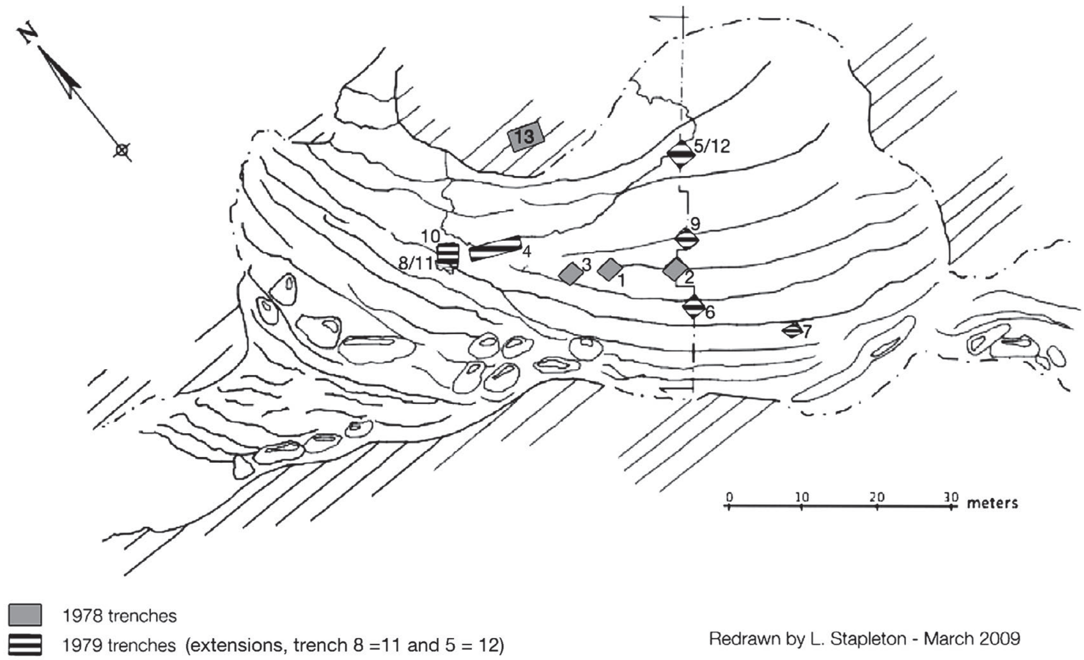


Fig. 2.1.23. 1979. Location of trenches inside Upper Chamber (Gimbutas Archives).

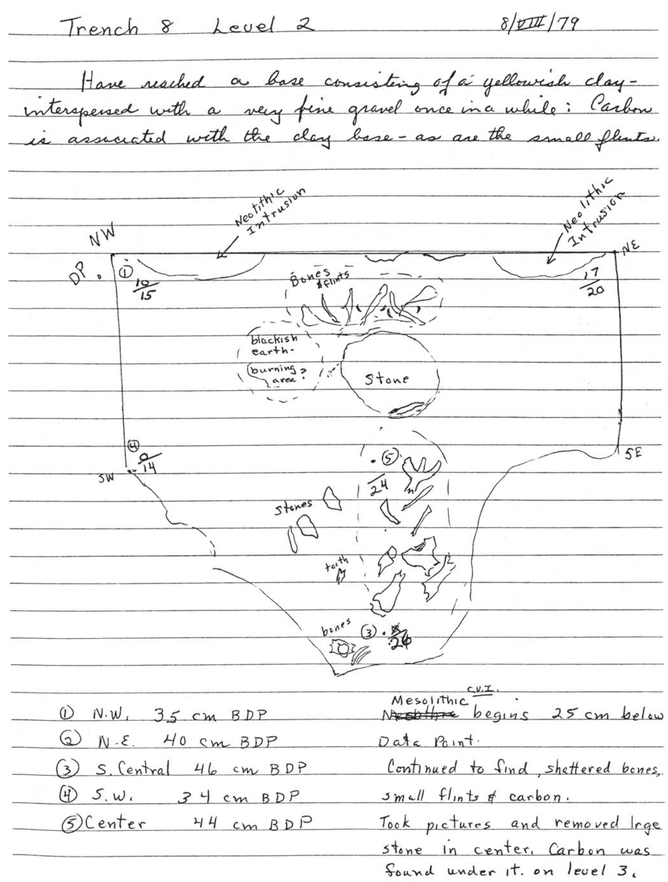


Fig. 2.1.24. Sketch of trench excavations from 1979 excavation diary.

Trench 4

Trench 4 (1×5 m) was located at the base of a landslide in an untouched deposit and was considered particularly important due to the possibility of pre-Neolithic levels below the landslides. Under a level of concretion 5 cm thick, excavators encountered several levels of dark and moist soil that contained abundant pottery, lithics, large bones, and clear traces of burning. At a depth of approximately 40 to 50 cm (level 4), between two concretized levels, a yellow soil without rocks and of a different texture was reached. Level 4 had no ceramics but did have abundant lithics and bone. At a depth of approximately 50 cm, the excavation was halted, as the lithic and bone material diminished and sterile soil was encountered.

Trench 5

Trench 5 (2×2 m) was also set at the base of the landslide in an untouched area, toward the northeast—that is, toward the original cave entrance. Below a 3-cm thick concretion, excavators encountered a number of levels with archaeological material. At the bottom of level 3, on the southern side of the trench with fewer rocks, they found a hearth, abundant charcoal, ceramics, lithics, and numerous bones. At level 4, in the area lacking rocks, artifacts were denser, possibly due to a longer or more permanent occupation. On the northern side of the trench, at the base of a large rock, excavators recovered an upside-down grindstone. Charcoal samples were collected and further levels yielded more artifacts (e.g., two axes). Eventually the trench terminated at 120 cm in a rocky, sloping, and nearly sterile bottom. The radiocarbon report noted the following:

> LJ-5095. Scaloria Cave, TR5, L3. 6120 ± 80. Charcoal from Trench 5, Level 3, from Neolithic period. Coll Aug 1979. Calibration: 5130 to 5020 BC (5295 to 4890). (Linick 1984:99)

Stratigraphy and associated ceramics (e.g., Ripoli-style painted ware) indicate the latest period (Late Scaloria) of habitation in the cave.

Trench 6

Trench 6 (1.5×2 m) was located on a slope (20-cm height difference from north to south) and went to a depth of 1 m. Excavators uncovered a skull and a disturbed burial of a child (level 6). In a deep fissure in the northeastern quadrant of the trench, close to bedrock in level 7, excavators also recovered a number of examples of impressed Guadone-style ceramics in yellow soil. The radiocarbon report noted the following:

> LJ-5095. Scaloria Cave, TR6/L4. 6400 ± 80. Charcoal from Trench 6, North, Level 4; habitation debris from Neolithic period. Coll Aug 1979. Calibration: 5500 to 5330 BC (5605 to 5080).
>
> LJ-5096. Scaloria Cave, TR6/L6 & 7. 6290 ± 80. Charcoal from Trench 6, South, Levels 6 and 7, near grave, from Neolithic period. Coll Aug 1979. Calibration: 5340 to 5250 BC (5505 to 4980). (Linick 1984:99)

Trench 7

We have little information about trench 7. It was opened approximately 100 m inside the cave entrance, in an area with bone fragments and burials. The top of the unit was covered with concretion and small rock fall and was terminated approximately 45 cm below the concretion level. Pottery fragments and bones were recovered. In addition, charcoal samples were collected from wet soil. The radiocarbon report noted:

> LJ-5097. Scaloria Cave, TR7/L1. Charcoal from Trench 7, Level 1, near Gravesite 12, in low gallery apparently reserved for cemetery usage. No habitation levels present. Neolithic period. Coll Aug 1979. Calibration: 5340 to 5250 BC. (Linick 1984:100)

Trench 8

Trench 8 (3×2.7 m) was on the western side of the Upper Chamber, on level ground between the original entrance and the entrance created by the aqueduct. At a depth of 25 cm, excavators encountered a layer devoid of ceramics but which contained an abundance of microliths, large animal bones and teeth, and shells. The soil at this level was sandy with charcoal (similar to that described in trench 4 at level 4) and was followed by a yellow, clayey soil interspersed with fine gravel. A curved group of stones was reminiscent of a hearth. At level 3, in the central part of the trench, soil was found mixed with charcoal, large bones, and a few shells. Two intrusive Neolithic pits were isolated and partially excavated. Radiocarbon dating of charcoal recovered from this trench has revealed an Upper Paleolithic occupation (for comments on this trench and the

early dates, see Robb, Chapter 2.3; see also Conati Barbaro, Chapter 6.1, and Elster, Chapter 6.2, this volume; and Bartosiewicz and Nyerges, Chapter 3.3, this volume). The context for the radiocarbon dates is as follows (Linick 1984:100):

> LJ-4982. Scaloria Cave, TR8/L3. 9560 ± 140. Charcoal from Trench 8, Level 3, from Upper Palaeolithic/Mesolithic period. From area with concentration of animal bones and teeth; some lithics present. Coll Aug 1979.

> LJ-5098. Scaloria Cave, TR8/L4. 9030 ± 120. Charcoal from Trench 8/8N, Level 4, from Upper Palaeolithic/Mesolithic period. From feature of arranged stones, splintered bone, and burned area, suggesting fire pit. Coll Aug 1979.

> LJ-4978. Scaloria Cave, TR8/L8. 10,790 ± 210. Charcoal from Trench 8, Level 8, from Upper Palaeolithic/Mesolithic period. From soil feature containing abundant lithics and bones. Coll Sept 1979.

> LJ-4979. Scaloria Cave, TR8/L9. 11,040 ± 190. Charcoal from Trench 8, Level 9, from Upper Palaeolithic/Mesolithic period. From yellowish, sandy soil containing numerous lithic artifacts. Coll Sept 1979.

Trench 9

Trench 9 (1×2 m) was set between trenches 5 and 6. Surface concretion indicated that, like trench 4, it was undisturbed. The trench was begun as a test to provide data for section mapping and insight into the geology of the cave and originally measured 1×1 m. The first 20 cm (level 1) were composed of concretion mixed with charcoal and archaeological material. This part of the trench eventually yielded lighter-colored soil with an abundance of pottery and shell, before terminating in a nearly sterile level and rocks. The trench was enlarged to the south with an adjoining 1×1-m unit. An almost intact Upper Scaloria–style vessel was found in the first level, underlying the concretion. In the southern portion of the unit, two more levels were excavated before reaching sterile soil.

Trench 10

Trench 10 (2.5×1.5 m) was located close to trench 8 where a thick layer of concretion sealed the underlying material. It was excavated in the hope that it would yield a continuous sequence of strata from the Neolithic to the Paleolithic (as noted above, Paleolithic material had been found in trench 8). Under the first two levels, nine groups of human remains were found. At the time, it was thought that these were possibly originally tightly flexed burials, perhaps multiple individual burials with overlying deposits (see discussion and reassessment below). No boundaries of the burial pit were visible. Below the burials, the soil seemed almost sterile. Among the finds, no. 8, located in the upper level of the eastern part of the trench, turned out to be particularly interesting. A ceramic vessel set inside a circle of stones was discovered, in addition to a large vessel bottom, both of them upside down. Part of a skull belonging to this group was found inside the vessel bottom. It also contained ocher and a retouched flint blade. In the surrounding area, close to the skull, excavators found two extraordinary pendants (Pian, this volume, Chapter 6.4; and Figures 2.1.25–2.1.26) made of engraved wild boar tusks, together with long, broken blades and two more vessel bottoms. The combination of these materials, ocher and engraved pendants, suggested a custom of human decoration and personal adornment. The radiocarbon report noted:

> LJ-4980. Scaloria Cave, TR10. 6410 ± 150. Charcoal from Trench 10, from level of Neolithic ritual burials. Found with boar tusk pendants and long flint blades. Coll Sept 1979. Calibration: 5500 to 5330 BC.

> LJ-4981. Scaloria Cave, TR10/L4. 6530 ± 260. Charcoal collected from Trench 10, Level 4, from burial floor of level of Neolithic ritual burials. Coll Sept 1979. Dates floor of ritual mass burial. Calibration: 5520 to 5450 BC. (Linick 1984:100)

Preliminary Excavation Summary

The preliminary results of the 1979 excavation, summarized below, are from Marija Gimbutas's report (1981), in which she reported the initial findings of Dr. János Nemeskery, physical anthropologist, and paleozoologist Dr. Sándor Bökönyi, both from the Institute of Archaeology, Budapest. Dr. Wolfgang Götte (Nuremberg, Germany) provided a brief preliminary report on the human teeth, and Dr. Ernestine S. Elster (UCLA) analyzed the lithics.

Particularly important was the material from the Epipaleolithic (trench 8) previously unknown at

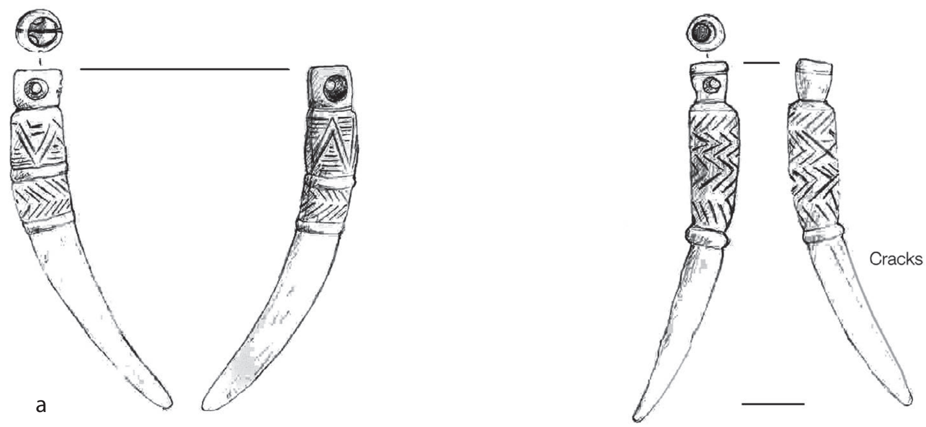


Fig. 2.1.25. Engraved boar tusk pendants. (a) 1979, cat. no. 1253, SF 277 (archives of S. Tiné). (b) 1979, cat. no. 1218, SF 265.

a

b

Fig. 2.1.26. (a) Engraved boar's tusk pendant, cat. no. 1218, SF 265 (Gimbutas Archives). (b) Pendant in situ, trench 10, burial group 8 (Gimbutas Archives).

Scaloria. Two radiocarbon dates derived from hearth remains clustered in the eleventh millennium BP (LJ-4978: 10,790 ± 210; and LJ-4979: 11,040 ± 190 BP) (Linick 1984:100). Among the faunal remains (identified by the late Sándor Bökönyi and with further recent analysis by Bartosiewicz and Nyerges, Chapter 3.3, this volume), the most numerous were wild donkey and fallow deer; other animals included deer, chamois, lynx, fox, hare, bird, and some type of fish. Based on Bökönyi's early analyses, Gimbutas noted the continuing presence of wild fauna during the Neolithic (steinbok, deer, wolves, and foxes), although a majority of the remains were derived from domestic animals (90% were from goats and sheep). Based on these data, Gimbutas posited an occupational use of the cave in addition to its function as a cemetery. Occupation extended from 5600 to 5300 BCE, based on a sequence of radiocarbon dates in the sixth millennium, the same period as both the Scaloria Alta and the Scaloria Bassa ceramic types. Gimbutas considered it as one period, characterized by the painted red-band pottery. She termed the cave a "Holy Site," comprising the Upper Chamber and the Lower Chamber burials. "Secondly, traces of both habitation and graves of three or more phases of the Neolithic Scaloria culture have been discovered" (Gimbutas 1981).

Gimbutas noted that the Upper Chamber was also inhabited during the Guadone impresso ware period, in the early phases of the Neolithic. Further, a few finds corresponded to Diana and Serra d'Alto ceramic types (i.e., the last phases of the Neolithic), which could indicate sporadic visits in the fourth millennium, when the cave became less accessible.

Gimbutas connected the symbolism on the painted vessels with representations of the gods (bird and snake goddesses), a prehistoric symbology spread throughout the southeastern Mediterranean (Gimbutas 1990:223). Skeletal evidence of trepanning and possible signs of cannibalism led Gimbutas to postulate that many of the dead were not simple burials but ritualistic ones, or that perhaps sick people had come to the cave for a cure.

Tiné and Gimbutas both realized that the 1979 excavation was also significant on account of the large quantity of human remains recovered, most incomplete but some with articulated joints and some also tightly flexed, as in trench 10 (Tiné and Isetti 1980:79). These were originally interpreted as a collective burial after an epidemic in the Tavoliere. However, a more recent study by John Robb (1991) discounted an epidemic and noted that the highly fragmented nature of the bones could have resulted from ancient activity. He concluded that the group of remains could have been due to a prolonged use of a very narrow area in the chamber for multiple, single, primary burials (Figure 2.1.27a). This view, however, was reassessed in the course of the present work (see Robb et al., Chapter 4.1).

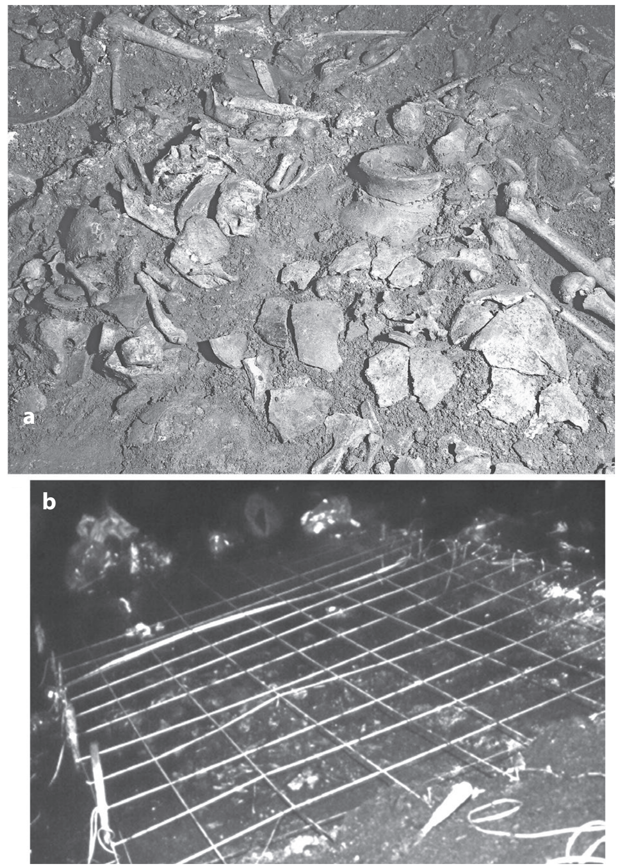


Fig. 2.1.27. 1979. Excavation inside cave. (a) With human remains and ceramics. (b) With grid placed on floor of Upper Chamber to control excavation recovery (Gimbutas Archives).

Conclusions: Interpretation of Cave through the 1980s

Santo Tiné (Tiné and Isetti 1980:79), after a preliminary data comparison, came to the following conclusions:

> Because the various areas of the cave had not been used continuously and because undoubted vertical stratigraphic elements were missing, there is the possibility of a horizontal stratigraphy based on a different concentration of

remains—above all, pottery—wherever the trenches had been opened. A most important find was the Upper Paleolithic stratum discovered in trench 8, on the west side of the cave. Because all of the trenches contained traces of Neolithic deposits located directly on the floor of the cave, without any evidence of older material, the Upper Paleolithic must be considered limited to that part of the cave.

The most intense and prolonged occupation of the cave appeared to coincide with the Lower Scaloria pottery phase, when the Lower Chamber (unknown to Quagliati) was frequented for ritual purposes. Although the 1978 and 1979 excavations yielded few elements related to Upper Scaloria, it must be remembered that Quagliati might have earlier removed the majority of the Upper Scaloria ceramics. Because of their excellent state of preservation, the ceramics might have been linked to burial goods, supporting inferences that the Upper Chamber was utilized as a cemetery.

Riassunto

Grotta Scaloria fu scoperta casualmente nel 1931, in occasione della costruzione dell'Acquedotto Pugliese, grazie allo scoppio di una mina. Quintino Quagliati, Soprintendente alle Antichità della Puglia, condusse le prime ricerche e si limitò ad una prima ricognizione generale. Il materiale raccolto interessava soprattutto il Neolitico e l'Età dei Metalli.

Nel 1934 Ugo Rellini esaminò i materiali e individuò nelle caratteristiche ceramiche figuline dipinte un nuovo stile ceramico pertanto detto "stile della Scaloria".

Nel 1967 il Gruppo Speleologico locale segnalò la presenza di numerosi vasi preistorici; dopo un sopralluogo, Santo Tiné dispose l' esplorazione sistematica della parte più profonda della Scaloria. accorgendosi che la gran parte dei reperti restava concrezionata nella formazione stalagmitica.

Il programma esplorativo del 1967 si concentrò sul rilevamento della grotta, sul posizionamento dei 40 gruppi votivi riconosciuti e sulla relativa documentazione fotografica.

A differenza del Camerone superiore noto a Quagliati, dove il deposito ha restituito ceramiche inquadrabili in varie facies, nelle gallerie inferiori i vasi ritrovati appartenevano tutti ad un'unica fase, differente da quella della Scaloria Alta e perciò definita da Tiné della Scaloria Bassa.

Negli anni successivi venne scoperto sul lato Sud-Ovest del camerone superiore, denominato "Camerone Quagliati", un ulteriore passaggio che conduceva nella parte più profonda della vicina grotta di Occhiopinto; le due cavità risultarono così essere parte di un'unica struttura ipogea caratterizzata da due principali diramazioni che probabilmente furono separate dal collasso di parte della volta apparendo ora separate.

I primi scavi sistematici, sia all'interno che all'esterno della grotta, si ebbero nel 1978 e nel 1979, nell'ambito di un programma di ricerche sul Neolitico del Sud Est dell'Italia avviato negli anni '70 da Santo Tiné e Marija Gimbutas, con la direzione sul campo, per il 1978, di Shan Winn. Gli scavi si conclusero con una seconda e più intensa campagna l'anno successivo, seguita nel 1980 dallo studio preliminare a completamento della fase di ricerca.

2.2. Research in Occhiopinto Cave

By Nicoletta Bianchi, Eugenia Isetti, and Antonella Traverso

Occhiopinto Cave opens about 200 m southeast of the current mouth of Scaloria Cave (see aerial photographs, Figure 2.1.1). Its entrance is a wide sinkhole or *dolina*, approximately 10 m deep and about 20 m wide. Like Scaloria, it is an extensive cave, with steeply sloping, irregular chambers, and twisting galleries. Its true extent is unknown, as many galleries are blocked by sediment and rockfall. Its importance for this report is that explorations by cavers have shown that Scaloria and Occhiopinto caves interconnect; in other words, they form different branches of a single, very extensive cave system (see map, Figure 2.1.4a). Occhiopinto Cave is connected with the Upper Chamber of Scaloria (the so-called Camerone Quagliati) through a narrow passage (called by its discoverers Passaggio D'Avanzo); this passage may have been more easily negotiable before roof collapse. Like Scaloria, it was frequented in ancient times.

Today the shelter, partially blocked by blocks of roof fall, shows a totally disturbed deposit, with a few Daunian and Classic pottery fragments. Moreover, as Quagliati mentioned in his 1936 report, the cave could well have been in continual use by shepherds and farmers, which certainly contributed to disturbance of the archaeological deposits. Occhiopinto Cave was undoubtedly used in prehistory, probably for ritual purposes, as suggested by several whole vessels from the Upper Scaloria and the more recent Bronze Age phases. Moreover, it was used during the Neolithic, since Catignano-Lower Scaloria phase vessel depositions were placed along the winding passages leading to Scaloria. Only the small entrance room has yielded abundant Middle Bronze Age material, among which the small single-handle whole jugs and ribbon-handle bowls are prominent.

After the 1931 Quagliati exploration, research at Occhiopinto Cave was not pursued for decades until 1967 and then a limited excavation was conducted by Shan Winn in 1978. The preserved collections are today in the National Archaeological Museum of Manfredonia.

The only direct testimony about the 1967 work has been collected by Nicoletta Bianchi through an interview with Santo Tiné (see Appendix 7 [online]). Tiné pointed out that the cave ceiling in Occhiopinto had collapsed, and the excavation was dug immediately behind the collapse area; a second test excavation, made outside the cave in the eastern side of the cave entrance, was undertaken in a single layer and yielded almost entirely prehistoric pottery.

Santo Tiné conducted a first reconnaissance in 1967 for which we lack stratigraphic information. The material recovered was not homogeneous from the point of view of culture, but is attributable to a chronological period that runs from the Early Neolithic to the Metal Ages. Subsequently, in 1978, two test trenches were carried out by Winn (University of Southern Mississippi), the field director for the Scaloria excavations (Winn and Shimabuku 1980), both inside and immediately outside the cave. The documentation from these explorations is missing, as is stratigraphic information. Here we attempt a reconstruction, albeit imprecise, of the deposit in which the 1978 material was found, based on material stored in the Manfredonia Museum. In fact, this stored material appears related to two trenches: the exterior one, dug in a single level, and the inside one, probably organized in a system of squares, identified by the references A-T1, C-T2A, and C-T1A, and, respectively, dug in 10, 14, and 2 artificial levels. The deposit yielded 446 prehistoric ceramic fragments, of which 99 are classifiable.

This material changes our view of the deposition in the Scaloria-Occhiopinto cave system dramatically. It suggests that the cave's use did not end in the prehistoric period: study of the 1978 material has yielded a few sherds from the Daunian and Classical periods, as well as more abundant medieval and modern pottery associated with numerous gun flints. The material of more

recent phases appeared in stratigraphic association with prehistoric material; in fact, in the two principal sectors, A-T1 and C-T2A, the greatest number of fragments of non-prehistoric pottery were recovered in the central layers. Thus, we can also state that level L7, in the A-T1 trench, which is the only one to have exclusively yielded prehistoric ceramics, cannot be considered intact. As a consequence, we also exclude the hypothesis of an inverted stratigraphy.

Quagliati, in his 1936 report about the first investigation at Occhiopinto Cave (Quagliati 1936:145–153), indicated the presence of shepherds and farmers on the land in front of the cave. This factor could have been one of the possible reasons why the external trench in the cave entrance is stratigraphically corrupt. Moreover, Tiné (personal communication) pointed to the collapse of the vault of the cave as one of the possible causes of the disturbance to the archaeological levels. Nothing else can be noted about the sequence of deposits.

Consequently, pottery study has been conducted only on a typological basis. Even if the Neolithic ceramic elements are interesting and similar to those found in Scaloria Cave, the occupation from the Metal Ages appears to be the most significant find. Among the material examined, some elements seem to point to a possible occupation of the cave from the Eneolithic period. A fragment of an askos (Figure 2.2.1:1) seems comparable to some forms typical of the Gaudo facies, while a truncated cone cover (Figure 2.2.1:2) presents some correlations with the Conelle di Arcevia facies, again from the Eneolithic period. Other samples seem to show traces of the facies of Laterza, a transitional Eneolithic/Early Bronze Age group. Among the ceramic fragments published by Quagliati, some elements with similarities to this facies are identifiable (Quagliati 1936:151, fig. 61). This chronological attribution seems confirmed by other sherds; this is the case of a beaker with a small perforated knob placed immediately under the rim and on the body (Figure 2.2.1:3), which again evokes the Laterza facies and coeval forms of the Early Bronze Age in central Italy (Cocchi Genick 1999:fig. 5), particularly from Beato Benincasa Cave, where such vessels have been specifically interpreted as objects used in water cult rites. Finally, a semicircular bowl (Figure 2.2.1:4) could also be classified among the Early Bronze forms, although such a form also existed in the following Bronze Age periods.

The use of Occhiopinto Cave seems to continue in subsequent periods, since among the finds, some elements characterize the Middle Bronze period. A raised strap handle with a central hole recovered by Quagliati (1936:fig. 59) is among the characteristic forms of the Middle Bronze in central-southern Italy (Cocchi Genick 1995:fig. 175). In the trenches of 1967–1978, several other handles of the same type, with the strap rising from above or below the rim, have also been found (Figure 2.2.1:5–8). The above-the-rim strap handle with an expanded superior part (Figure 2.2.1:5) invites comparison with a sample recovered in Manaccora Cave (Recchia 1993:fig. 9:1); another handle rising on the edge of a carinated bowl with a low basin (Figure 2.2.1:6) also recalls a sherd found in Manaccora (Recchia 1993:fig. 10:7). An overhead strap handle with parallel borders (Figure 2.2.1:8) is comparable instead with a specimen from Torre de' Passeri (De Pompeis and Di Fraia 1981:fig. 5:10). Finally, a bowl with an overhead strap handle that presents a concave cross-section, placed on the point of maximum expansion of the body (Figure 2.2.1:7), is generically comparable to type 494 of Cocchi Genick's typology for the Middle Bronze Age in central-southern Italy (1995:fig. 151).

As far as the handles are concerned, two fragments with a vertical strap handle can be attributed to the same period. The first sherd (Figure 2.2.1:9), in spite of the presence of an excrescence on the top of the handle, resembles some earlier samples attributable to the Early Bronze Age, such as the oval pot with a strap handle decorated with a small knob and a cordon (Recchia 1993:fig. 17:2). The second fragment (Figure 2.2.1:10) is also attributable to the Middle Bronze, but that type of overhead strap ribbon handle on the edge is generically associated with narrow and deep forms. Several samples of carinated forms, among which are fragments of basins or cups, and other sherds related to bigger forms, seem to date from the same period (Middle Bronze). For example, a fragment of a carinated bowl (Figure 2.2.2:1) represents a form comparable to two samples from Manaccora Cave (Recchia 1993:figs. 10:7, 11:2). One carinated basin (Figure 2.2.2:2) resembles two basins from Caporciano Lake (Mattiocco 1986:fig. 27) and from Riparo Monte La Difesa (Agostini and D'Ercole 1986:209, fig. a), while another, whose maximum diameter occurs at the rim (Figure 2.2.2:3), resembles one from S. Vito dei Normanni (Lo Porto 1964:Tav. IV:3). Two bowls with a thickened edge (Figure 2.2.2: 4–5) present the same morphology as a sample from Rissiedi (Coppola 1973:fig. 7a) and one from Cardini Cave (Bernabò Brea et al. 1989:fig. 100g). One cup (Figure 2.2.2:6) invites comparison with the two sites of Mezzano Lake (Franco 1982:Tav. 15:M1-12) and Sal-

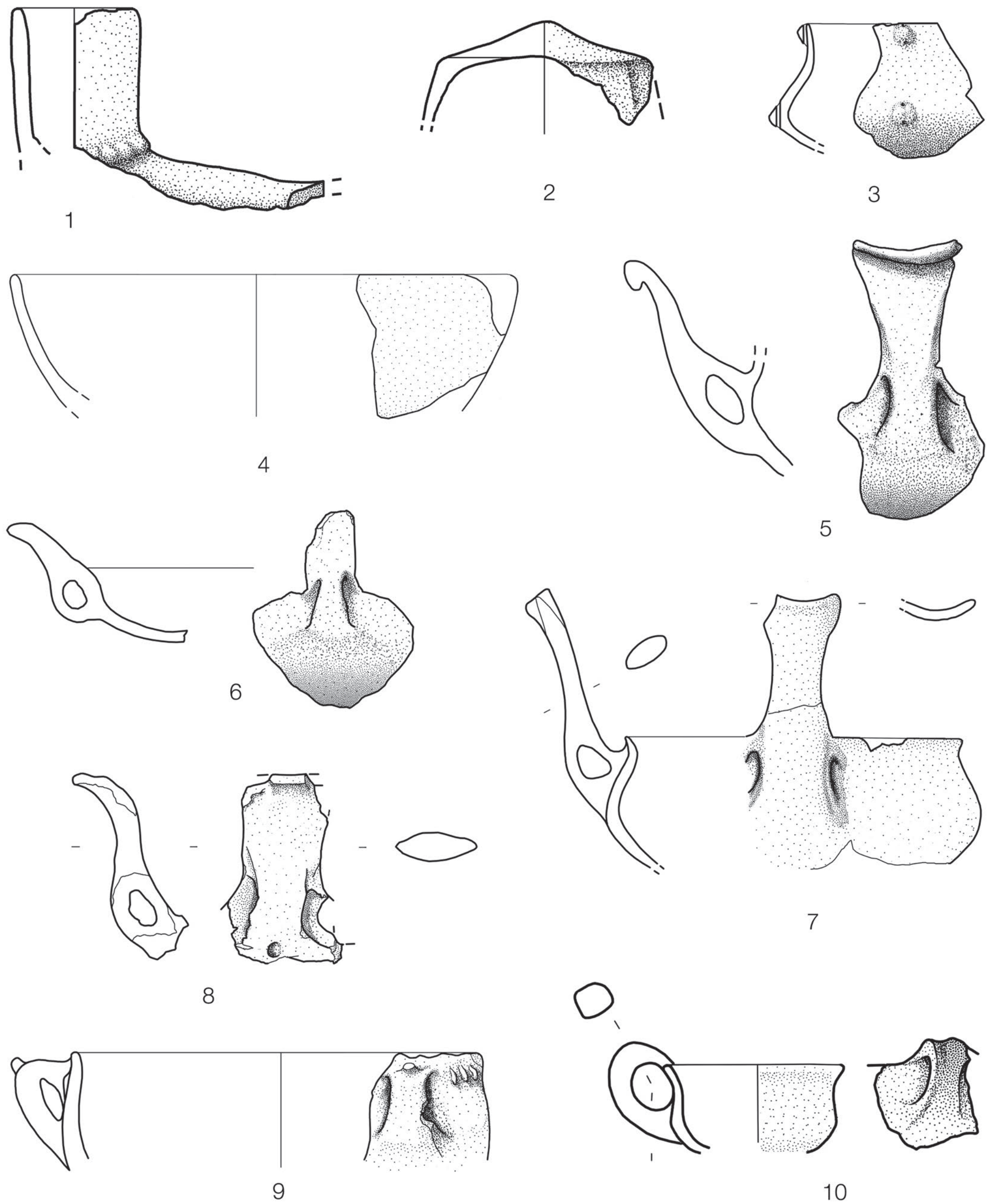


Fig. 2.2.1. Prehistoric and nondiagnostic materials found in test trenches in Occhiopinto Cave. (1–2, 10): scale 1/2; (3, 5–9): scale 1/3; (4): scale 1/4.

done (Bianco 1991–1992:fig. 4:4). Once again, two fragments (Figure 2.2.2:7–8) are similar to oval pots recovered from Manaccora Cave (Recchia 1993:fig. 17:4 for the first one; fig. 17:1 for the second). Two samples (Figure 2.2.2:9–10) with cordons recall form 425B, included by Cocchi Genick (1995:249–250) among typical Middle Bronze Age forms in central-southern Italy, and seem to belong to the same category. Lastly, fragment 11 of Figure 2.2.2 also seems classifiable with material of the Middle Bronze and is a sufficiently precise comparison to a jar found in Cardini Cave (Bernabò Brea et al. 1989:fig. 95b). Other less abundant forms (Figure 2.2.2: 12–13) seem to date from this period, based on the presence of cordons applied under the rim that resemble well-dated samples from other sites, but they could also be older (Table 2.2.1).

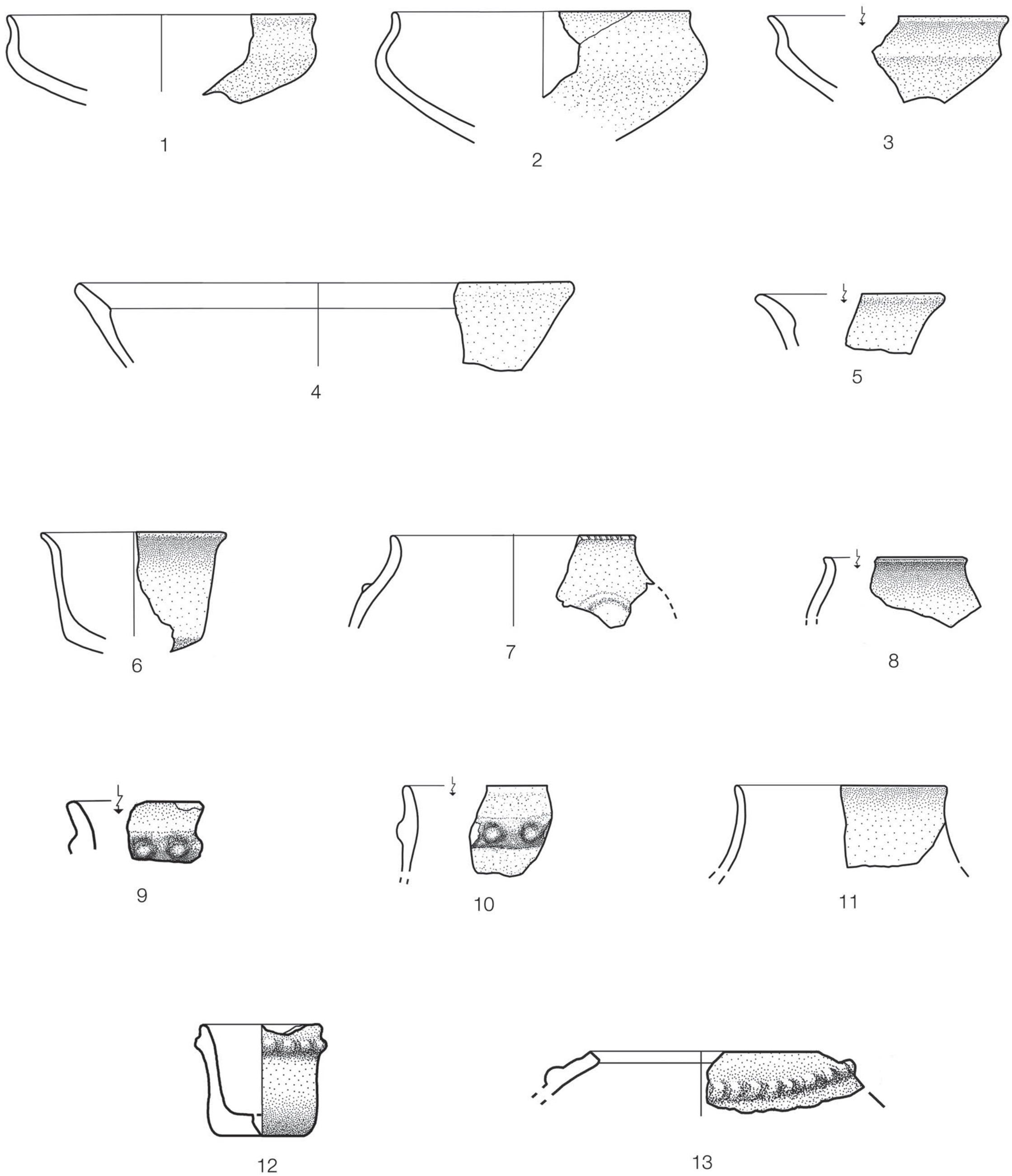


Fig. 2.2.2. Prehistoric and nondiagnostic materials found in the test trenches in Occhiopinto Cave. (1–8, 10): scale 1/3; (9, 12–13): scale 1/2.

As regards the chronological attribution, the Middle Bronze Age material at Occhiopinto seems to have more in common with the early parts of this period. From the cultural point of view, it seems to belong to the Protoappenninice facies. Nevertheless, because of the absence of stratigraphic data, we must point out that some forms only generically date to the Middle Bronze; the absence of distinctive elements from later phases also supports this chronological attribution.

Finally, it remains difficult to construct a clear picture of why prehistoric people occupied Occhiopinto Cave, as the deposit is poorly preserved and explored. However, one fragment of human bone was recovered in test trench A-T1 in the 1978 season. The use of the cave

Table 2.2.1. Prehistoric and nondiagnostic materials found in Occhiopinto Cave test trenches

Internal test trench	**Level**	**Prehistoric sherds**		**Non-prehistoric sherds**	**Internal test trench**	**Level**	**Prehistoric sherds**		**Non-prehistoric sherds**
		Identified	*Not identified*				*Identified*	*Not identified*	
A-T1	L1	13	41	5	C-T2A	L1	7	23	8
A-T1	L2	2	6	5	C-T2A	L2	20	77	43
A-T1	L3	7	17	10	C-T2A	L3	7	24	11
A-T1	L4	1	6	7	C-T2A	L4	7	25	16
A-T1	L5	5	10	29	C-T2A	L5	4	22	7
A-T1	L6	—	3	10	C-T2A	L6	2	9	12
A-T1	L7	2	1	—	C-T2A	L7	3	13	29
A-T1	L8	4	8	6	C-T2A	L8	—	2	15
A-T1	L9	—	—	—	C-T2A	L9	—	5	17
A-T1	L10	1	11	23	C-T2A	L10	1	5	1
					C-T2A	L11	—	7	6
					C-T2A	L12	—	—	-
					C-T2A	L13	1	5	17
					C-T2A	L13 (hole)	—	2	6
					C-T2A	L14	—	—	-
Internal test trench	**Level**	**Prehistoric sherds**		**Non-prehistoric sherds**	**External test trench**	**Level**	**Prehistoric sherds**		**Non-prehistoric sherds**
		Identified	*Not identified*		*Identified*	*Not identified*			
C-T1A	L2	—	—	—	C-T2A	L1	12	25	3
C-T1A	L3	—	—	—					

for funerary purposes cannot, therefore, be discounted, although the period of such use remains unknown.

Riassunto

La Grotta di Occhiopinto fu investigata nel 1967 da Santo Tiné e sondata nuovamente nel 1978—internamente ed esternamente—da Shan Winn della University of Southern Mississipi. Benché queste operazioni abbiano messo in luce un evidente sconvolgimento del deposito archeologico, il materiale rinvenuto ha fornito interessanti indicazioni cronologiche in quanto all'utilizzazione della grotta, che, all'interno del complesso, risulta essere la sola cavità occupata anche dopo il Neolitico. I resti ceramici più recenti rinviano infatti ad un periodo compreso tra l'Eneolitico e gli inizi del Bronzo medio, durante il quale la grotta potrebbe eventualmente essere stata utilizzata anche a scopo sepolcrale.

2.3. Radiocarbon Dating and Absolute Chronology[1]

John Robb

Introduction

There are only three potential sources for dating the human use of Scaloria Cave: stratigraphy, ceramics, and radiocarbon dates. Of these, stratigraphy is of little use; most trenches were shallow and all were poorly documented, without systematically recorded stratigraphic sections or notes. Furthermore, there is no master stratigraphy linking the 10 small trenches scattered around the large Upper Chamber. Hence, stratigraphy is useful only within specific trenches rather than for understanding the overall chronology of the site. Ceramic periods fit into a well-understood chronology for the Tavoliere area (see Chapters 5.1 through 5.6). The pottery from the cave serves to show that the Lower Cave cult site, where "Scaloria Bassa" pottery was deposited, was approximately contemporary with the main funerary deposition in the Upper Cave, typified by the same pottery. Both are later than an earlier Neolithic occupation characterized by Guadone-style impressed pottery, and both are earlier than a later Neolithic use of the Upper Cave characterized by "Scaloria Alta" pottery. This relative sequence, however, is not tied into an absolute chronology.

Scaloria's Radiocarbon Dates

Fortunately, there are presently 32 radiocarbon dates available for Scaloria Cave (Figures 2.3.1, 2.3.2; Table 2.3.1), making it one of the best-dated Neolithic sites in Italy (see Skeates and Whitehouse 1994). These were run in four groups.

1. The first sample was R-349, run at the Rome laboratory upon earth mixed with carbon from the Lower Cave (Alessio et al. 1969). This date is anomalously late, with a calibrated 2-sigma range of 4470–4161 BCE, about a millennium later than we would expect a date presumably associated with Scaloria Bassa pottery. There are two possibilities for making sense of it. One is simply to discount it as an unreliable date, run in the early days of the Rome laboratory using a poor-quality sample. Alternatively, it is possible that the date has no association with the Neolithic use of the cave; instead, sometime in the later fifth millennium BCE, somebody visited the Lower Cave, created some carbon-bearing deposits within a cult site that was already a millennium old at that point, and left leaving little other trace; in other words, the sample postdates the Neolithic cult site by a significant interval (see Bianchi et al, Chapter 2.2). In either case, this date does not help us understand the chronology of the Neolithic cult site.

2. Thirteen more radiocarbon determinations were run at La Jolla as part of the original UCLA project; they were originally published by Linick et al. (1984). These were all run upon charcoal found in archaeological levels. While their archaeological integrity has never been questioned, the association of charcoal with human occupation and/or burials is inferential, as it is possible that residual charcoal from earlier occupations was mixed in with later deposits; and, carried out before the development of the AMS method, they have large standard deviations, making them approximate at best.

3. A new series of 16 dates was run as part of this research. Fifteen of these were run at the Oxford Radiocarbon Accelerator Unit; a further one was carried out by Beta-Analytic (Beta-295657). All of these were AMS dates carried out on human bone

[1] We are grateful to the Arts and Humanities Research Council and to the Oxford Radiocarbon Accelerator Unit for funding the AMS radiocarbon dates on human bone samples, and to Professor Tom Higham of Oxford University for advice on the project and samples.

samples with the goal of dating the funerary depositions directly. They are reported here for the first time.

4. Finally, two further dates were run as a part of the geoarchaeological study of this project (Rellini et al., Chapter 3.1, this volume). These were carried out by Beta Analytic (Beta-247854 and Beta-247855); they used the AMS method upon charcoal microsamples from well-documented stratigraphic contexts. They are reported in this volume for the first time.

All dates reported here were calibrated using OxCal 4.2 (accessed August 28, 2013), using the IntCal09 calibration curve.

The Scaloria Chronology

By and large, the radiocarbon dates for Scaloria form a coherent chronology, which falls into several groups.

Late Upper Paleolithic

The four earliest dates all come from trench 8, an area identified during the 1979 excavations as "Mesolithic." In fact, they date to the Late Upper Paleolithic or Epipaleolithic, documenting use of the cave by post-glacial hunter-gatherers. There appear to have been two periods of use: during the twelfth millennium BCE, and later on between the late tenth and early eighth millennia BCE (at the very transition between the Upper Paleolithic and the Mesolithic). This agrees well with late Pleistocene/early Holocene fauna identified in this area (see Bartosiewicz and Nyerges, Chapter 3.3, this volume), and with Epipaleolithic stone tools (see Chapter 6.3).

The Earliest Neolithic Occupation: Before 5500 BCE

The next three dates all fall around the middle of the sixth millennium BCE. We cannot assess their significance too precisely, as, like all the La Jolla dates, they have quite large standard deviations, which means that their 95-percent confidence intervals span the greater part of the sixth millennium BCE. However, at least LJ-4649 (95% probability interval 5808–5479 BCE) attests use of the cave in the first half of the sixth millennium BCE. This is distinctly before the principal funerary and ritual use of the cave in the Scaloria Bassa period, and is to be associated with the use of the cave for habitation in the period represented by finds of Guadone-style impressed pottery there.

Middle Neolithic: 5500–5200 BCE

There follows a long series of 23 dates that form a remarkably compact group (OxA-21210 through LJ-5096). This shows that the period from about 5500 BCE to about 5200 BCE was the most intense period of the cave's use for both funerary and non-funerary purposes.

The two charcoal dates from samples sealed under hearths (see Rellini et al., Chapter 3.1, this volume) confirm use of the cave for probable non-funerary purposes between about 5500 and 5200 BCE. This overlaps completely with the principal funerary use of the cave; with present evidence, we cannot know whether the cave was used for funerary and non-funerary uses at the same time, such as habitation and pastoralism, or whether these activities took place within different parts of this 200- to 300-year time span. The five La Jolla dates in this interval, all run upon charcoal fragments recovered during excavation, coincide well with this time span, although their greater standard deviation means that we can place them only between about 5500 and 4900 BCE. Moreover, while they document general human use of the cave, they do not serve well to date the funerary use of the cave, since in no case is there positive evidence that the charcoal samples dated were positively associated with human remains. With dates of 5714–5081 BCE (LJ-4650) and 5479–5064 BCE (LJ-4651), which may not actually be associated with the skull, the trench 1 skull deposition must be regarded as undated. Charcoal found near the child's burial in trench 6 yielded a date of 5468–5055 BCE (LJ-5096), but charcoal of this age is found throughout the cave, and there is no sign that the burial rite involved burning in any way; the trench 6 child burial is better dated through a direct AMS date on a sample of bone directly from the skeleton (5463–5221 BCE, OxA-21203). Interestingly, this suggests that the single, primary inhumation whose skull had been removed may have been contemporary with the large-scale deposition of disarticulated bone in trench 10.

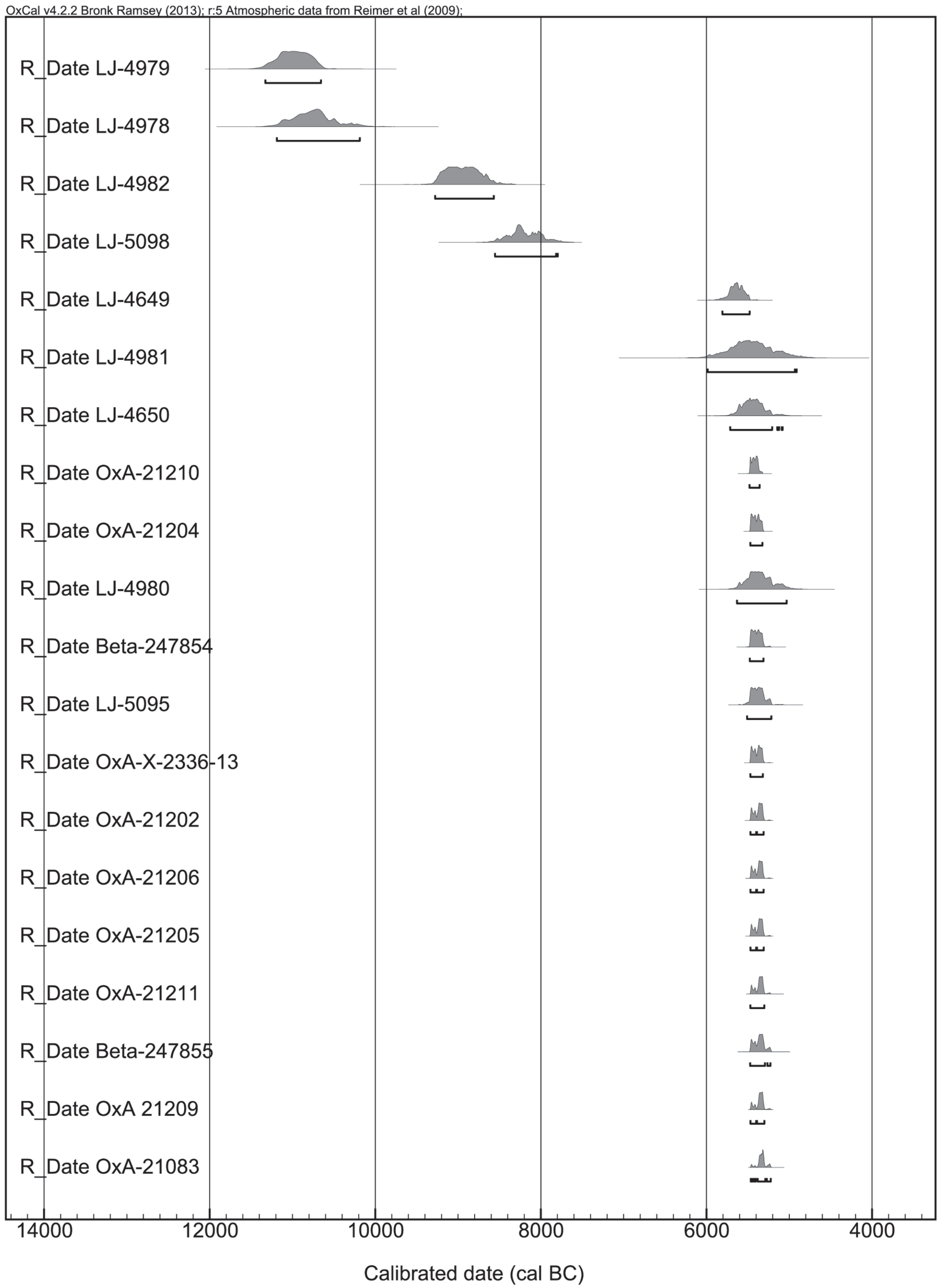


Fig. 2.3.1. *(*a*, above;* b*, facing page)* Calibrated probability distributions for all radiocarbon dates from Scaloria Cave.

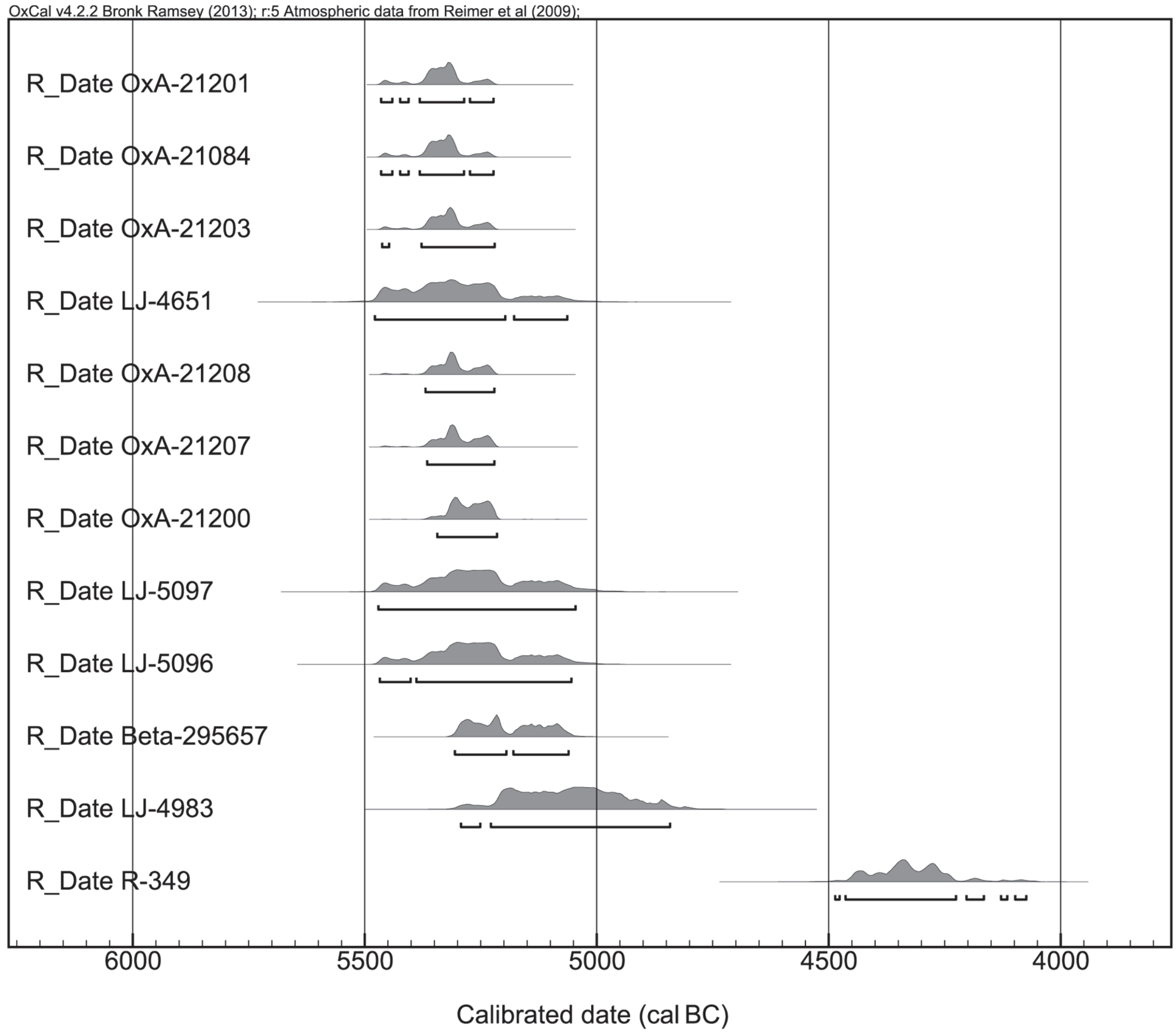


Fig. 2.3.1, continued. (b) Calibrated probability distributions for all radiocarbon dates from Scaloria Cave.

Funerary use of the cave is well dated through a remarkably consistent series of 15 AMS dates on human bone. The 95-percent probability intervals for these all fall between about 5470 and 5220 BCE, an interval of 250 years. For most of them, the 68-percent interval coincides around a narrower span of about 5480–5300 BCE. Given the resolution of the dates and the way the calibration curve tends to bunch dates around particular zigzags at this point, we cannot determine whether the dates are spread out evenly across this interval or whether they represent even a single point. In other words, the dating is consistent with a number of scenarios, ranging (at one extreme) from continuous bone deposition for several centuries to (at the other extreme) a single, never-repeated depositional event. It is likely that bone deposition was episodic rather than either continual or a one-time event, but this hypothesis depends on non-dating evidence (see Knüsel et al., Chapter 4.4, this volume).

Finally, the trench 2 burial of an adult female in a single primary inhumation was dated directly by an AMS date upon human bone; this yielded a 95-percent probability range of 5322–5017 BCE (Beta-295657). While this overlaps partially with the later end of the date range for the trench 10 disarticulated bone, inspection of the probability distributions for these dates shows that there is relatively low probability that either the disarticulated bone samples date to after about 5300 BCE or the trench 2 burial dates to before 5300 BCE. It is not certain but it seems likely that this burial is slightly later than the mass of disarticulated bone found in the cave. If so, it may be the case that this burial signals

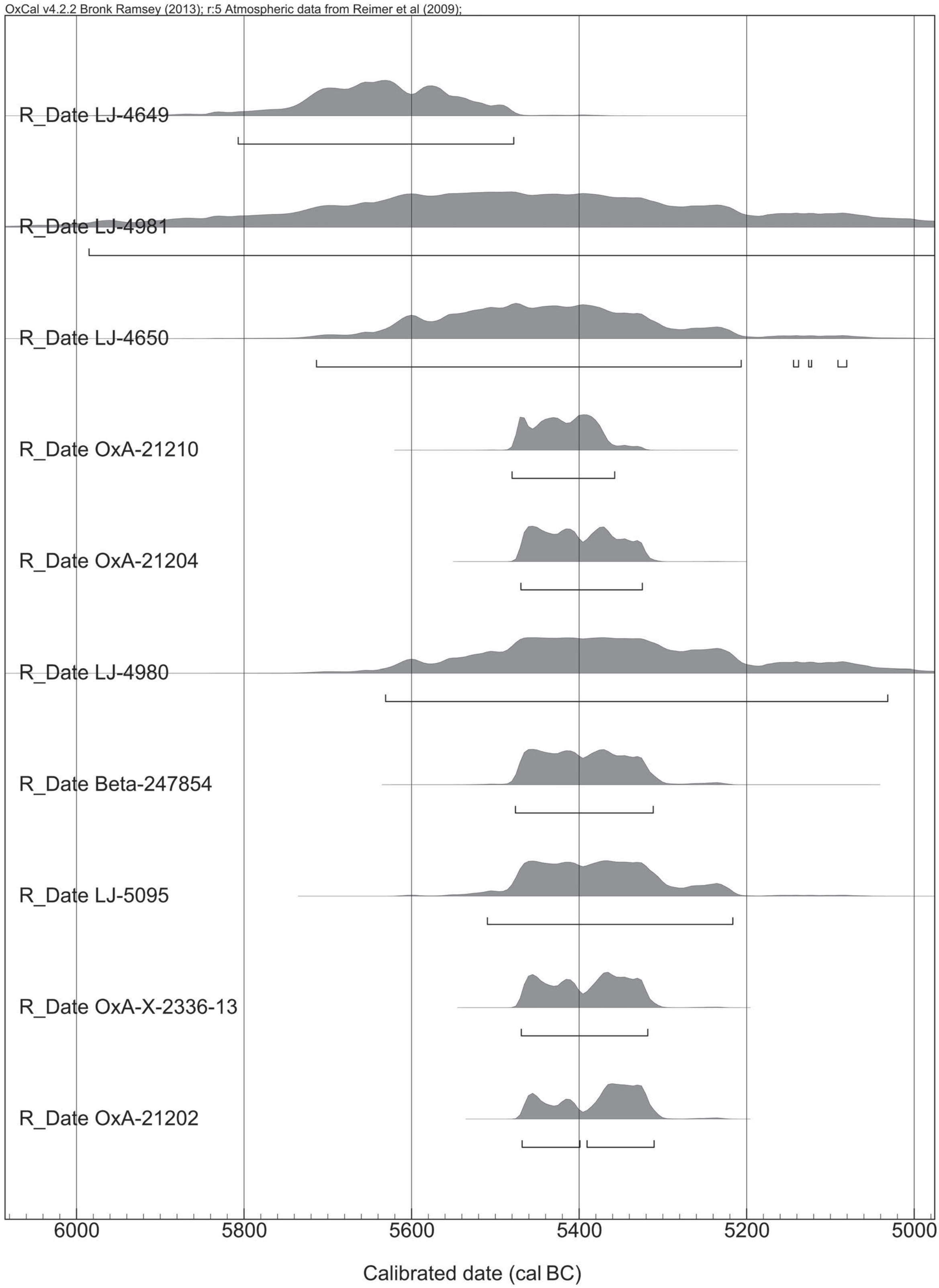


Fig. 2.3.2. (a, *above;* b, *facing page;* c, *following page)* Calibration curves for sixth-millennium BCE radiocarbon dates from Scaloria Cave.

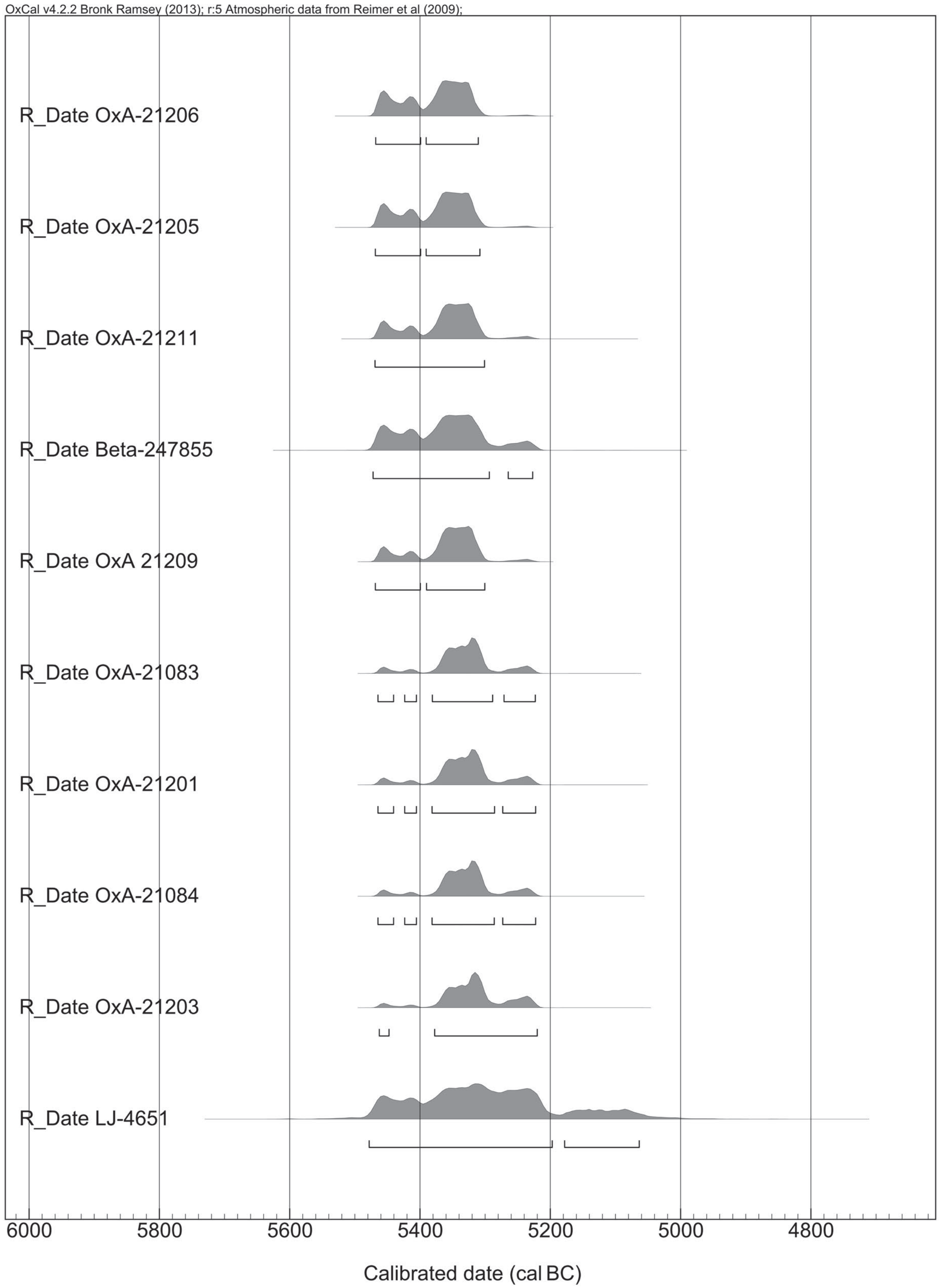


Fig. 2.3.2, continued. (b) Calibration curves for sixth-millennium BCE radiocarbon dates from Scaloria Cave.

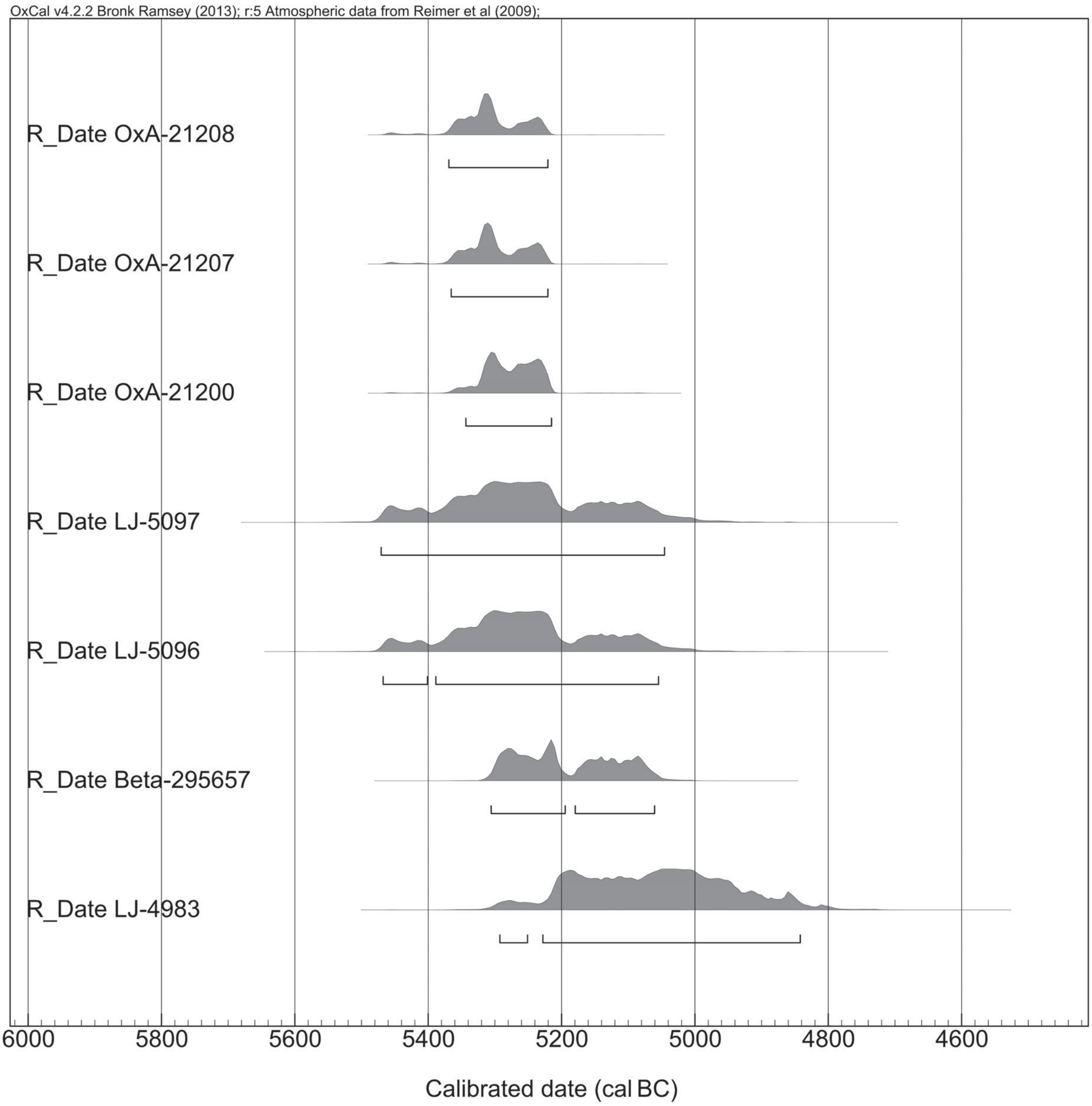


Fig. 2.3.2, continued. (c) Calibration curves for sixth-millennium BCE radiocarbon dates from Scaloria Cave.

a new, or renewed, practice of undisturbed single primary inhumation, something that seems to have been common in Serra d'Alto and contemporary burials around the end of the sixth millennium BCE (e.g., Masseria Candelaro: Cassano et al. 2004; Serra d'Alto: Ridola 1924, 1925, 1926; Serra Cicora: Ingravallo 2001; Pulo di Molfetta: Mosso 1910; Trasano: Guilaine and Cremonesi 1987).

Middle to Late Neolithic, Scaloria Alta/Ripoli

One date, LJ-4983, is distinctly later than the rest of the Neolithic dates, falling in the last century or two of the sixth millennium or the first century or two of the fifth (the 95% confidence interval is 5293–4843 cal BCE). It dates a context found with painted trichrome pottery, in the Ripoli/Scaloria Alta style. This usefully confirms that the cave continued to be used after the Scaloria Bassa period of intensive activity. It also reassuringly confirms the model of ceramic evolution in which elaborately painted trichromes such as Ripoli, Scaloria Alta, Capri and Serra d'Alto wares characterize the end of the Middle Neolithic, before the general shift to Diana-Bellavista pottery in the mid-late fifth millennium. Although not directly confirmed, this suggests that it is probably correct to ascribe the articulated burials

Table 2.3.1. Radiocarbon determinations for Scaloria Cave*

Date	Material	Context, provenience, critical notes	Date BP	Median	From	To	From	To	From	To
LJ-4979	Charcoal	Trench 8, level 9, "Upper Paleolithic/ Mesolithic, from yellowish sandy soil" (Upper Paleolithic)	11040 ± 190 BP	−10982	−11156	−10781	−11328	−10657	−11526	−10468
LJ-4978	Charcoal	Trench 8, level 8, "Upper Paleolithic/ Mesolithic" (Upper Paleolithic)	10790 ± 210 BP	−10755	−11011	−10485	−11190	−10188	−11385	−9873
LJ-4982	Charcoal	Trench 8, level 3, "Upper Paleolithic/ Mesolithic; area with concentration of animal bones" (Upper Paleolithic)	9560 ± 140 BP	−8946	−9175	−8761	−9278	−8568	−9449	−8303
LJ-5098	Charcoal	Trench 8/8N, level 4, Upper Paleolithic/ Mesolithic "feature of arranged stones, splintered bone, and burnt area" (Upper Paleolithic)	9030 ± 120 BP	−8219	−8421	−7969	−8554	−7796	−8701	−7635
LJ-4649	Charcoal	Trench 3, level 3 (20–30 cm depth) "near mandible in pit burial" (It is not clear what this refers to, as no pit burial is documented for this trench.)	6720 ± 100 BP	−5637	−5720	−5557	−5808	−5479	−5974	−5376
LJ-4981	Charcoal	Trench 10, level 4, "burial floor"	6530 ± 260 BP	−5464	−5719	−5219	−5986	−4911	−6231	−4651
LJ-4650	Charcoal	Trench 1, level 8, "charcoal on and around human skull" (Note that charcoal fragments may not be definitely associated with skull.)	6490 ± 140 BP	−5443	−5606	−5322	−5714	−5081	−5813	−4987
OxA-21210	Human bone	Trench 10, burial group 6, "A individual"	6448 ± 31 BP	−5419	−5473	−5379	−5481	−5358	−5485	−5322
OxA-21204	Human bone	Trench 10, level 2, "central tomb, homo"	6411 ± 32 BP	−5404	−5468	−5361	−5470	−5325	−5478	−5311
LJ-4980	Charcoal	Trench 10, "by boar tusk pendants and long flint blades, level of burials" (burial group 8)	6410 ± 150 BP	−5370	−5512	−5222	−5632	−5032	−5739	−4841
Beta-247854	Charcoal	From micromorphology samples; level sealed below hearths/herding levels	6410 ± 50 BP	−5397	−5468	−5345	−5477	−5312	−5509	−5222

Continued on next page

Table 2.3.1, continued. Radiocarbon determinations for Scaloria Cave*

Date	Material	Context, provenience, critical notes	Date BP	Median	From	To	From	To	From	To
LJ-5095	Charcoal	Trench 6N, level 4, "habitation debris"	6400 ± 80 BP	−5381	−5468	−5321	−5510	−5217	−5614	−5067
OxA-X-2336-13	Human bone	Trench 10, burial group 1, "C individual," juvenile	6398 ± 34 BP	−5386	−5465	−5325	−5470	−5319	−5480	−5234
OxA-21202	Human bone	Trench 4, level 3, juvenile; duplicate of sample run as OxA-21201	6384 ± 33 BP	−5367	−5464	−5318	−5469	−5311	−5476	−5227
OxA-21206	Human bone	Trench 10, burial group 2, "B individual," adult	6384 ± 32 BP	−5366	−5463	−5319	−5469	−5311	−5476	−5227
OxA-21205	Human bone	Trench 10, burial group 1, "A individual," juvenile	6381 ± 33 BP	−5364	−5463	−5317	−5469	−5309	−5476	−5226
OxA-21211	Human bone	Trench 10, burial group 8, "A individual," adult	6371 ± 33 BP	−5354	−5462	−5311	−5470	−5302	−5475	−5223
Beta-247855	Charcoal	From micro-morphology samples; level sealed below hearths/herding levels	6370 ± 50 BP	−5358	−5465	−5306	−5473	−5228	−5479	−5217
OxA 21209	Human bone	Trench 10, burial group 5, "A individual," adult	6368 ± 31 BP	−5351	−5374	−5311	−5469	−5301	−5474	−5223
OxA-21083	Human bone	Trench 10, burial group 9, adult	6348 ± 31 BP	−5332	−5365	−5305	−5465	−5224	−5470	−5219
OxA-21201	Human bone	Trench 4, level 3, juvenile, duplicate of sample run as OxA-21202	6347 ± 33 BP	−5331	−5370	−5302	−5465	−5223	−5470	−5218
OxA-21084	Human bone	Trench 10E, level 2, adult	6347 ± 32 BP	−5331	−5367	−5303	−5465	−5223	−5470	−5218
OxA-21203	Human bone	Trench 6, Neolithic levels, juvenile (This is the child skeleton from trench 6, level 6.)	6339 ± 33 BP	−5321	−5367	−5235	−5463	−5221	−5470	−5216
LJ-4651	Charcoal	Trench 1, level 8, "near human skull" (Note that charcoal fragments may not be definitely associated with skull.)	6330 ± 90 BP	−5309	−5465	−5216	−5479	−5064	−5552	−4979
OxA-21208	Human bone	Trench 10, burial group 4, "C individual," juvenile	6329 ± 31 BP	−5311	−5359	−5230	−5370	−5221	−5466	−5213
OxA-21207	Human bone	Trench 10, burial group 2, "C individual," adult	6324 ± 32 BP	−5306	−5342	−5228	−5366	−5221	−5466	−5212
OxA-21200	Human bone	Trench 1, level 6, adult	6303 ± 33 BP	−5275	−5317	−5226	−5344	−5216	−5465	−5138

Table 2.3.1, continued. Radiocarbon determinations for Scaloria Cave*

Date	Material	Context, provenience, critical notes	Date BP	Median	From	To	From	To	From	To
LJ-5097	Charcoal	Trench 7, level 1 "near grave 12" (This seems confused; there were no human remains in trench 7 and no grave 12 anywhere in the cave.)	6290 ± 90 BP	−5260	−5370	−5079	−5471	−5046	−5516	−4932
LJ-5096	Charcoal	Trench 6S, levels 6 and 7, "near grave" (e.g., child burial; charcoal may not be definitely associated with burial)	6290 ± 80 BP	−5263	−5370	−5080	−5468	−5055	−5482	−4961
Beta-295657	Human bone	Complete adult female burial, trench 2	6230 ± 40	−5209	−5298	−5080	−5306	−5061	−5322	−5017
LJ-4983	Charcoal	Trench 5, level 3, "with Ripoli-style painted pottery" (Middle–Later Neolithic)	6120 ± 80 BP	−5059	−5207	−4961	−5293	−4843	−5323	−4729
R-349	Soil	Lower Cave, finely powdered calcareous-carbonaceous earth, near basin (See discussion in text.)	5480 ± 70 BP	−4332	−4444	−4256	−4487	−4075	−4530	−4048

* Excavators' original contexts are noted in quotation marks. Critical notes are added in parentheses.

and Scaloria Alta and Serra d'Alto pottery that Quagliati found to a period distinctly later than the trench 10 mass of disarticulated bone.

Late Neolithic/Post-Neolithic or Erroneous?

Finally, the latest date (R-349), on carbon-rich sediment from the Lower Chamber, falls 500 to 1,000 years after the latest evidence for use of both the Upper and Lower Chambers. As noted above, this may be a "junk date," to be discounted on methodological grounds, or it may represent a sporadic visit to the cave long after its Neolithic use (see Bianchi et al., Chapter 2.2).

Riassunto

Questa breve sezione raccoglie le considerazioni cronologiche di grotta Scaloria. La sequenza stratigrafica spesso non è risolutiva in quanto non vi è un'unica stratigrafia che colleghi tra loro le dieci piccole trincee sparse disperse nella grande Camera Alta. La periodizzazione delle ceramiche mostra che la grotta segue la sequenza proposta da S. Tinè per il Tavoliere, e che il luogo di culto nella parte bassa era all'incirca contemporaneo con le principali deposizioni funerarie del camerone superiore. Un'ipotesi di cronologia assoluta dipende dalle datazioni al radiocarbonio.

Con 32 date al radiocarbonio disponibili, Scaloria uno dei siti neolitici più datati in Italia. La sola data, R-349, relativa alla parte bassa e molto recente, forse si riconduce a una sporadica rivisitazione della grotta più tarda non correlata all' uso principale della grotta. Le 13 date La Jolla sono affidabili, ma hanno grandi deviazioni standard. Le 18 nuove date AMS (16 su osso umano, 2 su carbone provenienti dal deposito della parte alta, sono state eseguite come parte di questa ricerca e formanouna cronologia coerente.

Tardo Paleolitico superiore. Quattro delle prime date dalla Trincea 8 definiscono un tardo uso della grotta

durante il Paleolitico superiore fasi finali di cacciatori-raccoglitori nel post-glaciale in diversi momenti tra il 12° e 8° millennio a.C., come confermano i ritrovamenti di fauna del tardo Pleistocene/Primo Olocene individuati in questa area.

La prima occupazione neolitica: prima del 5500 a.C. Tre date intorno alla metà del 6° millennio a.C. attestano l'uso della grotta nella prima metà del 6° millennio a.C. Questo precede la fase funeraria riferibile alla facies Scaloria e l'uso rituale della grotta; è associata alla ceramica impressa di stile Guadone dei depositi abitativi.

Neolitico Medio: 5500–5200 a.C. Questo è stato il periodo più intenso di utilizzo della grotta per scopi sia funerari e non come dimostrano due date su carboni. L'uso funerario principale della Grotta superiore è rappresentato da un gruppo straordinariamente compatto di 23 date dal 5500 a.C. al 5200 a.C., che comprende sia la massa di ossa umane disarticolate sia le sepolture articolate e la sepoltura del bambino senza testa della trincea 6. Tali date sull'insieme di ossa umane spaziano in un arco di tempo compreso fra il 5480–5300 a.C., ma non possiamo dire se le ossa sono state depositate durante un intervallo di tempo ristretto o in uno spazio temporale esteso fino a 300 anni. La sepoltura di una donna adulta dalla Trincea 2 risale all'incirca alla fine di questo periodo (5322–5017 a.C.), e probabilmente rappresenta una nuova, o rinnovata, pratica di inumazione primaria singola e indisturbata simile a quelle di Serra d'Alto e a sepolture contemporanee intorno la fine del 6° millennio a.C.

Medio e Tardo Neolitico, Scaloria Alta/Ripoli. Una data successiva (LJ-4983, 5293–4843 BCcal) si riferisce ad un contesto di ceramica dipinta tricromica in stile Ripoli/Scaloria Alta, confermando la sequenza ceramica generale. Anche se non sono datate direttamente, le sepolture con inumati articolati e le ceramiche Scaloria Alta e Serra d'Alto trovate da Quagliati quasi certamente risalgono a questo periodo.

Tardo Neolitico/post-neolitico Infine, come già detto, l'ultima data (R-349), ricavata dai carboni della parte bassa della Scaloria, cade da 500 a 1000 anni dopo la più tarda evidenza di uso sia della camera superiore sia di quella inferiore. Questa può essere una data inquinata, o può rappresentare una visita sporadica alla grotta molto tempo dopo il suo utilizzo neolitico.

Chapter 3

The Ancient Cave and Its Human Occupation

3.1. Geoarchaeological Studies

By Ivano Rellini, Andrea Ciampalini, Marco Firpo, and John Hellstrom

Introduction

Scaloria Cave is located at about 1 km northeast of Manfredonia. The entrance, about 45 m above present sea level, overlooks the modern coastal plain. Today Scaloria is part of a wide karstic system that encompasses other caves, such as Occhiopinto. Scaloria Cave was accidentally discovered in 1931 during the construction of an underground water system. Archaeological excavations were undertaken in 1931, after World War II, and in 1967, and then again in 1978–1979 by the University of Genoa and the University of California, Los Angeles. Most recently, in 2007 and 2008, a sampling program was implemented to investigate the physical character of the cave and its stratigraphy. The geoarchaeological study was undertaken using a descriptive approach and thus far has included a morphological description of the inner cave with its calcareous concretions and a stratigraphic study of the site by micromorphological analysis. A high-priority goal is to gain an understanding of the relationship between settlement and environmental dynamics, with a special focus on site formation processes. The new micromorphological observations of the occupation layers provide for a wider interpretation and assessment of cave use during the Middle Neolithic in Puglia (Italy).

Geological and Geomorphological Setting

The Gargano promontory, on the eastern coast of the Italian peninsula (Figure 3.1.1), represents a weakly deformed sector of the Apulian carbonate platform formed from the Mesozoic to the Early Tertiary (Brankman and Aydin 2004; D'Argenio 1974; Doglioni et al. 1994; Graziano 2000). The Apulia Platform has been a part of the foreland of the Apennine thrust belt since the Neogene. The Gargano constitutes a tectonic-stratigraphic domain formed by the foothills of the southern Apennine fold-and-thrust belt. It is composed mainly of shallow-water platform carbonate units, which represent the passive margin deposits related to the opening of the Tethys Sea (Graziano 2000; Masse and Luperto Sinni 1987; Neri and Luciani 1994). The landscape/relief near Manfredonia, northward of Scaloria Cave, is constituted predominantly by limestone and calcarenites.

The formation of the Tavoliere Plain started during the Lower Pleistocene, at the end of the compressive phase (Ciaranfi et al. 1988). The glacial eustacy and the last phases of uplift caused the cutting and the abrasion of the promontory. The sea-level oscillation directed the formation of eight orders of marine terraces comprised of between 350 and 5 m above sea level (masl) (Caldara and Pennetta 1993). The morphology of the

Fig. 3.1.1. Geomorphological setting of study area. (A) Gargano slopes formed by carbonate lithotype, subjected to a considerable karst process. (B) Alluvial fans. (C) Marine terraces (modified by SIT-Regione Puglia).

southern flank of the promontory dips abruptly seaward, generating an alternation of steep slopes and flat zones. The "Region of Southern Terraces" is placed southward of the Gargano promontory. This region is formed by two main terraces representing the hanging wall blocks of several semi-grabens that cut the promontory. These terraces are characterized by the presence of canyons partly filled by alluvial fan deposits, placed at the boundary with the plain below. The upper terrace is placed between 600 and 400 MASL, whereas the lower is placed at 150 to 100 MASL (Figure 3.1.1). The latter has been clearly modeled by the Quaternary sea-level variations. Many karstic forms characterize the slope between the two terraces. In particular, many caves exist; one of these is Scaloria Cave. The high sedimentary supply coming from the erosion of the Gargano promontory and from the Apennines slowly filled the area between the promontory and the continent. After this junction, the paleogulf of Manfredonia moved forward, followed by the formation of several lagoons bounded seaside by many coastal dunes.

The evolution of the Gargano promontory during the Holocene has been mainly affected by sea-level variations. As a consequence of the last glacial maximum, the coast of the study area was shifted 80 km east of today's coast (Caldara and Pennetta 1993). The Apenninic rivers formed a straight pattern in the inner part of their drainage net and a meandering pattern in the last part, from the alluvial plain to their outlet. Today that last part remains under the sea. The abundance of precipitation and the presence of a wide silty-sandy alluvial plain favored the development of a wide system of marshes. The rivers coming from the promontory were very short and characterized by the deposition of alluvial fans (Figure 3.1.1) each time they passed from a narrow valley to the plain (Mastronuzzi et al. 1989). At the end of the last glacial maximum, a

new intrusion took place: part of the ancient alluvial plain occupied by the marsh was flooded by the sea. The abundance of marine and fluvial sand encouraged the formation of many sand bars, which defined wide lagoons, parallel to the coast.

At the beginning of the Neolithic, the relative sea level in the Tyrrhenian Sea was 15 m lower than it is today (Antonioli et al. 1998; Antonioli 2004). The sea-level rise was halted for a long period, causing the formation of a wide band of dunes between the sea and the lagoon of the Gulf of Manfredonia. During the Early Neolithic, the climate was mild, so the alluvial plain was probably colonized, in particular the flourishing banks of the several rivers. The sea-level rise continued during the Middle Neolithic, when the sea level reached 3 m lower than it is today (Antonioli et al. 1998). The band of dunes was shifted westward as a consequence of the sea-level rise, and the lagoon was reduced. At the end of the Middle Neolithic, the climatic condition changed. A long period of drought resulted in the depopulation of the plain of Manfredonia (Gravina 1988). During the Late Neolithic, the drought continued and the strong evaporation replaced lagoons with sabkha. Woodland was reduced and the landscape became very eroded. The erosion processes deposited a lot of sediment in the plain occupied by the sabkha. The plain was slowly filled by the alluvial deposits, forming a landscape very close to that seen today.

The wide presence of limestone and the optimal climatic conditions in the past supported the development of karst processes in the entire Gargano promontory (Figure 3.1.1). Rock solubility and water are the primary factors in karst development. Limestone has a low primary porosity and a high secondary porosity, represented by fractures whereby acidic water slips in and dissolves the rocks. The removal of rock in solution creates an underground drainage system formed by channels and caves. The Gargano promontory is an excellent place for the development of karst landscapes because it is made mainly of fractured limestone.

Scaloria Cave is a classic example of an interlayer cave, formed between two layers of limestone in consequence of the limestone dissolution and the collapse of ceilings caused by seismic events. Cave evolution was revealed during the time of study—that is, the structure and the shape of the cave and the deposits inside. Caves are important geomorphic markers and excellent dedimentarytraps for sediment formed both inside and outside. Through the analysis of deposits, it is possible to obtain detailed information about climatic changes during or after the deposition (Laville 1976). For example, alluvial fan sediments are deposited in the caves during cool-wet periods; aeolian deposits are favored by cold-arid conditions. The stratigraphic reconstruction of the cave's deposits, combined with the study of the archaeological and biological contents (remains of plants or animals), provides an excellent record of the climatic changes that occurred in the cave and gives information about landscape evolution. The age of the cave can be determined by dating either speleothems (U/Th dating on calcite) or sediments deposited in the cave (cosmogenic $^{26}Al/^{10}Be$ burial dating).

The Cave

Here we present the first results obtained through the morphological study of the central part of the "Camerone Quagliati" and the micromorphological study of the deposits within it. The central part was chosen because it preserves the greatest thickness of deposits and is placed in front of the original entrance. The reference profile is oriented along the north–south direction, from the deepest point of the cave (S1) to the original entrance (on the south side; see Figure 3.1.2). Three parts, characterized by different morphologies, were observed in the ceiling along the profile. The ceiling of zone A (Figure 3.1.2) deepens abruptly and gently northward. Many stalactites and a carbonaceous crust, 5–7 cm thick, entirely cover the ceiling. The diameter of the stalactites varies from 1 to 25 cm. Between zones A and B is a 20-cm difference in height. Zone B (Figure 3.1.2) is characterized by an almost horizontal ceiling. The largest part of the ceiling is covered by a thin calcareous crust. Many stalactites are present, but their diameters vary from 1 cm to 2 cm. The thin calcareous crust covers the ceiling in zone C (Figure 3.1.2) too, but stalactites there are rare. This zone is characterized by several small sinkholes completely filled by sediments.

The morphology and the varied distribution of the stalactites provide data about the evolution of the cave. Scaloria Cave was formed under karstic processes, which were followed by several seismic collapses of parts of the ceiling. The presence of small stalactites in zones B and C and of bigger stalactites in zone A (Figure 3.1.2) suggests that one of the last seismic events caused the collapse of the ceiling only in B and C. This collapse is probably related to the opening of the cave.

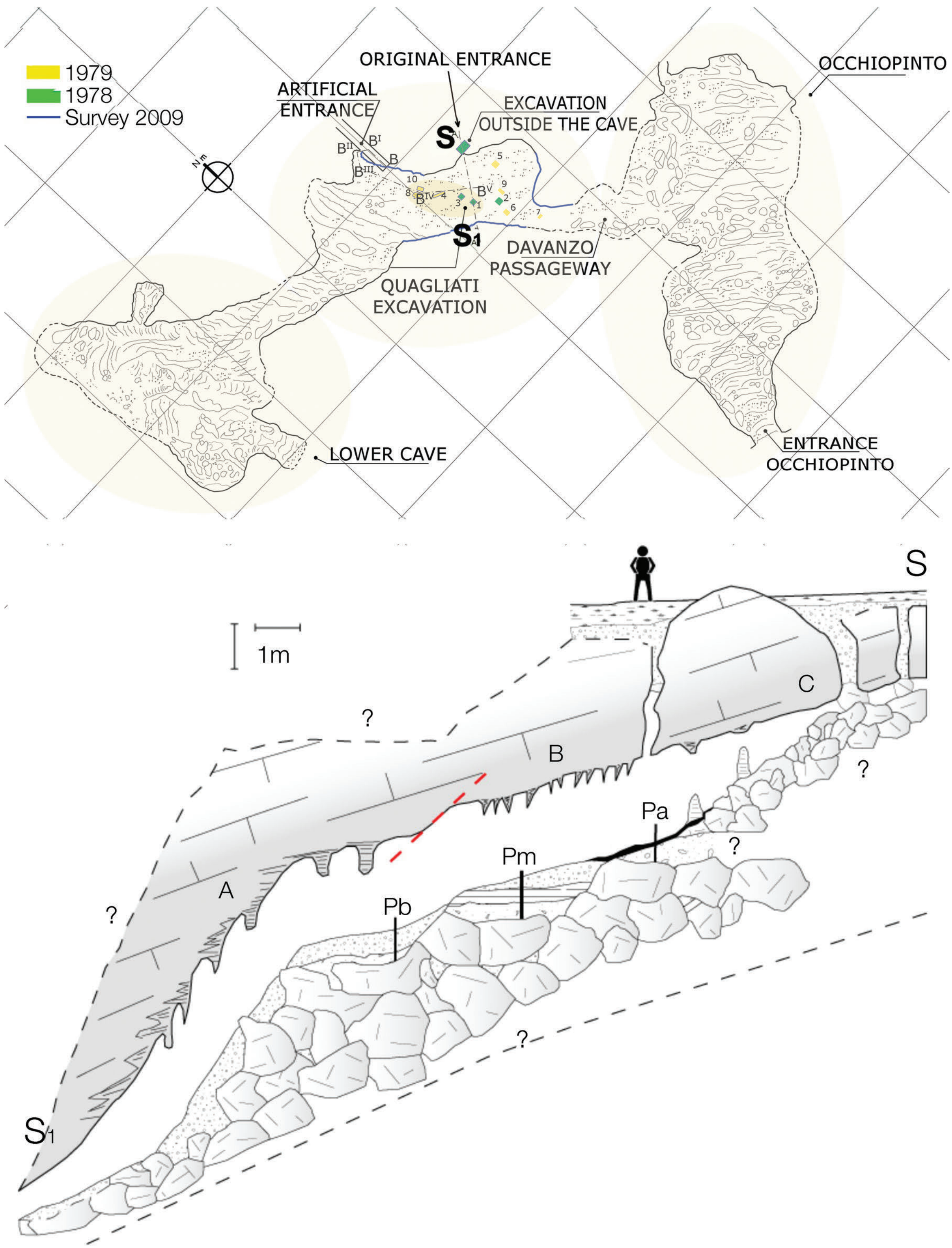


Fig. 3.1.2. Synthetic stratigraphic sections in Scaloria Cave fill. The lower part of the fill is comprised of large fall blocks; above this, the deposits contain remains from the Early Neolithic. Pa = upper profile (*profilo alto*); Pm = middle profile (*profilo medio*); Pb = bottom profile (*profilo basso*).

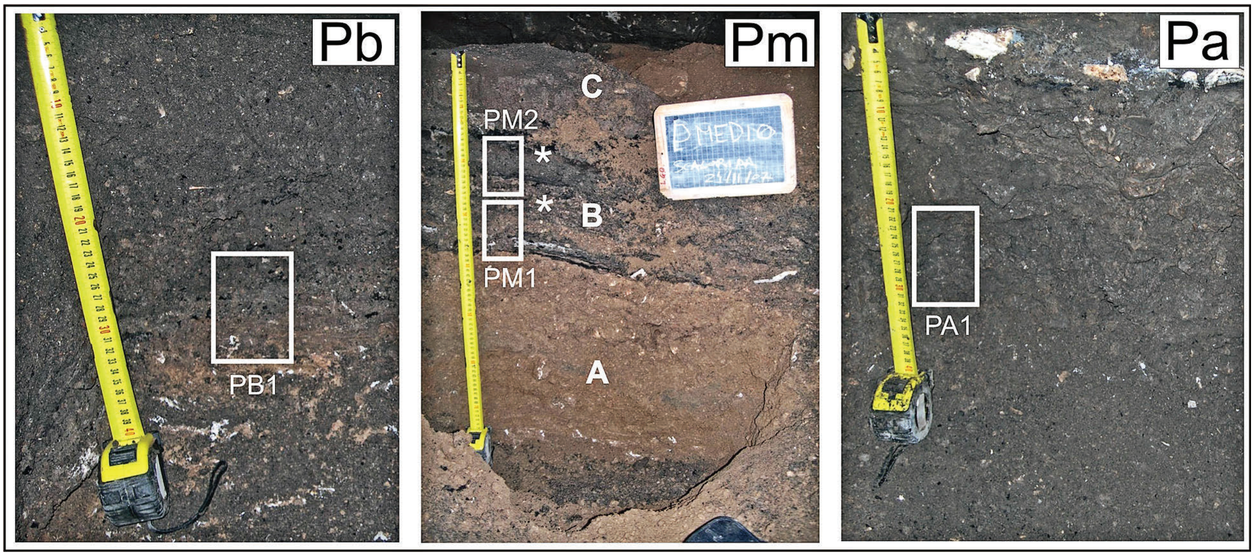


Fig. 3.1.3. Image of the three profiles sampled for micromorphological analysis. The rectangle indicates the sampled point. (A) Ceiling in this zone covered by carbonaceous crust with many stalactites. (B) Nearly horizontal ceiling; largest portion covered by thin carbonaceous crust, also many stalactites. (C) Thin carbonaceous crust covers ceiling in this zone as well; fewer stalactites. Pa/PA = upper profile (*profilo alto*); Pm/PM = middle profile (*profilo medio*); Pb/PB = bottom profile (*profilo basso*). *^{14}C dates.

This is supported by the presence of outside sediments on the blocks coming from the vault and within their interstices.

The floor of the cave presents a more complex shape, even though it follows roughly the shape of the ceiling. It is steeply inclined in the deeper part of the cave where it is covered by an unknown thickness of deposits. At present, the depth of the rocky substratum is unknown, because the thickness of sediment and rocks collapsed from the ceiling has not been investigated. Climbing from the bottom to the highest part of the cave, a first horizontal surface is present; here the oldest entrance may have been placed. The flat surface is covered by 60 cm of deposits. We dug a first trench (Pb in Figures 3.1.2 and 3.1.3) for micromorphological sampling and for analysis of the sediments. A second trench was dug to correspond to the second flat surface (Pm in Figures 3.1.2 and 3.1.3). A steep step divides this surface from the first. The sedimentary sequence observed here is more complex. The last flat surface is placed near the probable ancient entrance of the cave, where sediments have a lesser thickness with respect to the others (Pa in Figures 3.1.2 and 3.1.3). A variable thickness of gray-brown silty mud covers the entire surface of the cave and contains fragments of bones, tools, and pottery. At present, this layer is in formation because the sinkholes in the vault are not completely closed, allowing outside sediments to continue entering the cave.

Speleothems and Calcareous Tufa

Speleothems and calcareous tufa are formed in caves by precipitation of calcite from underground water rich in $CaCO_3$. The mechanism that drives the precipitation is represented by the CO_2 outgassing by means of falling pCO_2 in the cave (Ford and Williams 1989). The carbonate precipitation in caves is driven by dripping water combined with the cave's environment. In particular, the twilight zone, placed in proximity to the cave entrance, is strongly influenced by the extremely variable microclimatic conditions, which have a clear control on the evolution of actively forming speleothems. Temperature, humidity, and light intensity affect the deposition of the speleothems (Borsato et al. 2000; Railsback et al. 1994). These variables have a stronger influence in the twilight zone with respect to the cave interior. The morphology and petrology of actively forming stalactites and stalagmites reflect closely the microclimatic gradient existing between the cave entrance and the inner part. The microcrystalline speleothem fabrics, which are formed by physico-chemical precipitation, occur in the deepest part of some caves, where the environment is characterized by an absence of light and by a stable climate. The porous tufa fabric, correlated to biological processes, occurs very close to the cave entrance, where the environment usually has more illumination and variable climate

conditions (Tabarosi et al. 2005). Microcrystalline speleothems and porous tufa are the end results of a range of concretions that are often formed by both.

Tufa is a particular type of deposit formed by calcite precipitation from freshwater supersaturated with calcium carbonate (Chafez et al. 1994; Horvatinčić et al. 2003; Pedley 2000). Formation of the tufa is controlled by biogenic CO_2 present in the groundwater running on the upper part of the soil. Microbial metabolic activity of diatoms and cyanobacteria facilitate the precipitation and deposition of calcium carbonate (Pentecost and Zhahoui 2001). Study of the fabric could suggest changing events that cause shifts in local microclimates of cave gradients. Speleothems are useful paleoenvironmental archives because they record changes in climate and water circulation, and they can be dated back to 500 Kyr (Kyr = 1,000 years) by U/Th mass spectrometry (Drysdale et al. 2009; Edwards et al. 1986; Hellstrom 2003; Zanchetta et al. 2005).

Many stalagmites grow on the blocks located on cave floors. These blocks are arranged like a fan, with the apex corresponding to the ancient entrance. The last collapse of the ceiling formed the fan that closed the cave. We collected seven of these stalagmites and one stalactite to observe their growth and composition, and to date the beginning of their formation. The sampled speleothems appear slightly irregular and crumbly and have been cut along the major axes. Two distinct parts are distinguishable in one of the stalagmites (Figure 3.1.4a). The lowest part is characterized by tufa deposits. It appears lightweight, porous, and friable and shows the presence of several vacuoles. Tufa deposits suggest that during their deposition, the twilight zone of the cave was not completely closed. Above the tufa concretion, many fine calcareous laminae are present. They represent the usual growth style of calcareous concretion produced at ambient temperatures from water dripping from the walls of the cave (speleothem). Each band corresponds roughly to one year.

The other stalagmites suggest a more complex framework (Figure 3.1.4b). They show the presence of two or more phases of calcareous tufa, suggesting periodic openings of a usually closed cave. The strong influence of the light on the fabric of the speleothems is clearly expressed in the sampled stalactites (Figure 3.1.4c), which were located very close to the ancient entrance. This speleothem was formed predominantly by calcareous tufa, which exhibits a very dark band, evidence of the presence of organic material. Dating the different fabrics observed in the speleothems or their boundaries through the U/Th method could reveal the timing of such events (sealing of the cave).

One stalagmite has been sampled at two points (Figure 3.1.4a) in order to date the beginning and the end of the carbonate precipitation. The U/Th disequilibrium dating method performed in the School of Earth Science of the University of Melbourne (Hellstrom 2003) suggests that 1.17 Kyr ± 0.02 ago there was an important change in the environmental conditions of the twilight zone of the cave, as suggested by the change in the type of concretion. This change may be related to the complete sealing of the cave in consequence of the last deposition of alluvial fan sediments. This condition persisted at least until 1.04 Kyr ± 0.02 ago, when the growth of the stalagmite stopped. The high growth rate between 1.17 and 1.04 Kyr was 0.67 mm per annum; this suggests that the stalagmite grew very quickly.

All the speleothems collected grew in the twilight zone and appear different from the ordinary speleothems placed in the deeper zones of Scaloria Cave. Actually, the concretions usually present in the twilight zone are not considered to be true speleothems because they are formed in part by calcareous tufa, have an irregular shape, and normally present the deflection of the axis (Taborosi et al. 2005). The irregularity and deflection of the axis are often due to biological processes that are strongly influenced by direction of the sunlight. The surface texture of the speleothems collected in the "Camerone Quagliati" look like ordinary speleothems because they became such after the sealing of the cave. The last step of the growth of these speleothems happened after the last closure event of the cave.

Finally, the floor of the deeper cave galleries is frequently covered by broken stalagmites. The presence of seismothems (Delaby 2001; Quinif 2001) suggests a possible seismic origin (earthquake) for the speleothem breaks. Some broken stalagmites may be due to human cutting, as indicated by the recovery of numerous vessels placed on the stumps of these features. Many broken stalagmites show a new stalagmite development along different axes (Figure 3.1.5). Therefore, the possibility of dating the speleothems allows a chronological reconstruction of the rupture. By dating the youngest part of the fallen stalagmite and the oldest part of the new intact stalagmite, which grows on the stump, a maximum and minimum age for the stalagmite rupture (cut or earthquake) can be estimated (Delaby 2001). The observation of the remaining

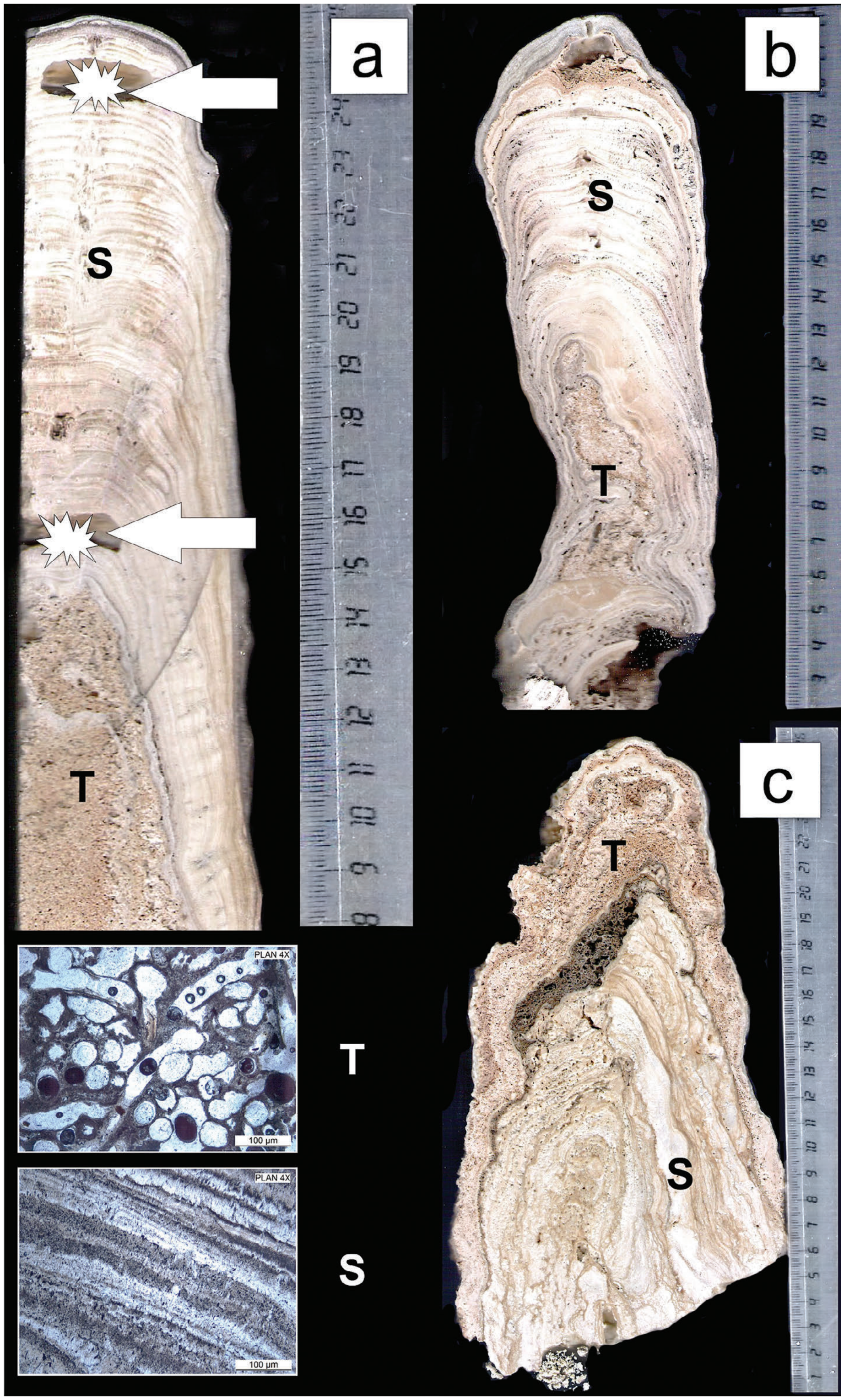


Fig. 3.1.4. Examples of speleothem sections. (a) In this stalagmite, the lowest part is characterized by tufa deposits, compared to fine calcareous laminae above. (b) Other stalagmites show more complex framework. (c) Sampled stalactites. Arrows indicate sampled points for U/Th dating. T = tufa concretion with porous fabric characterized by smooth tubular voids formed by bryophyte encrustation; S = normal speleothem with finely laminated microcrystalline fabric.

Fig. 3.1.5. Large truncated stalagmite with new stalagmite development along a different axis.

stump, of the new stalagmites, and of the displacement of the fallen pieces offers more accurate information about the earthquake that caused the Gargano promontory to emerge.

MICROMORPHOLOGICAL STUDY

Four representative, undisturbed soil micromorphology samples were collected in the levels with features of human settlement identified in the excavated profiles: one sample each for Pa and Pb (PA1, PB1) and two for Pm (PM1–PM2) (Figure 3.1.3). Relatively disturbed sequences were rejected. Sampling for micromorphological analysis was performed using Kubiëna boxes. Thin sections were prepared at the Servizi per la Geologia laboratory, Piombino, Italy. The samples of sediment were impregnated with polyester resin under vacuum, following the methodology of Benyarku and Stoops (2005). Large-format (80×50 mm) thin sections were first examined by eye or using a stereomicroscope at magnifications of 5 to 40× to establish different macro-sedimentary zones within them and then using a polarizing microscope and incident UV light microscope at magnifications ranging from 50 to 400× for more detailed studies. Thin sections were mainly described according to the terminology and methods of Stoops (2003) and Bullock et al. (1985) and, as to interpretation, with reference to Courty et al. (1989).

Upper Profile (Pa)

Field Description

The profile comes from near the ancient entrance of the cave, where sediments are shallower than in other parts of the cave. It is represented by a massive deposit (about 30 cm) of angular clasts of limestones scattered in a gray-brown silty mud matrix containing fragments of bones, tools, and pottery. A black charcoal layer is present at the top of the deposit, overlaid by a white-yellowish carbonate crust.

Section PA1: Microscopically, these deposits are dominated by large amounts of finely pulverized charred material, oxalate druses, spherulites, non-articulated phytoliths, and some silty and quartz clasts embedded in a clay- and silt-sized calcitic matrix. The overall appearance of this layer suggests that all the components are scattered throughout the sediment, where the main component is ash, made up of common variously preserved micritic pseudomorphs and calcite (micritic and microspartitic aggregates) deriving from the weathering of ash. Only thin and discontinued lenses of preserved grass ash and rare aggregates of dung remnants can still be observed (coprolites; Figure 3.1.6a). The coprolites have been identified by their shape (rounded surface), compact nature, and charred organic and phytolith content and arrangement, as well as by the presence of calcium oxalate druses and spherulites (Canti 1997, 1998), which appear in the form of less-than-20–micron spheres with a characteristic black cross under crossed polars (Figure 3.1.6b). The even distribution of

spherulites inside the matrix produces a closed speckled pattern. They probably represent sheep-goat coprolites (Courty et al. 1989).

Bone fragments and charcoal are also frequent, both often associated with burned soil aggregates. Rare fragments of pottery and knapped flint artifacts are embedded in the sediment. Some biological channels display opaque brownish coatings caused by percolation of organic-rich solution. Secondary precipitations of calcium carbonate have been observed within the groundmass ($CaCO_3$ impregnative nodules), and especially around channels ($CaCO_3$ coatings). In addition, microscopic calcified rootlets (calcitic cellular pseudomorphs; Figure 3.1.6c) were recognized. In thin section, the carbonate crust is composed of large carbonate nodules, strongly weathered, and characterized by replacement of diverse isotropic phosphate minerals.

Interpretation

The abundance of ash, bone, charcoal, and artifacts associated with a remarkable quantity of spherulites and some coprolites can be interpreted as a contemporaneous mixing of reworked, continuous, and domestic deposits. The coprolites reveal the presence of domestic animals, mainly sheep and goats. The frequent presence of microscopic calcified rootlets confirms that the upper sequence was formed near the original (now destroyed) cave entrance. Moreover, weak dissolution-reprecipitation processes periodically modified the micritic, fine fractionation during climatic conditions characterized by a limited amount of water and possibly rapid evaporation that favored locally the in situ recrystallization of calcite. The continuous output of calcium released during the successive dissolution processes reacted with the solutions rich in organic matter (brownish coatings) to form the amorphous calcic phosphates in the superficial crust.

Middle Profile (Pm)

Field Description

Three main units (A, B, and C) were distinguished during the excavation (Figure 3.1.3). The sequence starts with 40 cm of reddish brown silty sediment, rich in angular limestone fragments and showing an unstratified appearance (A). The following 25 cm of the sequence consists of alternating blackish and whitish layers, or lenses, including several fossil hearths, laced with brownish sandy-silt layers with few unsorted angular stones (B). Bones and ceramic fragments are common in this layer. In contrast, the uppermost centimeters, characterized by a chaotic mixture of grayish mud and archaeological materials, are disturbed (C).

Accelerator mass spectrometry (AMS) assays of carbonized barley from the top and center of unit B provided calibrated dates of BCE 5470–5290 and BCE 5480–5310, respectively (2σ; calibrated age ranges are based on the Beta Analytic Radiocarbon Dating Laboratory, Miami, Florida, IntCal04 Database), suggesting human occupation of the site during the Middle Neolithic.

The two thin sections under the microscope show dense alternation of facies corresponding to different micromorphological subunits (A, B, C, etc.). The micromorphological description follows the same stratigraphic order (from bottom to top) as the description in Figure 3.1.7.

Section PM1-A: This subunit consists of loosely packed subangular blocky aggregates (centimeter-sized), composed of poorly sorted clasts of limestone and sand grains, including sand/silt quartz grains, mixed within a reddish brown clay having a stippled-speckled or weakly crystallitic b-fabric due to the presence of variously preserved fine-grained crystals of calcite (ash). In the upper part of the layer, subangular reddened aggregates combined with small bone fragments, generally yellowish brown, are present. Some bone fragments without signs of burning are included in subrounded aggregates that are highly phosphatic (highly fluorescent in blue light; Figure 3.1.6d) with dark brown groundmass, non-birefringent. They can be formed from carnivore coprolites (e.g., canid, hyena; Courty et al. 1989).

Section PM1-B: This level is dominated by horizontal thin lenses of articulated phytoliths (Figure 3.1.6e, f) with remains of incompletely burned vegetal tissue alternating with thin layers of charcoal and ash. Ash is represented by rare micritic pseudomorphs on calcium oxalates with very low birefringence (undifferentiated b-fabric) under crossed polars. These characteristics, with the high amount of phytoliths, mainly result from burned grass (Courty et al. 1989). The phytoliths are sometimes elongated forms with dendritic margins (Figure 3.6g), which could derive from domesticated cereals (e.g., *Triticum aestivum*; Courty et al. 2008). At the base, the ash/charcoal layer includes reddened, rounded soil aggregates similar to those observed in the underlying layer; presumably these were reworked from the underlying aggregates during burning.

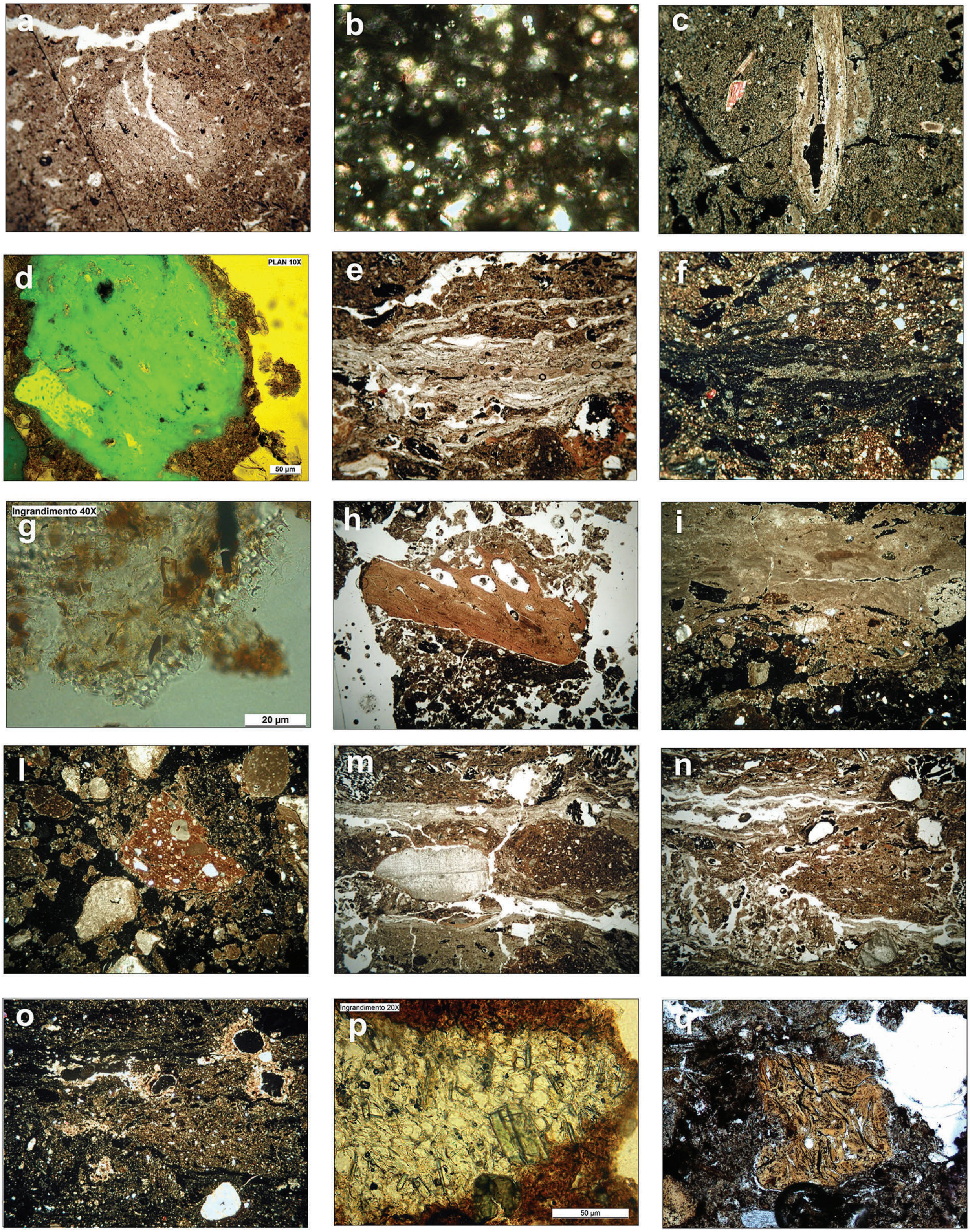


Figure 3.1.6. Micrographs from profiles. See facing page for full caption with details.

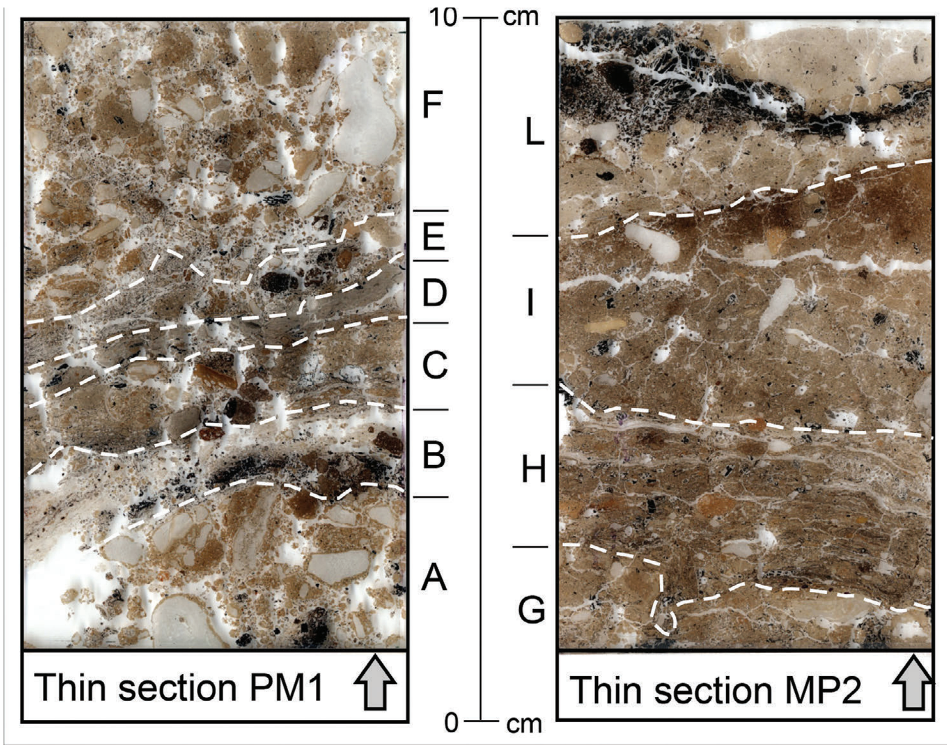


Fig. 3.1.7. Thin sections from middle profile. Note the dense alternation of facies.

Facing Page: Fig. 3.1.6. Micrographs from profiles. (a) PA: rounded sheep-goat coprolites; 16×, plain-polarized light. (b) PA: dense packing of spherulites and non-articulated phytoliths; 250×, crossed polarizer. (c) PA: calcified rootlet; 40×, crossed polarizer. (d) PM1 (A): highly fluorescent coprolite contains bone fragment; blue light. (e) PM1 (B): lens of articulated phytoliths; 16×, plain-polarized light. (f) PM1 (B): same as (e), isotropic phytoliths are dark under crossed polars; 16×, crossed polarizer. (g) PM1 (B): elongated phytoliths with dendritic margin; plain-polarized light. (h) PM1 (C): burned bone; 16×, plain-polarized light; (i) PM1 (D): calcite bands due to reheated ash; 16×, crossed polarizer; (l) PM1 (F/G): pedorelict showing internal crude bedding; 16×, plain-polarized light. (m) PM2 (H): human occupation layers with horizontal bedding of articulated phytoliths and clayey to sandy layers; 16×, plain-polarized light. (n) PM2 (H): biological disturbances created by root penetrations and earthworm activity; 16×, plain-polarized light. (o) PM2 (I): micritic hypocoatings, thin coatings along channels; 16×, crossed polarizer. (p) PB: grain of acid volcanic glass, characterized by inclusions of rod-like minerals; plain-polarized light. (q) PB: human coprolite; 16×, plain-polarized light.

Section PM1-C: This thin layer is constituted by aggregates of reworked ashes characterized by dusty, brownish gray fine fraction with abundant phytoliths and micro-contrasted particles (fine charcoal and charred organic fragments), which shows under crossed polars a crystalliferous b-fabric resulting from dispersion of the calcite crystals and micritic pseudomorphs. Common aggregates of "terra rossa" soil, reddish brown under plain-polarized light and often burned, also occur together with rounded limestone fragments (coarse sand and gravels) and mineral grains of quartz (fine sand). Bone and shell fragments are abundant and evenly distributed in the sediments, and many of these bone fragments show signs of burning (Figure 3.1.6h), with an even transition in color to yellowish brown and brown tints (Courty et al. 1989).

Section PM1-D/E: In this portion of the thin section, a dark-gray cemented layer is observable. It presents a microscopic layered appearance with evident calcite-rich bands. The calcite bands consist of recrystallized ashes resulting from the melting of ash below (Figure 3.1.6i), which has been reheated and transformed by a subsequent fire (Courty et al. 1989). Charred plant fragments and charcoals are still visible

within these bands. This layer is overlain by horizontal beddings of charred plants and lenses of articulated phytoliths.

Section PM1-F/G: This subunit consists mostly of weathered ash and reworked soil material: charcoal fragments, bone, shells, lenses of charred vegetal residues, and phytoliths. Amorphous phosphate concretions are also rather common, and subrounded pedorelics are frequent. The latter show a well-preserved sedimentary structure; in fact, the original internal crude bedding of water-laid deposits (Figure 3.1.6l) is still visible, in addition to fragments of alluvial clay (papulae). The coarse sandy and gravel portion is abundant, and it consists mainly of subangular limestone fragments in addition to quartz grains and rare amphiboles and pyroxenes (fine sand), especially of the green varieties (i.e., augite, hornblende). Some subrounded limestone fragments display thin coatings of grayish brown calcitic silty clay (seldom pendants), and sometimes well-rounded calcite nodules can be detected and some fragments of stalagmitic concretions have been observed. The horizontal orientation of the tabular or elongated rock fragments observed in the upper part of the layer (PM1-G) is an interesting result.

Section PM2-H: This consists of a laminated mixture of grass ash crystals with relict articulated phytoliths regularly alternating with clayey to sandy layers (Figure 3.1.6m), with a porphyric distribution of coarse grains (limestone fragments) in a marked horizontal orientation. The grass ash (with very low birefringence) is intimately associated with many small fragments of charcoal. Sometimes these stratified deposits show clear evidence of bioturbation, such as earthworm activity (loose continuous infilling of channels by excrements) and well-developed networks of void channels (Figure 3.1.6n). The l channels are covered by thin, coarse calcite coatings and surrounded by micritic hypocoatings (Figure 3.1.6o).

Section PM2-I: This layer is apparently similar to those observed in the underlying PM1-F/G level. It is a chaotic mix of reworked ash and pedorelicts, with randomly oriented coarse rocks, bones, charcoal, and shell fragments. Coatings on limestone fragments are absent, while channel voids with micritic hypocoatings are always present, together with rare, small calcite nodules and biological activity features (excrements in channels). The fine material is dark brown in the upper part and light brown in the lower part, because the top of the layer was clearly modified by heating. Evident cracks due to heating, often planar, also occur.

Section PM2-L: This subunit is characterized by a complex of thick ash interlaced with charcoal layers. The ash consists of variously preserved micritic pseudomorphs on calcium oxalates (including rounded spherulites) and irregular aggregates of micrite and microsparite, with some phytoliths. These probably represent the remnants of burned leaves (Courty et al. 1989).

Interpretation

From the micromorphological analysis, we infer that these layers represent a well-structured multisequence of burned remains (hearths) attributed to continuous use of fire (subunits B-C-D-E-L). All these features suggest that most of the material was burned in situ, as seen, for example, in the reheated ash layer and the thermal alteration (reddening, structural cracks) of the material below the burned remains (Courty et al. 1989). The characteristics of the ash of the first hearths (subunits B-C-D), less homogeneous and with an admixture of charred grass and unburned organic matter, result from low burning temperatures. The burned bone fragments show colors indicating temperatures between 150° and 300° C (yellowish brown; Courty et al. 1989). Moreover, the H layer exhibits a platey structure, laminated fabric of the coarse fraction, and compaction, which are the result of occupation (i.e., a living floor; Courty et al. 1989). The alternating layers of stratified plant fragments and clayey to sandy material could reflect a constructed and/or prepared surface. The presence of colluvial and reworked layers (F/G–I) indicates that the hearths and occupation layers were sometimes abandoned and rapidly buried. The colluvial nature of these sediments is attested by the presence of rounded nodules, fragments of soil materials (pedorelics), and allochthonous mineral grains (volcanic).

These subunits resulted from the erosion and subsequent transportation of—in wet and temperate environments—outside soil material and cave sediments. The presence of angular fragments of stalagmitic concretions and the occurrence of calcitic pendants below some grains—for instance, in the F/G subunit—indicate that a small part of the material comes from disaggregation (cryoclastic fragmentation) of the previously altered cave wall during previous periods of colder and dryer conditions (Courty et al. 1989).

Furthermore, the well-developed network of void channels in the H/I subunits indicates that there was sufficient moisture and sunlight to favor biological

activity, probably in the form of fine roots and associated microorganisms, suggesting that the sequence was formed close to the entrance. Such structures indicate that a kind of "cave soil," related to the action of soil fauna and microorganisms, was developed to colonize the cave, but because no macrophytic vegetation cover was able to colonize the cave, post-human activity could not lead to development of a true soil profile. The same channels show calcite hypocoatings that may be an indicator of the start of warmer and dry climatic conditions unfavorable to soil development.

Bottom Profile (Pb)

Field Description

The lower profile starts with 30 cm of angular clasts of limestones (10 cm in diameter maximum) scattered in a silty-sandy brown matrix overlain by about 30 cm of brown-gray clayey silt with abundant fragments of bones and pottery and containing small layers of charcoal and fragments of coal.

Section PB1: The sediments here are heterogeneous and disturbed. The components are mixed and take the form of loose, commonly subrounded aggregates, with different kinds of material constituents. Moderate homogenized ash, rich with charred material, oxalate druses, and phytoliths, are very common. Sometimes spherulites, associated with burned dung, are also present. Some small lenses of still connected phytoliths are preserved. Shell and bone fragments are frequently embedded in the ash. Some small aggregates of yellowish phosphatic organic matter (Figure 3.1.6q) look like human coprolites (Courty et al. 1989). Also striking is the presence of colorless rounded grains (Figure 3.1.6p) of acidic volcanic glass (isotropic), characterized by inclusions of rod-like minerals. The coarse mineral fraction is essentially composed of angular quartz grains (fine sand, silt) and subrounded limestone fragments (coarse sand and gravels) with angular flint fragments. Moreover, there also are rare amphibole and pyroxene grains. The grains/matrix of the sediment is moderately sorted and does not present a distinct layering.

Interpretation

This level represents a colluvial deposit coming from the highest part and outside of the cave with an admixture of domestic material. The coarse fraction (rock and bone fragments) shows mostly a vertical and inclined orientation, also indicating movement. The amount of silt/fine-sand-size quartz suggests an aeolian origin of part of the material (loess), undoubtedly originating from outside the cave. The volcanic glass aggregates, as well as amphibole and pyroxene grains, can only be correlated with fresh volcanic ashes and pyroclastic material deposited by the wind in the soil of surrounding areas during some eruption. A close relationship seems to exist between loess and pyroclastic materials, as clearly shown by Cremaschi and Ferraro (2007) in Paglicci Cave.

Conclusion

The studies reported in this chapter add two principal results to our knowledge of the cave. First, the micromorphological study suggests that the presence of well-preserved multiple sequences of burned remains (undistributed hearths) in the Pm subunits, along with several other features, attests to the use of this area as a household. In contrast, the upper and the deeper parts of the cave show no clear stratigraphy. This fact suggests that the deposits had been frequently disturbed. However, according to the micromorphological evidence, the cave entrance (upper profile) is an area where dung was more frequently accumulated and burned. It is thus reasonable to conclude that some areas could have been used as a pen (for the stabling of ovicaprines). This, combined with the identification of archaeological findings (pottery, lithics, bones), suggests the existence of an associated settlement (permanent or seasonal).

The micromorphological study sheds new light on the issue of Scaloria Cave occupation during the Neolithic. The relatively elaborate use of the cave space indicates that it was not only occupied as a temporary shelter or for special uses (ritual, etc.), but could have functioned as the seat of complete households. The presence of reworked layers and bioturbation in the undisturbed sequence could be an indication of discontinuous attending of the cave.

Second, study of the speleothems adds new information on the configuration of the cave. Carbonate formation of speleothems indicates periods when the cave was open to air currents. Moreover, U/Th dating shows when speleothem formation altered with the final closure of the cave; this happened around 1.17/1.04 Kyr ago (approximately 830–960 CE), much later than previously supposed. Based on the climatic indications reported by Caldara and Pennetta (1989) (Table 3.1.1), the last step of the growth of these

Table 3.1.1. The main climatic changes in the Manfredonia Gulf inland, with dating results (modified by Caldara and Pennetta 1989)

Events	Age	Climatic indications	Datings
Various historical sources	Last two centuries	Predominantly warm/dry	
Abbot Longano journey and description	CE 1790	Torrid in contrast with Little Ice Age	
Repeated transfer of Salpi inhabited place	Ca. CE 1550	Warm/dry	
Repeated sales of the Salpi "lake" and "marsh"	Ca. CE 1400–1500	Alternation warm/humid and warm/dry	
Presence of large wood northwest of Salpi lake	Ca. CE 1200	Warm/humid	* U/Th BP 1.004 ± 20 BP 1.170 ± 20
Transformation into swamp and transfer of Salapia harbor	1st century BCE (beginning)	Dry	
Transformation into swamp and abandonment of Siponto harbor due to increase of Paleocarparelle suspended load	185 BCE	Humid	
Foundation of the Salapia seaport	9th–8th centuries BCE	Humid	
Hypogeous tombs at Trinitapoli and superficial drawdown	2nd millennium BCE	Warm/dry	
Maximum expansion of lagoon and abandonment of Neolithic sites	3rd millennium BCE	Warm/humid	
Maximum expansion of Neolithic sites	5th–4th millennia BCE	Climatic optimum	*AMS 5470–5290 BCE 5480–5310 BCE
Neolithic colonization of the Tavoliere	7th–6th millennia BCE	Temperate	

* ^{14}C dates; BP = before present (1950).

speleothems (1.17/1.04 Kyr ago) properly corresponds with a warm/humid period, which may also argue for the complete sealing of the cave by the deposition of alluvial fans.

Acknowledgments

We are very grateful to Dr. G. Zanchetta (University of Pisa) for the many helpful suggestions and support that improved the manuscript. We gratefully acknowledge financial support by the Cotsen Institute of Archaeology (UCLA) and Istituto Italiano per l'Archeologia Sperimentale (Genoa, Italy) for dating. Very special thanks go to Nicola Leone, our irreplaceable speleological guide, for his expert help and advice.

Riassunto

La grotta di Scaloria è un classico esempio di grotta di interstrato, formatasi a seguito di processi carsici e a successivi crolli della volta scatenati dagli eventi sismici che hanno caratterizzato la zona. La grotta si apre lungo il margine esterno di un terrazzo marino, il cui margine interno coincide con il piede dei rilievi settentrionali, da cui si originano numerose e imponenti conoidi alluvionali.

Nell'autunno del 2007 un sopralluogo all'interno della grotta ha permesso di eseguire la descrizione di tre profili, e di sottoporli ad analisi micromorfologica. Inoltre sono state campionate e descritte, alcune concrezioni carbonatiche di particolare interesse per la loro locazione.

La morfologia e la diversa distribuzione delle stalattiti lungo la volta hanno permesso di individuare un'evidente superficie di crollo, probabilmente responsabile dell'apertura della grotta verso l'esterno e della formazione del corpo di frana, che ha reso accessibile la grotta addolcendo l'elevata pendenza iniziale. Il corpo di frana, costituito da grossi massi di dimensioni metriche misti a "terre rosse", è ricoperto da un modesto deposito archeologico che, a sua volta e nella sua porzione più alta, è in parte sepolto da materiali provenienti da un ulteriore crollo, che dovrebbe gradualmente aver sigillato la grotta. La datazione di una stalagmite sui depositi dell'ultimo crollo attraverso il metodo U/Th ha permes-

so di attribuire data di 1.17 KY ± 0.02 da oggi il momento della chiusura della grotta.

L'analisi micromorfologica del primo profilo, descritto nella parte più profonda della grotta, ha evidenziato la natura colluviale di tale materiale e la presenza di escrementi umani, provenienti dallo smantellamento dei depositi sovrastanti. La gran quantità di grani di quarzo delle dimensioni del silt e la peculiare presenza di anfiboli e pirosseni unitamente all'identificazione di aggregati di vetro vulcanico, ha permesso di evidenziare un rilevante apporto di materiali alloctoni di natura eolica all'interno della grotta.

*Nel successivo profilo, posto nella parte centrale in una tasca del corpo di frana, l'analisi micromorfologica ha permesso di individuare una sequenza multipla di focolari in posto. Le caratteristiche delle ceneri, poco omogenee, ricche di materiali organici parzialmente combusti e di fitoliti e le osservazioni sulle ossa combuste, indicano temperature modeste tipiche di focolari domestici, dove venivano bruciate soprattutto essenze erbacee e di graminacee domestiche (*Triticum aestivum*). Inoltre all'interno di queste sequenze di focolari è stato possibile anche individuare un evidente livello d'occupazione caratterizzato da un alternanza di livelli planari di ceneri e frammenti di piante con livelli di sabbie argillose, fortemente compattati. Gli intervalli intercalati di materiali colluviali posso essere messi in relazione ai rispettivi momenti di abbandono o a un cambio di utilizzo della grotta. Due datazioni ^{14}C effettuate su carboni prelevati nei focolari più superficiali della sequenza hanno permesso di ottenere rispettivamente le seguenti date calibrate: 5470–5290 BCE e 5480–5310 BCE.*

Il terzo profilo posto in prossimità del corpo di frana più alto è sigillato da una crosta carbonatica di pochi cm. L'analisi micromorfologica ha rilevato la natura colluviale di tale deposito ed ha permesso di stabilire che il principale componente della matrice fine sono ceneri provenienti dalla combustione di sterco di capriovini. Inoltre il rinvenimento di radici calcificate conferma che tale deposito si è formato in prossimità dell'antica entrata della grotta in condizioni allora di buona luminosità, limitata umidità e forte evaporazione che avrebbero favorito la ricristallizzazione in situ della calcite. Le evidenze descritte hanno permesso di ipotizzare un uso piuttosto elaborato dello spazio della grotta probabilmente legato anche ad usi domestici oltre che rituali.

3.2. Archaeobotanical Analysis: Paleoenvironmental Implications

By Girolamo Fiorentino and Cosimo D'Oronzo

Introduction

In 1978–1979, archaeological surveys enabled researchers to identify the original entrance to the cave known as Grotta Scaloria. It also became possible to examine a stratigraphic sequence indicating that the cave was inhabited in the Late Upper Paleolithic (LJ-4982: 9560 ± 140 BP) and in various periods during the Neolithic (LJ-5096: 6290 ± 80 BP; LJ-4983: 6120 ± 80 BP) (see Chapter 2.3). During excavation, sediment samples were taken in order to recover plant remains by flotation, useful for radiometric dating of the various contexts. Here, we analyze these plant remains to reconstruct aspects of the relationship between the human community and the environment surrounding the cave (Fiorentino 2002).

Materials and Methods

The materials analyzed in this study represent the residue of samples taken during the 1979 excavation and subjected to radiometric dating (Skeates 1994). In all, 16 samples were analyzed, belonging to various periods of habitation of the cave. The plant remains are all fragments of combusted secondary woody tissue. The individual fragments (which are not rounded at the ends) vary from 5 to 40 mm in length. Some of the anthracological remains from the most recent levels are secondary branches, with diameters of 2–18 mm. In some cases, the charcoals have calcium carbonate concretions on their outer surface, or infiltrations of carbonate or sediment inside anatomical elements or along fractures or planes of discontinuity in the tissue caused by combustion.

The taxonomic identification of the remains was based on a reading of anatomical features in cross-sections, tangential sections, and radial sections, with the help of a metallographic microscope (Nikon Eclypse Me 600) and comparison with samples from the anthracological collection of the Laboratory of Archaeobotany and Palaeoecology at the University of the Salento and specific atlases (Jacquiot et al. 1973; Schweingruber 1978, 1990).

Results

The anthracological analysis was based on a total sample of 63 fragments (Table 3.2.1). Seven taxa were identified, belonging to the following families: Fagaceae (*Quercus* cadux; *Quercus* semicad), Betulaceae (*Ostrya carpinifolia* Scop., *Carpinus* sp.), Salicaceae (*Salix/Populus*), and Prunoideae.

Table 3.2.1. List of samples analyzed, with chronological and cultural attribution and number of fragments identified

Trench	Layer	Sample	Chrono-cultural phase	Fragments (N)
Tr-5	L-3	29	Neolithic	9
Tr-5	L-4	61	Neolithic	6
Tr-5	L-5	74	Neolithic	11
Tr-5	L-6	82	Neolithic	3
Tr-5	L-7	91	Neolithic	2
Tr-5	L-7	90	Neolithic	3
Tr-5	L-8	95	Neolithic	5
Tr-5	L-8	99	Neolithic	2
Tr-5	L-9	111	Neolithic	3
Tr-5	L-9	106	Neolithic	2
Tr-6	L-3	21	Neolithic	2
Tr-6	North Pit	85	Neolithic	1
Tr-6	L-6	64	Neolithic	2
Tr-6	L-7	94	Neolithic	3
Tr-8	L-7	119	Mesolithic/Upper Paleolithic	1
Tr-8N	L-3	93	Mesolithic/Upper Paleolithic	2

The three charcoal fragments belonging to the Late Upper Paleolithic levels show the presence of deciduous oaks and riparian trees such as poplars and willows. The Neolithic fragments show an increase in deciduous oaks and the presence of other woodland species such as *Carpinus* spp. and maple in association with Prunoideae.

The distribution of the various species changed significantly at a later stage of the Middle Neolithic period (Scaloria culture), involving a drastic reduction in deciduous oaks and an increase in other woodland trees, such as *Carpinus* spp. and the European Hop-hornbeam, as well as riparian trees such as poplars.

During the study of the anatomical elements of the woody tissue, a series of taphonomic observations were made. In addition to traces of sediment in the transport tissue, the fragments from the Upper Paleolithic to Mesolithic levels show fractures and deformations, such as separation of portions of woody tissue along planes that are tangential to the axis of growth. The oak found in the Neolithic samples has the same characteristics as those of the more ancient levels, with combustion-related fractures and infiltration of sediment. In the *Prunus* samples from the same levels, the fractures detected during the anatomical analysis are attributable to postdepositional crushing, which also appears to have favored the infiltration of sediment from the substrates. One sample (99) is characterized by a partial collapse of the walls of the transport tissue. Of special interest are some of the fragments of deciduous oak and willow discovered in the levels attributed to the Scaloria Bassa facies: along the tangential section, carbonate filaments were observed inside the transport tissue, probably substitutions of fungal hyphae, although in the current state it is not possible to determine whether their formation happened while lying on the forest floor or while still attached to the plant (D'Oronzo et al. 2008; Osono 2007; Scott et al. 2000).

Discussion and Conclusions

The limited sample available precludes a detailed reconstruction of the botanical component of the ancient landscape around the cave. Despite this limitation, however, a reading of the anthracological diagram (Figure 3.2.1) offers some information on the trees present and their associations.

Currently, the wider area in which the Scaloria Cave is located is characterized by a mosaic of plant

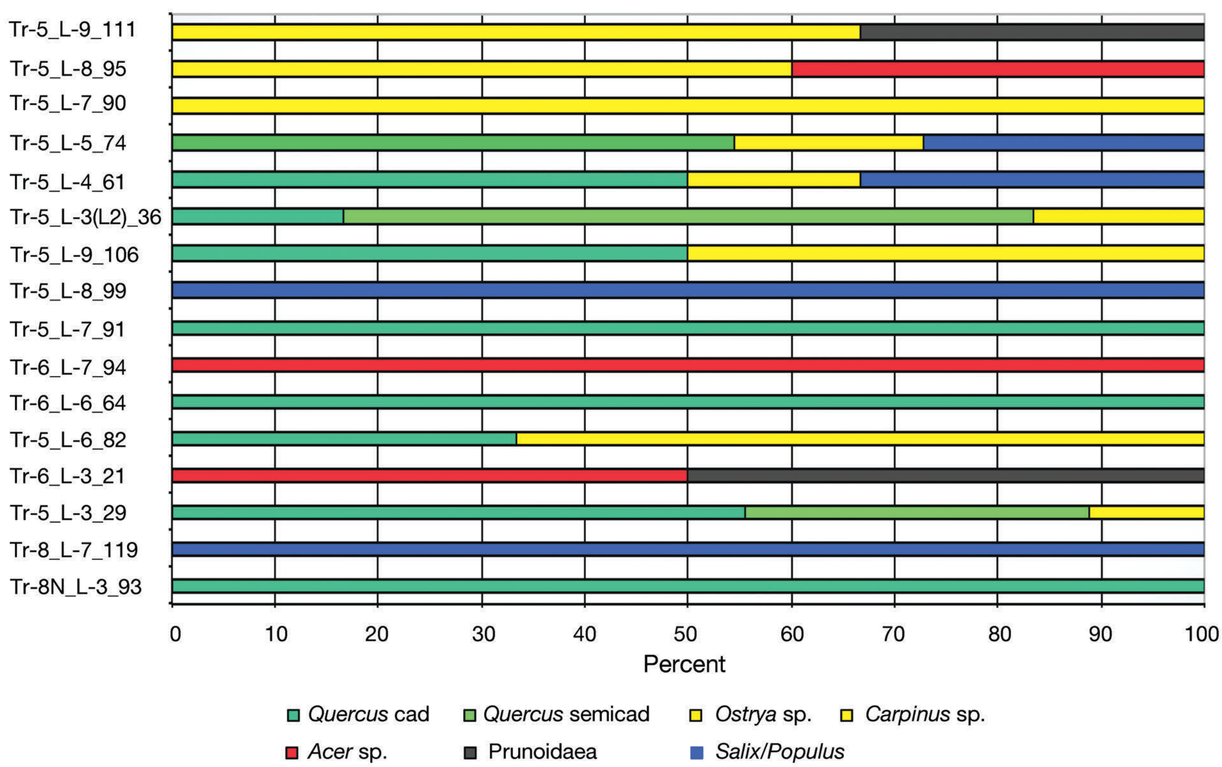


Fig. 3.2.1. Anthracological percent diagram, by level.

types, with areas dominated by *Quercus cerris*, *Fagus sylvatica* (submontane mesophile vegetation, in the higher parts of the Gargano), *Quercus pubescens* and xeric shrubland (found at altitudes of 400 to 850 m), *Quercus ilex*, thermophile shrubs typical of Mediterranean maquis (found at altitudes of 150 to 400 m), and riparian vegetation (found near lagoons or along watercourses) (Macchia et al. 2000).

The plants found in the archaeobotanical record point to the use of *Quercus cerris* forests and areas of riparian vegetation in the most ancient phase of the sequence analyzed (Late Upper Paleolithic).

The stratigraphic hiatus between these more ancient phases and the subsequent Middle Neolithic phases prevents us from fully understanding the dynamics of the vegetation and the interaction with the human presence in the area. The samples from trench 5, which are more numerous, reveal a sequence that shows several changes through time. Specifically, the evidence points to the presence of a mixed forest of deciduous trees associated with other species such as maple, *Carpinus* spp., and *Prunus* spp. The relative quantities of the various trees change in a more recent phase, with an increase in *Carpinus* spp. and willow and the appearance of semideciduous oaks. The variation points not so much to a change in the climate as to the enlargement of the settlement catchment area, particularly toward areas characterized by the presence of watercourses (Fiorentino et al. 2009).

From the taxonomic analysis of the remains, we were able to partly reconstruct the ways in which fuel was procured and to determine how the deposit was formed (Fiorentino 1995, 1998). The discovery of anthracological remains with fractures and explosions of some parts of the woody tissue may indicate the use of green wood as fuel, while the presence of hyphae may indicate the gathering of dead wood from the forest floor (D'Oronzo et al. 2013).

However, the small number of fragments analyzed to date, together with the difficulties associated with the contextualization of the samples, means that any hypotheses regarding the relationship between the human community that inhabited the cave and the surrounding vegetation must necessarily be approximate.

Riassunto

Nel corso delle campagne di scavo del 1978–1979, una serie di campioni di sedimento sono stati prelevati con l'obiettivo di recuperare macroresti vegetali per la datazione radiometrica della sequenza archeologica della Grotta di Scaloria. Il residui di questi campioni sono stati analizzati in questa sede nel tentativo di ricostruire le caratteristiche del paleoambiente vegetale circostante la grotta. Le analisi presentate si riferiscono a 16 campioni che hanno restituito un totale di 63 frammenti pertinenti a tessuto legnoso combusto, variamente distribuiti nella sequenza stratigrafica. Sono stati riconosciuti complessivamente 7 taxa pertinenti a Quercus tipo caducifoglie, Quercus tipo semicaducifoglie, Ostrya carpinifolia, Carpinus *sp.*, Acer *sp.*, Salix/Populus, *Prunoideae. Nel corso delle fasi comprese tra Paleolitico superiore/Mesolitico la vegetazione è caratterizzata dal querceto misto e dalla presenza di essenze riparali. Successivamente, nel corso delle diverse fasi del Neolitico, si assiste ad una progressiva riduzione del querceto misto ed un aumento di carpini e pruni accompagnati da una presenza costante di essenze riparali. L'analisi, per quanto quantitativamente limitata, sembra evidenziare variazione nelle strategie di approvvigionamento del combustibile legnoso in relazione a probabili variazioni della copertura vegetale dell'area circostante la cavità.*

3.3. Prehistoric Animal Remains from Grotta Scaloria

By László Bartosiewicz and Éva Ágnes Nyerges

Introduction

Grotta Scaloria was first excavated in 1978 by teams from the University of Genoa and the University of California, Los Angeles. At the time, Sándor Bökönyi of the Hungarian Academy of Sciences was invited to participate by identifying the animal bones recovered from the site. His extensive experience at various prehistoric projects in southern Italy would have provided a framework for the comparative evaluation of his observations. Unfortunately, his untimely death in 1994 preceded the current intensive research on find materials from the site. Therefore, the authors of this brief analytical essay have taken up the task of entering his handwritten raw data into a computerized database and carrying out the evaluation and interpretation of the resulting information.

The karstic cave is located at approximately 1 km northeast of the city of Manfredonia (latitude 41.63° N, longitude 15.92° E) on a marine terrace of the Adriatic, overlooking the coastal plain toward the south. Grotta Scaloria was frequented in the Neolithic partly as a burial place, but it was also inhabited, as demonstrated by the great number of animal bones, predominantly of domesticates, especially sheep and goats.

Water seeping through the cracks and limestone bedding planes had gradually dissolved the rock, compromising the stability of the cave, the opening of which repeatedly collapsed and was ultimately buried by alluvial sediment. Grotta Scaloria opens about 45 m above present-day sea level. It is part of a wider, regional karstic system (Rellini et al., Chapter 3.1, this volume).

Chronological Outline and Phasing

The archaeozoological assemblage of Grotta Scaloria contains 2,854 hand-collected pieces of bone, mostly from the Neolithic component of the site, a major focus of investigations. Some of the relevant archaeozoological features are summarized below.

The area near the cave entrance was rich in sheep and goat coprolites, indicating that this surface had been intensively used by flocks. The inside was dominated by anthropogenic features, showing that the cave may have served as a habitation area. In addition to archaeological artifacts and food refuse, the floor surface was littered with plant remains, burned dung, and red soil (Rellini et al., Chapter 3.1, this volume).

Some ritual activity, which presumably took place in the lower part of the cave during a single phase, was dated to 4350 cal BCE using charcoal collected by Santo Tiné in 1967. This date, however, is not congruent with dates obtained in the upper section of the cave (5630–5060 cal BCE) and is probably erroneous (cf. Chapter 2.3). The cave was used as a dwelling from 5600 to 5300 BCE, a period during the so-called Scaloria facies. Additional trenches opened inside the cave exposed Late Upper Paleolithic levels (10840 ± 230; 10960 ± 210; 10100 ± 300 BP). They occurred in trench 8 below the Neolithic layers, yielding remains of hearths, animal bones, flint tools, and mussel shells of local origins (Isetti, Chapter 2.1, this volume). One-quarter of the vertebrate remains in the Grotta Scaloria assemblage originated from these earlier, Late Upper Paleolithic provenances.

Unfortunately, due to the intricacies of cave taphonomy and paucity of detailed stratigraphic information, the gross chronological subdivision of the material into Late Upper Paleolithic and a general Neolithic component could not be further refined. Contamination by later material in the Paleolithic subassemblage is shown by the presence of domestic animal remains (making up 10% of the earlier sample). Evidently, these bones originate from later periods, especially those of sheep and goats, whose wild ancestors were not present in the area and so could not be mistaken for the domestic form, as could be the case with pigs or even cattle.

The contribution of wild animals to the Neolithic subassemblage is relatively high (23%) and stands out

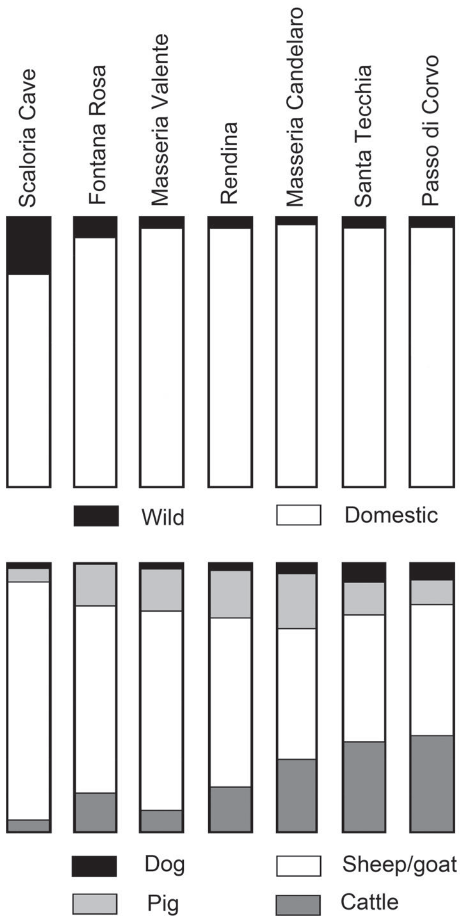


Fig. 3.3.1. High contribution of wild animals to Neolithic component of Grotta Scaloria in comparison with other early Neolithic assemblages in southern Italy (redrawn after Bökönyi 1988–1989:fig. 1).

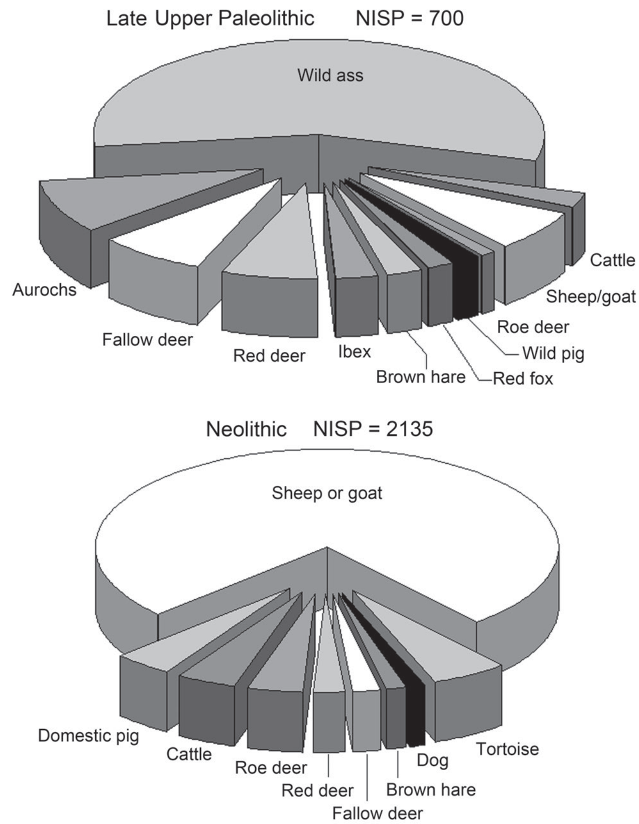


Fig. 3.3.2. Changes in taxonomic composition of economically most important species in Late Upper Paleolithic (top) and Neolithic (bottom) of Grotta Scaloria.

among coeval sites discussed by Bökönyi (1988–1989: 374, fig. 1; Figure 3.3.1). It shows that meat had become an important food by the Early Neolithic at this site as well. However, we are unable to estimate to what degree the various Neolithic occupations have been mixed with Late Upper Paleolithic strata.

There may be, however, a cultural/historical explanation for the almost one-quarter share of wild animals among the archaeozoological remains. Later Neolithic archaeozoological assemblages originate from nonhabitation caves in Apulia (Cala Colombo, Grotta Pacelli, and Ipogei Manfredi) and the Apennine caves of Abruzzo and Tuscany. These remains are sometimes considered evidence of feasting in a cultic context, especially that of roe and red deer at Ipogei Manfredi (almost two-thirds), and represent a significant increase (from 39% to 56%) of wild animal remains from the Mid to the Late Neolithic at Grotta Pacelli (de Lucia et al. 1977; Scattarella 1977; Striccoli 1982, 1988; Whitehouse 1971). The fauna from Grotta del'Uzzo in Sicily also differed from those of coeval open-air settlements, as the majority of remains (58.1%) originated from wild animals (Tagliacozzo 2005–2006: 437, table 6).

Since Bökönyi pooled his data from Grotta Scaloria under the general term "Neolithic," some later provenances, possibly related to similar rituals pursued in this cave, may also have been included in the sample of otherwise typical, sheep-and-goat–dominated Early–Middle Neolithic food refuse.

The contribution of the most characteristic animal species to the two main chronological subassemblages is shown in Figure 3.3.2. Aside from the dominant role changing from wild asses to sheep and goats (Caprinae), the narrowing spectrum of alternative meat resources between these two gross chronological phases is also expressed by the lower pie chart in this figure,

Table 3.3.1. Summary of animal remains identified in the two gross chronological periods of Grotta Scaloria

Species	Number of bones	
	LUP	N
Total wild	632	405
Total domesticated	68	1,730
Total identifiable	700	2,135
Mammalia non-identifiable, large	0	1
Mammalia non-identifiable, small	11	0
Total non-identifiable	11	1
Human	3	4
Total	714	2,140

Note: LUP = Late Upper Paleolithic, N = Neolithic.

representing the conglomerate of Neolithic periods at Grotta Scaloria.

The overall composition of the faunal assemblage is summarized in Table 3.3.1. The overwhelming majority of bones in Bökönyi's records were identified to species, a tentative indicator of good preservation in this hand-collected set of animal remains. A few human bones were accidentally mixed into the archaeozoological material, not a surprising phenomenon given the taphonomic complexity of caves.

Good preservation is evidenced by the relatively large number of measurable bones found at the site, some full length. Measurements were taken following the protocol developed by Duerst (1926), which later served as the basis of the archaeozoological bone measurement system standardized by von den Driesch (1976).

Results

The animal remains recovered at Grotta Scaloria largely represent food refuse, thereby reflecting the dietary preferences and, indirectly, meat procurement strategies of the prehistoric inhabitants in two distinct gross time periods. In each period, the animal species selected from those available in the natural habitat were determined by cultural filters. The main differences between the two periods are summarized in percentages in Figure 3.3.2.

Taxonomic Composition

Wild animals are a primary source of food from an ecological point of view, as they usually characterize the site's environment. This is especially the case in earlier periods, when hunting was the only—or at least the major—means available for meat provisioning. This is true at Grotta Scaloria as well, as is shown by the taxonomic composition of wild animal remains in the two studied gross periods (Table 3.3.2).

On the basis of the number of identifiable specimens (NISP), the bones of wild asses overwhelmingly dominated in the Late Upper Paleolithic subassemblage, making up more than half of the identifiable animal remains. The great number of these bones yielded many specimens that could be easily identified and aged (Figure 3.3.3) during a detailed analysis. The next

Table 3.3.2. Number of identifiable specimens (NISP) from wild animals in the two gross chronological periods of Grotta Scaloria

Species		NISP		%	
		LUP	N	LUP	N
Aurochs	*Bos primigenius* *Bojanus* 1827	61	15	8.7	0.7
Red deer	*Cervus elaphus* L. 1758	45	44	6.4	2.1
Fallow deer	*Dama dama* L. 1758	53	42	7.6	2.0
Roe deer	*Capreolus capreolus* L. 1758	7	80	1.0	3.7
Cervidae	Cervidae	4	6	0.6	0.3
Chamois	*Rupicapra rupicapra* L.1758	3	0	0.4	0.0
Ibex	*Capra ibex* L. 1758	21	9	3.0	0.4
Wild pig	*Sus scrofa* L.1758	11	16	1.6	0.7
Equidae	Equidae	2	0	0.3	0.0
Wild ass	*Asinus hydruntinus* Regalia 1907	376	19	53.7	0.9
Gray wolf	*Canis lupus* L. 1758	0	1	0.0	0.1
Red fox	*Vulpes vulpes* L. 1758	13	8	1.9	0.4
Small carnivore	Carnivora	2	1	0.3	0.1
Lynx	*Felis lynx* L. 1758	3	0	0.4	0.0
Wild cat	*Felis silvestris* *Schreber 1775*	1	0	0.1	0.0
Brown hare	*Lepus europaeus* *Pallas 1778*	17	28	2.4	1.3
Rodent	Rodentia	2	1	0.3	0.1
Bird	Aves	4	13	0.6	0.6
Fish	Pisces	1	13	0.1	0.6
Tortoise	*Chelonia*	6	105	0.9	4.9
Shell		0	2	0.0	0.1
Crab		0	2	0.0	0.1
Total wild		632	405	90.3	19.1

Note: LUP = Late Upper Paleolithic, N = Neolithic.

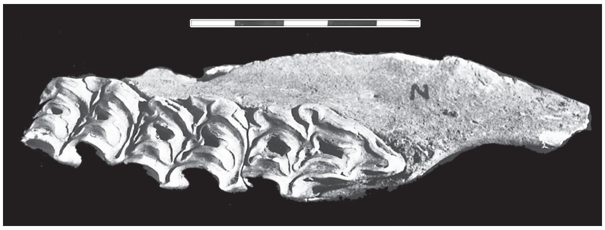


Fig. 3.3.3. Left maxilla fragment of adult Late Upper Paleolithic wild ass with premolar teeth.

Fig. 3.3.4. Proximal ulna fragment from large, putatively Late Upper Paleolithic lynx.

best-represented species were also large game: aurochs, fallow deer, and red deer, contributing over 50 identifiable bones each; their respective percentage values, however, did not even reach 10 percent in the Late Upper Paleolithic assemblage. As for the environmental interpretation of these results, it is evident that the inhabitants of the pre-Neolithic cave primarily exploited wild asses, characteristic herbivores that inhabited the grasslands of the coastal plain. Aurochs, roe deer, and brown hares must have lived in the same habitat. The two larger deer species prefer slightly more forested habitats and may have been available in the foothill zone near the cave. Lynx and wild cat are typical woodland animals, although they also frequent caves and crevices, so their remains may have been natural deposits from time periods when humans were not present in Grotta Scaloria. This may be the case with the lynx whose ulna (Figure 3.3.4) was found in association with a metacarpus and a proximal phalanx within the same stratigraphic unit. Occasional hunting in the hilly karst area stretching north of the site is indicated by the presence of bones from two wild mountain caprines, ibex, and chamois. The rest of the sporadically represented wild animals are less characteristic of the environment.

In comparison with this earlier subassemblage, the proportions of wild animal species changed during the Neolithic. Percentages of remains show that altogether hunting became a minor source of meat, and both wild asses and aurochs practically disappeared from the repertoire of prey items. Deer species, especially roe deer, retained some importance, and hare was also relatively commonly hunted, possibly in the site's immediate environment. A likely explanation is that grassland habitats increased due to deforestation and herding, and most hunting was largely practiced within the same habitat. Early farming would have certainly altered the natural flora. Once the woodland was initially cleared for farming, deforestation would have been further exacerbated by the depredations of browsing and grazing domesticates, which inhibit the regeneration of trees and shrubs. Of the mountain species, only ibex was sporadically present among the Neolithic food remains.

How did domesticates substitute for the meat previously gained from the increasingly abandoned hunting? The composition of domestic animal remains summarized in Table 3.3.3 shows that most of the meat must have still originated from the coastal plain, where the herds of wild asses were replaced by flocks of sheep and goats—also grassland animals, but of Asiatic origins. (The aforementioned ibex that inhabited the neighboring hills and was still sporadically hunted is

Table 3.3.3. Number of identifiable specimens (NISP) from domestic animals identified in the two gross chronological periods of Grotta Scaloria

Species		NISP		%	
		LUP	N	LUP	N
Cattle	*Bos taurus* L. 1758	16	84	2.3	3.9
Domestic sheep	*Ovis aries* L. 1758	1	137	0.1	6.4
Domestic goat	*Capra hircus* L. 1758	0	23	0.0	1.1
Sheep or goat	Caprinae	45	1,376	6.4	64.4
Sheep and goat		46	1,536	6.5	71.9
Domestic pig	*Sus domesticus* Erxl. 1777	6	86	0.9	4.0
Donkey	*Equus asinus* L.1758	0	1	0.0	0.0
Domestic dog	*Canis familiaris* L.1758	0	23	0.0	1.1
Total domesticated		68	1,730	9.7	80.9

Note: LUP = Late Upper Paleolithic, N = Neolithic.

Fig. 3.3.5. Complete metacarpal bones from Neolithic sheep used in withers height estimations.

not the ancestor of the domestic goat, an animal imported into Europe.)

The remains of small domestic ruminants, including some complete long bones (Figure 3.3.5), made up over 70 percent of the fragments recovered from Neolithic provenances. Most of these could not be clearly identified to species, as most bones of sheep and goats tend to be morphologically similar to each other. Distinctions are made even more difficult by the typically fragmented state of prehistoric find materials. In cases where the two species could not be differentiated, we referred to the finds as "sheep/goats"—that is, the Caprinae subfamily of the Bovidae family, in strict taxonomic terms. In the few cases where precise species identification was possible, 86 percent of the 160 such bones came from sheep. Although this ratio (derived as it is from a small sample) should not be extrapolated to the entire assemblage of caprines at Grotta Scaloria, it may be noted that when high-quality graze is available, sheep tend to be at least three to five times better represented than goats at many prehistoric sites in southeastern Europe (Bartosiewicz 1999).

Bones of other Neolithic domesticates, notably cattle (Figure 3.3.6), pigs, and dogs occurred, but sporadically. The identification of a single piece of bone

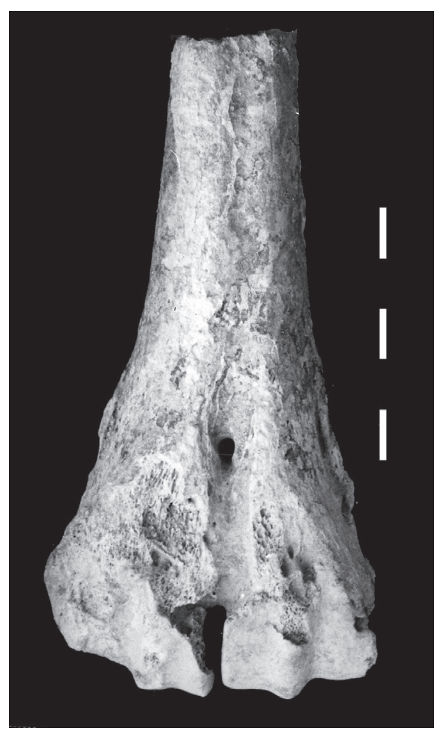


Fig. 3.3.6. Distal half of Neolithic cattle metatarsus with large exostosis over lateral articular condyle possibly originating from traumatic periostitis.

from a putative domestic ass remains one of the contentious issues at the site: the bones of wild and domestic asses are not easily distinguished from each other. Moreover, the piece in question is an undeveloped tooth bud. Given the hundreds of wild ass remains in the older subassemblage, as well as evidence of mixing represented by the bones of domesticates in this sample, the presence of Neolithic domestic ass at Grotta Scaloria should be treated with extreme caution.

Age Distributions

Thanks to the large assemblage size and good preservation, relatively numerous remains (both teeth and bone epiphyses in various stages of fusion) could be aged. In the case of wild animals, age could be estimated on one-third of the Late Upper Paleolithic and one-quarter of the Neolithic specimens (Table 3.3.4).

Notably, however, the immense taxonomic richness of the material (i.e., the great diversity of wild animal species) somewhat diluted these favorable ratios. Statistically viable numbers of ageable bones were available only in the case of wild asses, the species that provided half of the Late Upper Paleolithic assemblage. These will be evaluated in comparison with demographic data concerning domesticates, presented in Table 3.3.5.

Due to the slight but evident stratigraphic mixing shown by the presence of some domestic remains in the Late Upper Paleolithic assemblage, the ratio of ageable bones from domesticates is relevant only in the case of Neolithic provenances where they reached almost half of the identifiable specimens. Naturally, the best-represented taxonomic group, sheep and/or goats, can be most reliably interpreted. In addition to the aforementioned wild asses, the values for cattle, sheep, and non-distinguishable sheep/goats are summarized in Figure 3.3.7. The few embryonic/newborn as well as senile specimens are not shown in this graph, as their occasional presence is evidently an artifact of sample size: bones in these under-represented, extreme age groups occur with greatest probability in subassemblages that contain sufficiently high numbers of bones.

In the Late Upper Paleolithic sample, the wild ass remains came overwhelmingly from mature and adult individuals. Aside from the possibility that hunters targeted larger (thus, by definition, older) individuals, the relative scarcity of foals may also indicate that ass hunting was practiced year-round, with no special emphasis on preying on the vulnerable young during the summer or fall. Naturally, some of the remains representing very young foals may also have been selectively destroyed, although the material seems in general well preserved (Figure 3.3.8).

Among the Neolithic domesticates, cattle are also represented by a few bones from older animals, a phenomenon well known from many much larger assemblages. Killing these animals at a young age, before they reached their full meat-producing capacity, would have been a luxury. While it is difficult to appraise the rationale behind Neolithic kill-off patterns, selecting older animals producing more meat could have been a realistic consideration.

Among the small ruminants, the numerous ageable bones show a trend toward slaughtering young as well as older animals. Due to the small sample size, the slightly greater contribution of lambs among the sheep remains is not significantly different from the pattern of the three major age groups shown for sheep/goats in Figure 3.3.7 (chi-square = 4.331; degrees of freedom = 2; p-value = 0.115; ageable bones unambiguously identified as those of goats were too few to be included in this comparison). In contrast to cattle, sheep and goats are easier to replace when killed, as their shorter gestation period leads to more rapid reproduction. Most importantly, the presence of bones from lambs and kids (although the latter only in negligible numbers) positively shows late spring/summer use of the cave, although year-round human activity at the site cannot be ruled out. The possibility of seasonal visits to coastal caves throughout the Neolithic is given some credence by the osteological evidence. Many caves along the Adriatic coastline must have been visited during spring lambing time, as bones of fetal and newborn kids and lambs as well as those below the age of 2 months were found—for example, in Pupićina Cave (Miracle and Pugsley 2006:331–336) and Grotta dell'Edera/Stenašca (Boschin and Riedel 2000). Animals from the 2- to 6-month age cohort are absent in those caves. As in Grotta Scaloria, however, the majority of Neolithic caprines in Grotta dell Mitreo/Mitrej were culled as juveniles, between 2 and 6 months of age (Mlekuž 2005:37–38; Petrucci 1997). The scarcity of fetal remains may indicate that animals were not present in the cave at the time of lambing. The majority of caprines from Grotta degli Zingari/Ciganska jama were aged over 6 months, although the sporadic presence of bones from neonatal animals demonstrates spring occupation when lambing took place near or inside the cave (Bon 1996).

This culling pattern may be in contrast with the habits of Late Upper Paleolithic wild-ass hunters. A

Table 3.3.4. Taxonomic distribution of ageable bone specimens from wild animals in the two gross chronological periods of Grotta Scaloria

		Age							Total, including
Species	**Period**	**Embryo**	**Neonatus**	**Juvenilis**	**Subadultus**	**Adultus**	**Maturus**	**Senilis**	**unidentified**
Aurochs	LUP			2	5	21	1		32
	N					5			10
Red deer	LUP			1	4	6			34
	N			3	7	6			28
Fallow deer	LUP			2	1	13	1		36
	N			7	3	5			27
Roe deer	LUP					1			6
	N				6	19	1		54
Cervidae	LUP					1			3
	N								6
Chamois	LUP				1	1			1
	N								
Ibex	LUP				2	8			11
	N				1	4			4
Wild pig	LUP			1	1	1			8
	N				3	4			9
Equidae	LUP					2			
	N								
Wild ass	LUP			11	36	72	4	7	246
	N			3	2	8	5		1
Gray wolf	LUP								
	UN								1
Red fox	LUP			1	2	4			6
	N					2			6
Small carnivore	LUP								2
	N					1			
Lynx	LUP					3			
	N								
Wild cat	LUP								1
	N								
Brown hare	LUP				1	1			15
	N					10			18
Rodent	LUP					2			
	N								1
Bird	LUP								4
	N								13
Tortoise	LUP								6
	N			2	2				101
Total wild: 632	LUP			18	53	136	6	7	412
100%				2.9	8.4	21.5	1.0	1.1	65.2
405	N			15	24	64	6		296
100%				3.7	5.9	15.8	1.5		73.1

Note: LUP = Late Upper Paleolithic, N = Neolithic.

Table 3.3.5. Taxonomic distribution of ageable bone specimens from domestic animals in the two gross chronological periods of Grotta Scaloria

Species	Period	Age							Total including unidentified
		Embryo	Neonatus	Juvenilis	Subadultus	Adultus	Maturus	Senilis	
Cattle	LUP					2			14
	N			6	9	18		1	50
Domestic sheep	LUP								1
	N			28	32	29			48
Domestic goat	LUP								
	N			2	2	4			15
Sheep or goat	LUP			3	7	1			34
	N	3		223	201	128	3		818
Domestic pig	LUP			2					4
	N			17	25	5			39
Donkey	LUP								
	N				1				
Domestic dog	LUP								
	N			1		10			12
Total domestic: 68	LUP			5	7	3			53
100%				7.4	10.3	4.4			77.9
1,730	N	3		277	270	194	3	1	982
100%		0.2		16.0	15.6	11.2	0.2	0.1	56.8

Note: LUP = Late Upper Paleolithic, N = Neolithic.

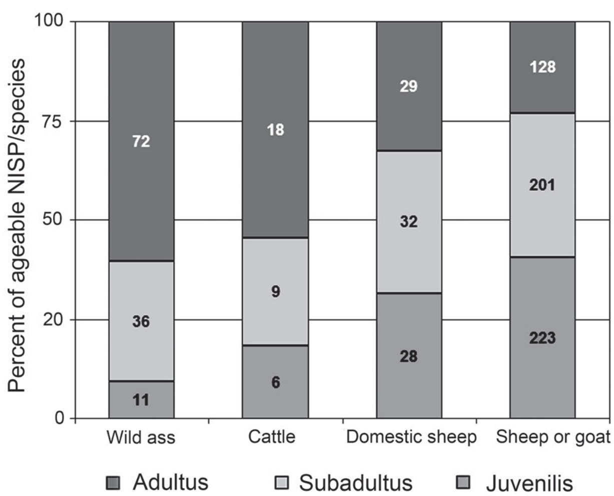


Fig. 3.3.7. Age distributions of animal groups best represented in Grotta Scaloria. Under-represented extremely young and old age groups are shown only in Tables 3.3.4 and 3.3.5.

Fig. 3.3.8. Oral fragment of mandible with incisor teeth from adult Late Upper Paleolithic wild ass.

related question is whether, during the seasons of intensive land cultivation and harvest in the coastal plain, small stock may have been taken to the foothill zone to encourage agricultural activity in the fertile coastal plain. Even if this were the case, it should not be interpreted as "proper" or standard transhumance practice but rather as an opportunistic use of marginal pasturage that would have made a lot of sense to any skilled herder not wishing to interfere with cultivators. Nevertheless, the dominance of sheep and/or goats anticipates a comparable emphasis on pastoralism in Copper and Bronze Age economies, when extensive transhumance strategies producing wool and milk probably came into existence (Bökönyi 1988–1989; Puglisi 1959; Barker 1981).

Meat Quality and Carcass Partitioning

Caves were used not only as burial grounds and sheep pens but also (at least) as temporary habitations. The ubiquity of food waste and the relative frequency of bones representing different body parts of animals can provide valuable information about meat processing on site. The material of Grotta Scaloria identified by Bökönyi was subdivided into body regions defined according to meat quality by Uerpmann (1973), as follows:

A (high-value meat): Vertebral column (except caudal vertebrae), the proximal segment of legs and bones of the shoulder and pelvic girdle

B (medium-value meat): Skull (with brain and mandibular musculature), the mandible (with its musculature and the tongue), ribs and sternum, and the lower segments of legs

C (lowest value meat): Viscerocranium, caudal vertebrae, and feet (metapodia with carpals, tarsals, and phalanges)

The resulting subdivision of bones is shown by chronological periods in Table 3.3.6. The chief meat providers in both main periods, wild asses in the Late Upper Paleolithic and sheep/goats in the Neolithic, are again the best represented in this analysis.

Evidence shows that caprines were slaughtered, dismembered, and most visibly consumed on location, a phenomenon recorded at most prehistoric caves in the Adriatic region (e.g., Miracle and Pugsley 2006: 339–341; Mlekuž 2005:38–40). At Grotta Scaloria, their contribution could be best compared with those of other animals in the Neolithic assemblage, and (as in the age distribution graph in Figure 3.3.7) the Late Upper Paleolithic wild ass was likewise included in the last row of Figure 3.3.9.

Table 3.3.6. Taxonomic distribution of animal bones by Uerpmann's meat value categories in the two gross chronological periods of Grotta Scaloria

Species	A: High		B: Medium		C: Low		Total	
	LUP	N	LUP	N	LUP	N	LUP	N
Cattle	1	16	8	25	7	43	16	84
Domestic sheep		24	1	26		87	1	137
Domestic goat		3		11		9		23
Sheep/Goat	13	427	18	612	14	337	45	1,376
Domestic pig		14	3	32	3	40	6	86
Ass						1		1
Domestic dog		6		9		8		23
Mammals/small	4		5		2		11	
Mammals/large		1						1
Aurochs	13	7	20	3	28	5	61	15
Red deer	2	14	9	8	34	22	45	44
Fallow deer	4	5	15	14	34	23	53	42
Roe deer	1	18	3	21	3	41	7	80
Cervidae			2	6	2		4	6
Ibex		1	7	4	14	4	21	9
Chamois			1		2		3	
Wild pig	2	10	2	4	7	2	11	16
Equidae					2		2	
Wild donkey	19	3	119	2	238	14	376	19
Gray wolf						1		1
Fox	3	1	6	5	4	2	13	8
Small carnivore	1				1	1	2	1
Felidae	1		1		2		4	
Brown hare	4	8	4	7	9	13	17	28
Rodent			1		1	1	2	1
Wild bird	4	7		6			4	13

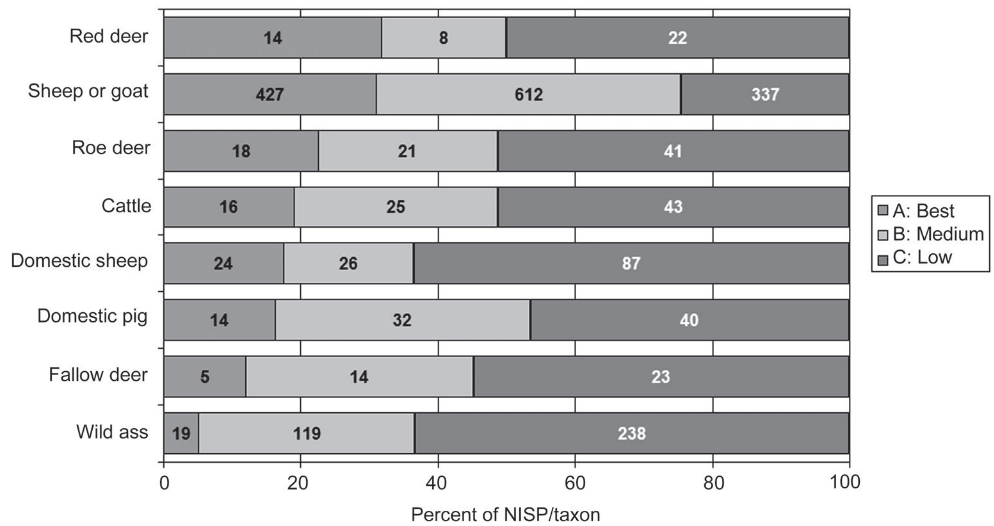


Fig. 3.3.9. Distribution of skeletal remains by Uerpmann's meat value categories in best-represented animal species, sorted by decreasing percentage contribution of bones representing high-quality meat.

In this graph, the remains of general caprines (nondistinguishable bones from sheep and goats) and identifiable sheep should be seen as complementary to each other. While the first group includes great numbers of nonspecific fragments from ribs and vertebrae, sheep/goats distinctions are typically based on the horn cores and bones representing the lowest-value meat (C category: metapodia, tarsals, and phalanges). Taking this methodological bias into consideration, one may say that the bodies of various Neolithic meat animals (both wild and domestic) shown in Figure 3.3.9 were treated in more or less similar ways. This hypothesis was tested using the data summed up in Table 3.3.7.

Table 3.3.7. Taxonomic distribution of bones by Uerpmann's meat assemblage

Species	A: High	B: Medium	C: Low	Total
Domestic sheep	24	26	87	137
Cattle	16	25	43	84
Domestic pig	14	32	40	86
Roe deer	18	21	41	80
Red deer	14	8	22	44
Fallow deer	5	14	23	42
Total	91	126	256	473

A test of homogeneity showed that, at least on the basis of the number of bones available, meat animals were partitioned in similar ways at Grotta Scaloria during the Neolithic (chi-square = 12.374; degrees of freedom = 8; p-value = 0.135). Approximately 19 percent originated from the most valuable body parts, 27 percent represented medium-quality meat, while 54 percent of the remains were of low meat value. The possibility of taphonomic bias must also be mentioned here: compact and resistant bones of the feet, as well as well-preserved teeth, fall into this category. Vertebrae and ribs, associated with prime cuts, tend to be far less well preserved and more difficult to identify.

As far as diachronic differences are concerned, meat quality categories between the two most numerous animal groups, Late Upper Paleolithic wild asses (NISP = 376) and Neolithic caprines (NISP = 1,376), are worth comparing here. These two are not only visually different in Figure 3.3.9, but this difference is significant in formal statistical terms as well (chi-square = 225.44; degrees of freedom = 2; p-value = 0.000). Meat from the wild asses killed in the plain had to be carried to the cave; thus, it would make sense that the hunters would have defleshed some of the larger bones at the kill site and left them behind. The large proportion of C-category bones of the lowest nutritive value (almost two-thirds of all ass remains), often left in the skin after carcass partitioning (Figure 3.3.10), seems like a classical manifestation of the "schlepp effect" (Perkins and Daly 1968). Although this phenomenon cannot always be recognized as clearly as was originally hoped by the

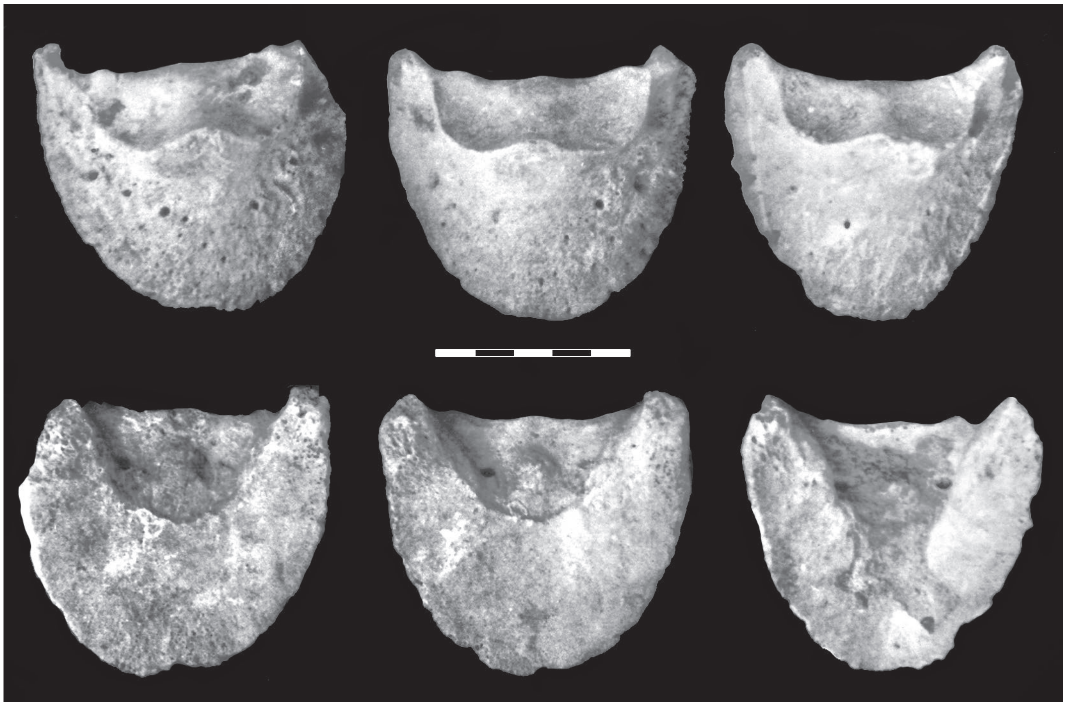


Fig. 3.3.10. Dorsal (top row) and plantar (bottom rows) aspects of two anterior hooves (left) and one posterior (right) hoof of adult Late Upper Paleolithic wild asses.

inventors of the term, hunting in the coastal plain and meat consumption in Grotta Scaloria would have provided two endpoints between which such selective transport (of skeletal parts) would have made a lot of sense during the Late Upper Paleolithic.

The distribution of bones between the three meat value categories is far more even in the case of Neolithic caprines (31%, 45%, and 24%, respectively, in the sample of 1,376 bones), which is indicative of on-site carcass processing, including primary disarticulation. Indirectly, the more even distribution of skeletal parts also coincides with the presence of sheep and goat dung in and near the cave, indicating that these animals were far more abundantly at hand during the Neolithic than once the wild asses of the plain had been, even if those hunting grounds could not have been too far away.

Stature of Animals

Bones preserved in full lengths can be multiplied by specific coefficients in order to estimate the withers height of ancient livestock. No such bones were available in the Late Upper Paleolithic material, even in the remains of wild asses.

Among the Neolithic animals, the best-represented sheep yielded a single humerus, five radii, six metacarpal, and three metatarsal bones preserved in full length. Coefficients developed by Teichert (1975:67) using modern skeletons indicate that these sheep were on average relatively large (n = 15; mean withers height = 656 mm; standard deviation = 63.2 mm; maximum = 784 mm; minimum = 577 mm). The only complete long bone from Neolithic Capo Alfiere indicates that the sheep were approximately 644 mm at the withers (Gál 2010). This exceeds the maximum (640 mm) of Neolithic sheep described from Pantanello, a trend also valid for Early Neolithic Rendina (Bökönyi 2010:20–21).

However, the withers heights of Early Neolithic sheep in Italy well exceed the averages of 602 mm, 572 mm, and 549 mm calculated on the basis of complete long bones from the Körös culture sites of Röszke-Lúdvár, Endrőd 119, and Ecsegfalva 23, all located in the Great Hungarian Plain (Bökönyi 1974:506–511, 1992:216; Bartosiewicz 2007:293).

The greater average withers height obtained for Neolithic sheep in Grotta Scaloria may be influenced by four relatively large individuals that probably exceeded 700 mm and may have been rams or wethers

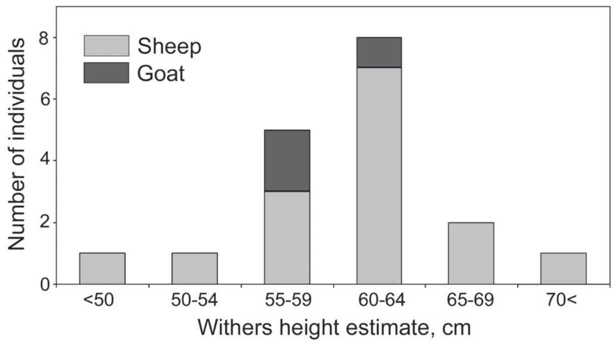


Fig. 3.3.11. Distribution of withers height estimates for Neolithic small ruminants recovered from Grotta Scaloria.

(Figure 3.3.11). The same graph also shows withers height estimates for three goats using the method published by Schramm (1967). These individuals fall within the height range of ewes.

Aside from the most commonly occurring caprines, other animals were represented only by single long bones. According to a metatarsus, a Neolithic cow was estimated as 1,240 mm at the withers using the coefficient developed by Matolcsi (1970). The value thus obtained fits within the range of Early Neolithic cattle in Hungary (Bökönyi 1974:115), but falls somewhat short of the 1,263-mm mean value calculated for 12 cows on the basis of metapodial lengths at the Körös culture settlement of Endrőd 119 (Bökönyi 1992:203). A domestic pig astragalus yielded a withers height estimate of 716 mm (Teichert 1969).

A complete roe deer metacarpus was also recovered from a Neolithic context (Figure 3.3.12). Although coefficients are yet to be developed for the estimation of withers height in this species, the algorithm developed for red deer by Godynicki (1965) to obtain a tentative value of 718.9 mm was obtained, also shown in Figure 3.3.11. This value falls somewhat short of the withers height of modern roe deer in Central Europe (Faragó 2002:413). Roe deer, however, is an extremely adaptable species, with many localized size varieties, and a single individual cannot be interpreted in quantitative terms anyway.

Environment and Economy

Neolithic animal exploitation in southern Italy has been investigated for more than four decades (e.g., Whitehouse 1968a, 1968b, 1971; Cipolloni-Sampò 1973; Bökönyi 1977–1982; Bökönyi and Siracusano 1987; Tagliacozzo 1994, 2005–2006; Bökönyi 2010; Gál 2010). Many of these studies concern the shift in subsistence strategies stimulated by the beginnings of animal keeping during the Early Neolithic.

The major portion of the pottery recovered during the 1978 excavations at Grotta Scaloria was attributed to the Middle Neolithic Scaloria Phase, sixth–fifth millennia BCE. However, all periods of the Neolithic pottery in southeastern Italy are represented at Scaloria, including the earliest occurrences (impresso phase, seventh millennium BCE; Winn and Shimabuku 1980:13).

Finer stratigraphic distinctions within the Neolithic faunal assemblage of Grotta Scaloria could not be reconstructed. This material, however, could be successfully contrasted with an assemblage of Late Upper Paleolithic bones from the cave. Analyses of other cave sites from southeast Italy have offered finer details of economic and cultural development during the Neolithic, from shell collecting (Coppa Nevigata; Puglisi 1955:25) and hunting-gathering (Grotta delle Mura) to the gradual turn to animal keeping (Grotta delle Prazziche and Grotta del Fico, Whitehouse 1971: 241–246, fig. 4). The special advantage of Grotta Scaloria is that the relatively large animal-bone assemblage illustrates two clearly distinguishable examples of animal exploitation:

- near-specialized wild-ass hunting in the coastal plain during the Late Upper Paleolithic and
- typical, caprine-based Neolithic animal husbandry complemented by opportunistic hunting during the Neolithic.

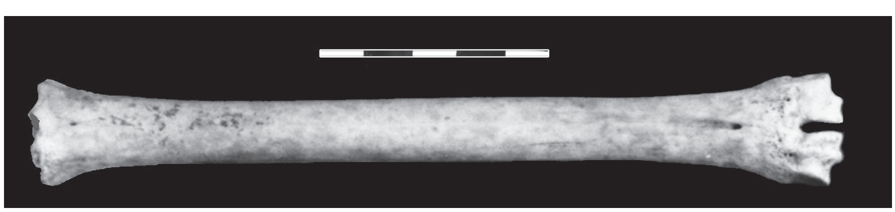


Fig. 3.3.12. Neolithic roe deer metacarpal bone used in withers height estimation.

Our study has shown that these two different forms of subsistence not only defined meat-consumption habits but also influenced culling strategies and carcass partitioning and reflect diachronic changes in the use of the complex cave system of Grotta Scaloria.

Wild asses, a typical grassland species, seem to be a sensitive indicator of shifts in subsistence at this site. This ungulate survived into the early Holocene of southeastern Europe; it was, however, probably most directly outcompeted by herding in good-quality pasturage (the similarly threatened aurochs became extinct only millennia later). In the comprehensive analysis of 53 Neolithic sites in the north-central Balkans (Bartosiewicz 2005:55), the faunal assemblage of Nosza-Gyöngypart (Voivodina, Serbia; NISP = 911) stood out uniquely with almost three-quarters of bones coming from wild asses. Bökönyi (1974:21) went as far as considering the bones of this species to be the index fossil of the Early Neolithic Körös culture contamination at the Middle Neolithic Tisza culture settlement of Lebő (Bökönyi 1958:61). At the Early Neolithic Hamangia culture settlement of Techirghiol on the Black Sea Coast in Romania, 89.5 percent of the remains originated from domesticates, ruminants making up almost 95 percent of the domestic animal bones (Necrasov and Haimovici 1962:177). The fact that wild asses were the most commonly exploited game at that site is a reflection of the dry and grassy steppe environment.

Given the time gap between the Late Upper Paleolithic and Neolithic representation in the archaeozoological assemblage of Grotta Scaloria, this site most visibly demonstrates the adaptation of a new economy to the local environment. The usage of the coastal plain changed from hunting grounds to pasturage and probably plow land. As Neolithic pastoralism was adopted, the contribution of wild animals to archaeozoological assemblages suddenly dropped across the lowlands of southern Italy. Although the large assemblage from Rendina 1 in the Ofanto Valley (Basilicata) included 16 wild animal species, this may be attributed to the unusually large assemblage size, which increased the probability of discovering rare wild animal species as well. In spite of this great taxonomic diversity, 97 percent of all identifiable bones were made up of remains of domesticates.

The remains of domestic animals (cattle, sheep, goats, pigs, and dogs) dominate, making up 88.1 to 98.8 percent of the animal bone assemblages from the open-air sites of Ripa Tetta, Rendina Lake 3 Phase 1, Rendina, Scamuso, Torre Sabea, and Favella della Corte (Tagliacozzo 2005–2006:437, table 6). There is no question that, as at Grotta Scaloria, among domesticates, sheep and goats were the most important in Early Neolithic animal keeping across southern peninsular Italy. Cattle and pigs were the second best-represented domestic species. As is evident at Grotta Scaloria, dogs usually constitute around 1 percent of the remains.

The distribution of the bones representing the most significant percentage of animal species at Grotta Scaloria was compared with those of two major Neolithic assemblages from the region (Rendina and Metaponto), also identified by Bökönyi (1977–1982, 2010) in Figure 3.3.13. The towering preponderance of sheep and goat bones was not only noted at the Early Neolithic settlements in Italy. The overwhelming dominance of caprine remains was also described from contemporaneous settlements in the Balkans as well as in southern France (Bökönyi 1977–1982:347, 1985). Moreover, in spite of the more humid and cool environment of the annually inundated Tisza floodplain in the Carpathian Basin, sheep and goats were the most preferred animals at the beginning of the Neolithic (Bartosiewicz 2005:table 1, 2007:table 6). The dominance of these small ruminants in the bone assemblages from the major part of Europe is indicative of a

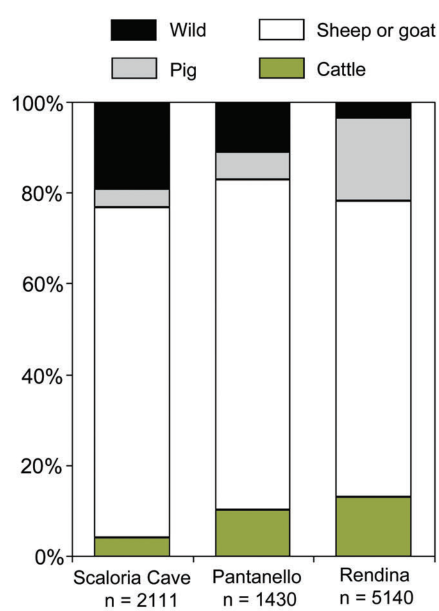


Fig. 3.3.13. Comparison between percentage contributions of main animal species to three major Neolithic animal bone assemblages from southeastern Italy identified by S. Bökönyi.

characteristic agricultural tradition of southeastern roots widely practiced by the seventh millennium BCE. Of the three assemblages compared in Figure 3.3.13, Grotta Scaloria shows the most extreme specialization in sheep and goat herding, while pork and beef must have played a somewhat greater role in the diet at the site of Rendina. Neolithic animal exploitation at Metaponto, located farther south on the coastal plain near the Ionian Sea, seems rather similar to that of Grotta Scaloria.

What is also noteworthy in Figure 3.3.13 is the consistent presence of deer remains in the assemblage recovered from Grotta Scaloria. Roe-deer hunting seems to have been especially common, at least during the fall and winter, as is shown by the state of cranial fragments from bucks with various stages of antler development (Figure 3.3.14; the seasonal indicator value of these finds is complementary to that of the age distribution of caprines in the material).

Aside from offering evidence of sporadic hunting, deer remains are also indicative of an environmental change between the Late Upper Paleolithic and Neolithic. As shown by the virtual extinction of wild asses by the Early Neolithic at Grotta Scaloria, the introduction and subsequent expansion of farming indubitably happened at the expense of the wild fauna. Wild animals would have been driven out of arable land and deprived of their preferred habitats by changes in natural vegetation. As was pointed out by Whitehouse (1971: 240), the decline of many game species, especially large ones (such as aurochs, red deer, and wild asses), would have had an adverse feedback effect on the viability of subsistence hunting by Early Neolithic times.

The decreasing ratio of wild animal remains in archaeozoological assemblages is not necessarily a direct sign of environmental change. It may have been caused by a simple shift in subsistence techniques, when wild animals could still have survived in the settlement's environment but the community saw little value in pursuing their hunting. Bioarchaeological finds from Grotta Scaloria offer a good opportunity for testing this hypothesis. Although no detailed information is available on the vegetation, diachronic change in the composition of wood remains (charred pieces of preserved firewood analyzed by Fiorentino and D'Oronzo, Chapter 3.2, this volume) could be compared with a shift in the proportions among the three deer species—red deer, fallow deer, and roe deer—to one another. The results are summarized in Figure 3.3.15. Although undoubtedly influenced by sample size, remains of wood (presumably gathered in the cave's immediate environment) show a gradual opening up of the deciduous oak forests by the Scaloria phase of the Neolithic represented in the cave. Omnipresent oak and willow, identified even in the small Late Upper Paleolithic sample, score medium high on the list of mean fuel quality value established by Zapata and Peńa-Chocarro (2003) in an ethnographic study. Since burning by humans contributed to the selective preservation of charred plant parts, cultural selection must always be considered in charcoal analysis. This is a very important point, rarely recognized in the case of

Fig. 3.3.14. Three frontal bone fragments from roe bucks. Those with antler are indicative of late summer or fall kills, while specimen at right was killed during late winter after its antler had been shed.

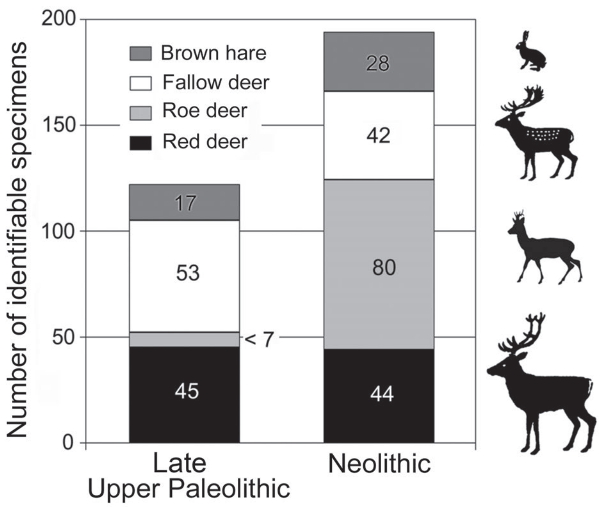


Fig. 3.3.15. Diachronic comparison between tree and game species identified in Grotta Scaloria, showing mutually supportive signs of deforestation (botanical data after Fiorentino and D'Oronzo, Chapter 3.2, this volume).

animal remains that likewise result from often restrictive selective patterns of meat consumption and thereby representing only a narrow segment of the natural fauna (Bartosiewicz et al. 2010). Given the taphonomic complexity of charcoal deposition, Fiorentino and D'Oronzo (Chapter 3.2, this volume) also correctly point out the preliminary nature of their results, especially as regards the possible variability in changing strategies of gathering firewood during the Neolithic, rather than reflecting micro-variation in the climate.

While results of the anthracological analysis are considered preliminary by the authors, the opening up of the natural vegetation may also be seen in the changing ratio between deer species: there is an "explosion" of roe deer remains by the Early Neolithic. Considering the differences among the live weights of the three species (roe deer ca. 15–25 kg, fallow deer ca. 60–80 kg, and red deer ca. 100–200 kg), it is noteworthy that it is the smallest of the three that seems to have become most available for Neolithic hunters. Importantly, this sudden increase in the contribution of roe deer remains is highly significant in statistical terms (chi-square = 51.5; degrees of freedom = 3; p-value = 0.000). The loss of protective vegetation cover leaves larger animals increasingly vulnerable to hunting. As Neolithic human impact on the environment increased, red and fallow deer must have become increasingly visible in the changing landscape, while roe deer could hide in more open gallery forests or even shrubs. Diachronic changes established within the structure of hunted animals are thus complementary to the preliminary results of anthracological analysis.

Concluding Remarks

The animal remains identified by Sándor Bökönyi from the cave site of Grotta Scaloria in southeastern Italy represent two characteristic periods of early prehistory. The earlier subassemblage originates from the Late Upper Paleolithic, when hunting wild asses in the nearby coastal plain contributed the overwhelming majority of meat consumed at the cave. Mostly adult individuals were targeted, and their bodies were probably dismembered at the kill site, which offers a partial explanation for the selective deposition of their skeletal parts in the cave. The remains of most other wild animals are indicative of a rather forested environment, probably in the immediate vicinity of the cave.

From the Early Neolithic onward, mutton became the most common form of meat attested by bone remains in the cave. Sheep and goats were the most important domestic animals, kept at least temporarily in or near the cave. This interpretation is consonant with the presence of sheep dung (see Chapter 3.1) in several layers. Spring–summer occupation is illustrated by the remains of young individuals. These animals must have been slaughtered and disarticulated on location, as their skeletal parts seem to originate more or less equally from all body regions.

Neolithic hunting was only of secondary significance, complementing the mutton-based meat diet. In the absence of detailed stratigraphic information, it remains a question whether the bones of game animals are leftovers from opportunistic hunting or originate from venison procured for purposes of feasting during ritual activities that took place in the cave.

The wild ungulate fauna reflected in the bone remains seem to have shifted radically relative to the spectrum of taxa characteristic of preceding Late Upper Paleolithic times. As a probable consequence of the ever-expanding human presence and acquisition of arable land, wild asses and aurochs became almost extinct in the coastal plain. Roe deer became far more common than larger deer species, the latter probably more severely impacted by the anthropogenic environmental changes triggered by deforestation.

RIASSUNTO

I resti degli animali individuati a Grotta Scaloria dal compianto Sándor Bökönyi rappresentano due momenti caratteristici della preistoria.

Il più antico sub-complesso si riferisce al Paleolitico superiore, quando la caccia all'asino selvatico nella pianura costiera forniva la maggior parte della riserva di carne. Sono stati uccisi per lo più asini adulti, e probabilmente erano smembrati nello stesso luogo dell'uccisione, ad una certa distanza dalla grotta. Questo fatto offre una spiegazione parziale per la deposizione selettiva di loro parti scheletriche all'interno della grotta. I resti di molti altri animali selvatici sono indicativi di un ambiente piuttosto boscoso, probabilmente nelle immediate vicinanze della grotta.

Durante la successiva fase neolitica, Grotta Scaloria era frequentata come luogo di sepoltura, ma anche di abitazione, come dimostra il gran numero di resti di animali, prevalentemente domestici, specialmente pecore e capre. Questi animali potevano essere tenuti nei pressi e all'interno della grotta. Questa interpretazione è in accordo con la presenza di sterco di pecora in diversi strati. La presenza di resti di individui giovani indica occupazione del sito durante la primavera-estate. Questi animali devono essere stati macellati e disarticolati sul posto, come dimostrato dalla presenza delle loro componenti scheletriche appartenenti a tutte le varie parti del corpo.

Con il primo neolitico la caccia è diventata di importanza secondaria, integrando la dieta di carne basata sul montone. Resta la domanda se le ossa degli animali cacciati siano i resti di una caccia opportunistica, o provengano da selvaggina consumata in occasioni speciali durante banchetti o attività rituali che avevano luogo nella grotta.

La fauna ungulata selvatica del Neolitico è cambiata radicalmente rispetto a quella delle fasi precedenti del Paleolitico superiore. Come una probabile conseguenza dell'espansione della presenza umana e dell'acquisizione di terreni da coltivare e di pascoli, l'asino selvatico e gli uri praticamente si estinsero nella pianura costiera. Il capriolo diventò molto più comune del più grande daino e del cervo rosso, essendo probabilmente quest'ultimo quello più colpito dai cambiamenti ambientali dovuti all'uomo, soprattutto la deforestazione.

3.4. Sensory Worlds of Grotta Scaloria

By Sue Hamilton, Mike Seager Thomas, and Ruth Whitehouse

Santo Tiné: A Special Tribute

Ruth Whitehouse

I would like to offer this tribute to Santo Tiné, who died in May 2010. I knew Professor Tiné for more than 35 years and I am a great admirer of his work. His contributions to the prehistory of Italy, and especially to the Neolithic, were outstanding, involving excavations of many iconic sites, as well as theoretical works of continuing importance. Although his work covered the whole of Italy, including major projects on the islands of Sicily and Sardinia, his contribution to the Neolithic of the Tavoliere, the region relevant to the current volume, still stands out—it includes field surveys, excavations at the largest of the *villaggi trincerati*, Passo di Corvo, and of course at Grotta Scaloria, and synthetic accounts that still provide the basis of work in the Tavoliere today.

It is no secret that professionally Santo Tiné and I had many differences of opinion, which were aired at conferences and seminars over the years and were also expressed in print. In my opinion these diverging opinions were of the constructive kind that contribute to the development of academic research, bringing subjects of controversy into closer focus and directing subsequent research programs. Our exchanges were never less than courteous and Professor Tiné was always gracious in allowing me scope to express my divergent views at the events he organized.

I also have happy personal memories of our meetings. In relation to the Tavoliere, I remember in particular the conference he organized in Foggia in 1973, one of the "Preistoria e Protostoria della Daunia" series, and the site visits we made afterward, to Passo di Corvo, Coppa Nevigata, and Grotta Paglicci. I also remember an occasion in 1980, when I brought a team of staff and students from our excavations at Botromagno, Gravina di Puglia, to visit the excavations at Passo di Corvo. Professor Tiné was characteristically generous with his time and knowledge on that occasion and the visit was made even more memorable by an overlap with a visit by Marija Gimbutas and her team, who were working on the material from Grotta Scaloria at the time.

Italian archaeology has lost an outstanding scholar, as well as a kind and generous man, who shared his abundant knowledge and experience with other researchers of all ages and nationalities. His contribution is lasting and indelible.

Introduction

General Introduction

Our interest in Grotta Scaloria is long-standing. One of us (RW) first became interested in the site as long ago as the 1960s, as part of her doctoral research, and subsequently developed this interest in the 1990s in the context of a wider study of cult caves in Italy (Whitehouse 1992). The third phase of our interest in the cave was initiated with the beginning of the Tavoliere-Gargano Prehistory Project, with which all of the current authors are involved. This project began with a pilot study in 2002, followed by five field seasons, and is now being written up for publication (Hamilton et al. forthcoming). A central interest of the project is the investigation of the relationships between the Tavoliere Plain and the Gargano promontory in later prehistory (Neolithic to Iron Age). It aims to elucidate the social use and organization of landscape and "taskscapes" and, in particular, considers the sensory worlds of inhabitation. In doing so, it explores the interfaces of the domestic, specialist, and ritual sites of these areas at regional, intersite, and intrasite scales. The work combines innovative and traditional surface survey and mapping methods, as well as the development of approaches for understanding the human experiential aspects of "dwelling" in prehistory. In the Neolithic part of the project, we have concentrated on the *villaggi*

trincerati of the Tavoliere Plain, but we have also looked at sites on the Gargano foothills and the adjacent limestone plateau (the Pedegarganico) extending southward toward modern Manfredonia, where Grotta Scaloria is located.

Our current work on Grotta Scaloria is concerned with its relationship to the *villaggi trincerati* (ditched villages), the nearest known example of which—Masseria Valente—is roughly 9 km away (Cassano and Manfredini 1983:104–106) (Figure 3.4.1). Radiocarbon dates demonstrate that the use of the upper cave of Grotta Scaloria for burial (and perhaps other purposes) was largely contemporary with the use of the ditched settlements on the Tavoliere. The *villaggi trincerati* seem to have been in use throughout the sixth millennium BCE, while the Grotta Scaloria human remains date to the second half of that millennium, according to the more recent, and accurate, ^{14}C dates for the site (Robb, Chapter 2.3, this volume). The single date available for the lower cave, with its cult of stalagmites and stillicide water, represents a period after the flourishing of the ditched settlements and is generally thought to be too late in relation to the typology of the associated pottery, which suggests that it was in use at the same time as the upper cave. The existence of a cave used for burial and other cult purposes on the perimeter of the known area of the ditched villages and contemporary with them invites an investigation of the relationship between the settlements and the cult site. In this paper, we explore what a sensory perspective contributes to an understanding of Grotta Scaloria as a cult site and as a potentially special place to be journeyed to, possibly with offerings and the relics of the dead, by people living in the nearby ditched villages of the Tavoliere. We are aware that some aspects of our interpretation are at odds with the views expressed

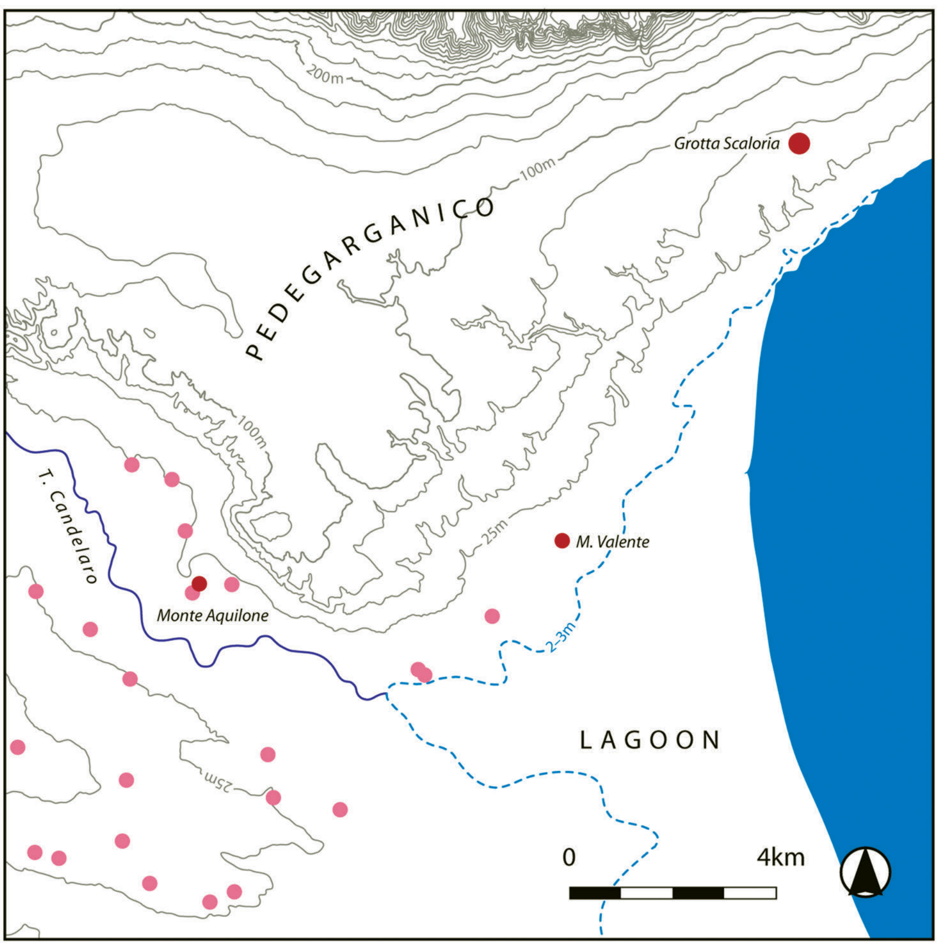


Fig. 3.4.1. Map of northeast part of Tavoliere showing known Neolithic ditched settlements and Grotta Scaloria. Pink and red dots represent Neolithic sites; the dashed line shows probable extent of coastal lagoon in the Neolithic period.

elsewhere in this volume, but we believe that our version is consistent with the evidence available. We offer it not as a definitive account but as a contribution to the ongoing discussion of the site and its context.

Introduction to Phenomenology/Sensory Archaeology

The sensory aspect of the project can be dubbed a phenomenological study. From the 1990s, "phenomenology" is a term and interpretive approach that has entered archaeology. Its early use in archaeology was in landscape studies (Tilley 1994) and draws on the philosophical stance that the existence of human beings in the world is both individually and culturally understood via their personal bodily presence in it. From such a perspective, all human interactions with the world are mediated through the experiences of the sensory body. The role of phenomenology in archaeology is as a mode of inquiry that considers the sensory impact of landscapes and their features, buildings, objects, and other sentient beings on our understandings of the world and the extent to which such experiences may have been used in the past to create and reinforce specific cultural meanings. In archaeological interpretation, this phenomenological perspective can be considered in two different ways. First, it can be understood as an all-encompassing framework for the establishment of human knowledge. Alternatively, it can be seen as a component of a broader hermeneutic endeavor. The former position is problematic, not least in the relationship of social mediation with bodily experience in the construction of knowledge. With regard to Grotta Scaloria, we envisage the role of phenomenology in the latter sense, as one method of interpretive practice (Hamilton and Whitehouse 2006a). Our use of it in the Tavoliere-Gargano Project as a whole has been to explore the sensory aspects of locales and the ways in which we can elucidate their past cultural use, in part by focusing on the probable absolute characteristics of sensory perception that can be ascertained—for instance, the maximal distances beyond which the human eye cannot generally focus or beyond which specific sounds are inaudible to most people—and how these relate to our knowledge of past environments of the Tavoliere-Gargano and their archaeology.

The recurrent ritual use of caves is documented widely in archaeology and history, but in the main, caves have been considered from the perspectives of their geological/topographic types and their associated material culture rather than in regard to the heightened sensory arena that caves can produce for ritual—Betts (2003), Skeates (2010), and Whitehouse (2001) being notable exceptions for central Mediterranean prehistory. Our work is distinctive not only in combining sensory studies of sites and locales with traditional survey and mapping of surface features and systematic plotting of surface find distributions, but also in its consideration of sensory aspects of the landscapes of everyday tasks alongside those associated with special rituals. While it is easy to theorize that sensory perceptions are key to how humans understand the world, how this might be explored via fieldwork is lacking in explicit methodology, and indeed the issue of how present-day individuals can reconstruct, record, and map the sensory experiences and environments of the past has often been raised. These are points that we elucidate below, and we suggest that our use of phenomenology alongside traditional methods of study enables a more nuanced understanding of the Neolithic use of Grotta Scaloria.

The Present-Day Environment of Grotta Scaloria

To describe the present-day environment of Grotta Scaloria as unprepossessing would be an understatement. The expanding industrial suburbs of Manfredonia have encroached on the mixed fields and scrubland that used to occupy the area (Figure 3.4.2). Today, one approaches the site from the Scaloria road on a defunct side road that leads nowhere but runs up to and along the back of a sports stadium. On several occasions when we visited the site, this area, just south and east of the site, was occupied by travelers' caravans, surrounded by considerable quantities of rubbish, much of it old clothing. On our last visit, numerous items of clothing, most notably children's knickers, as well as plastic bags and other debris, were spread along the side road and, to a lesser extent, across the field where the entrance to the cave is situated (Figure 3.4.3a).

Slightly farther south, where the entrance to the neighboring Grotta di Occhiopinto is located, the situation is even worse (Figure 3.4.3b). Here, access from the Scaloria road passes between a building being renovated on the north side and a builders' supplier on the south and opposite an enterprise that produces and sells olive oil. Some 50 m from the road is the swallowhole that provides access to the Grotta di Occhiopinto cave entrance, which is sealed with a concrete wall with

Fig. 3.4.2. Position of Grotta Scaloria as seen looking south from Gargano crest.

a padlocked iron gate in its center. Piles of building rubble and domestic rubbish surround the top of the swallow-hole. Flies buzz around little heaps of animal feces and other indeterminate organic deposits. Out of the swallow-hole grows a flourishing fig tree, and around it brambles and other prickly vegetation have gained hold; building rubble and domestic rubbish have found their way down here too. The place looks and smells disgusting.

Faced with this situation, the reaction of most people would be—understandably enough—to beat a fast retreat. A comparable, if less disgusting, example is that provided by Tilley's discussion of Swedish megalithic tombs. Describing surviving megaliths in Falköping in southern Sweden, variously located in parks, gardens, industrial estates, and on a traffic island, he concludes, "a megalith in an urban environment does not work" (Tilley 1993:52) and, equally, prehistoric cult caves in suburban wastelands "don't work." However, the Grotta Scaloria complex was one of the most elaborate burial and cult sites of Neolithic Italy, and it is worthwhile attempting to understand how the site and its location might have been experienced by Neolithic people in relation to both its original landscape setting and to other sites in the area, particularly settlement sites. In this exercise, the nature of the present-day environment is definitely a problem. It means that we cannot use our unmediated sensory responses to interpret prehistoric experience, as sometimes seems to be the case in phenomenological studies carried out in the wilder upland landscapes of northwest Europe where relatively little significant environmental change has occurred since prehistory (see Tilley 1994 and Bender et al. 2007 for archetypical examples). What we offer here is by no means a "pure" phenomenological approach, if such a thing is possible; rather, we have incorporated sensory experience into a holistic archaeological interpretation, as already described.

What of the ancient site can be identified on the ground today (Figure 3.4.4)? Most easily identifiable are the entrance to Grotta di Occhiopinto (Figure 3.4.5a), via the swallow-hole, and the current access to Grotta Scaloria itself, via the aqueduct maintenance shaft (Figure 3.4.5b). Between and around these features and where no building has taken place, there is a weathered limestone landscape with a thin soil cover. The original access point to Grotta Scaloria is situated southeast of the current access shaft, but at some stage this entry point was disabled and obscured by cave collapse and subsequent in-wash of sediments (Figure 3.4.5c). Its position was identified by surface observation and excavation in 1978 (Winn and Shimbaku 1980). Neither the published details of the 1978 excavation and survey, nor the analysis of the cores taken

a

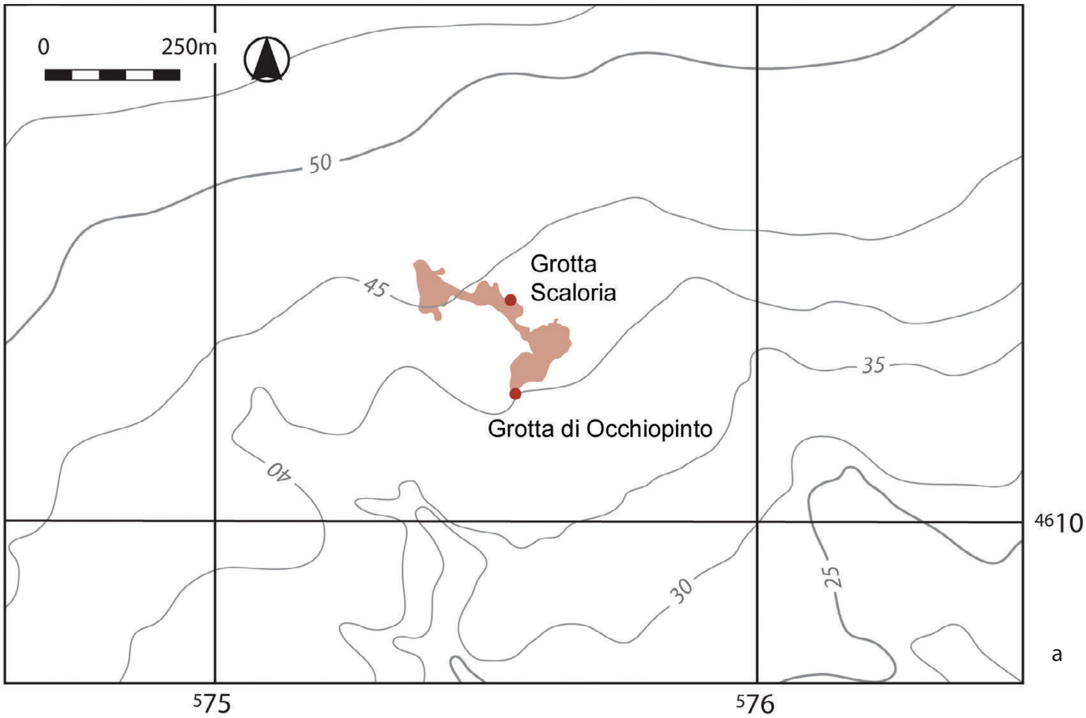
b

Fig. 3.4.3. Grotta Scaloria/Grotta di Occhiopinto area. (a) Children's knickers at road side near the original entrance to Grotta Scaloria. (b) Debris near Grotta di Occhiopinto swallow-hole.

within the cave in the recent reexamination, allow us to reconstruct the original entrance with any precision. In our interpretation, we assume that the cave was entered via a swallow-hole, similar to that which gives access to Grotta di Occhiopinto and that the cave entrance was similar in size. New excavations are now providing additional information indicating that there may have been a shallower and more gently sloping hollow in front of the entrance and that the entrance itself may have been larger, allowing more light to enter the cave (Eugenia Isetti and Antonella Traverso, personal communication). We do not think that this affects our general interpretation, although it would mean that the transition from the surrounding area to the cave entrance would have been gentler and less abrupt than we describe below and the passage from light to darkness would also have been more gradual.

The Ancient Entrance to Grotta Scaloria

As a natural feature, a swallow-hole would not have been regionally unusual. It is a geological phenomenon that would have been encountered at various locales, often in multiples of tens and more, across the Pedegarganico and the Gargano. Swallow-holes are a distinctive feature of karst landscapes and today remain most apparent on the Gargano promontory. Because in recent times the Pedegarganico has had more intensive construction and agricultural activities than the Gargano promontory, many of the swallow-holes that



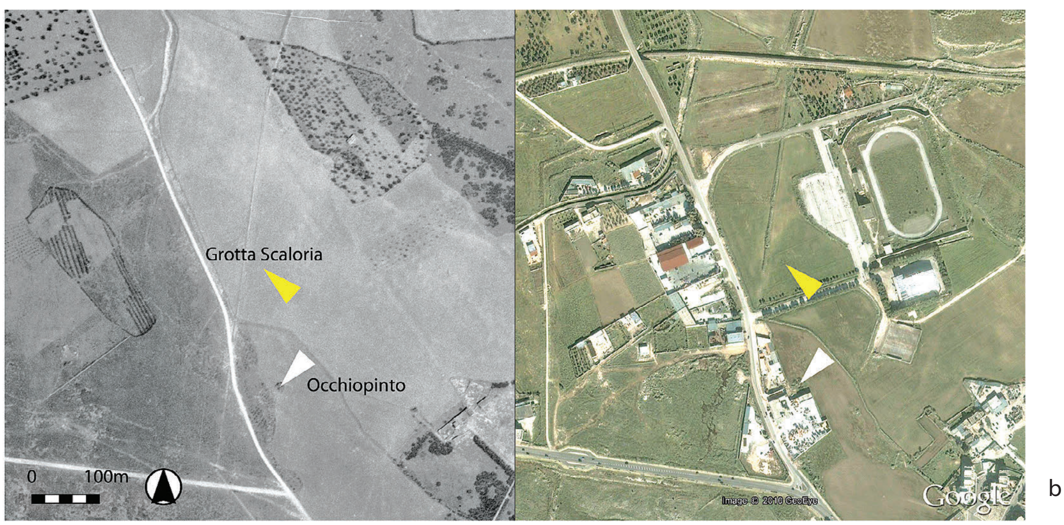


Fig. 3.4.4. Scaloria/Occhiopinto area. (a) Cave plan superimposed on contour map; red dots mark cave entrances. (b) Position of cave entrances shown on aerial photos: (left) photo in Bradford collection taken in 1945; (right) present day, courtesy of GoogleEarth, showing encroachment of Manfredonia suburbs.

were present in the past are now filled in. The Grotta di Occhiopinto swallow-hole lies some 200 m south of Grotta Scaloria's Neolithic entry point and provides an impression of what the now filled-in swallow-hole might have been like during the Neolithic. It is approximately circular, measuring 11×12 m and has a depth of 7 m, at which point there is an opening into the cave system from the south. This swallow-hole is soil-lined at its base and has an abrupt bedrock edge, which is near vertical on its northern face. We surmise that Grotta Scaloria's swallow-hole was of a roughly similar size and shape, based on the dimensions of the extant filled depression revealed in the 1978 excavation (Winn and Shimabuku 1980) at the entrance to the cave. The Grotta Scaloria swallow-hole was, however, entered from the north. In phenomenological terms,

a

b

c

Fig. 3.4.5. Features of cave complex visible today. (a) View of Occhiopinto swallow-hole. (b) View of modern entrance to Grotta Scaloria via aqueduct maintenance entrance. (c) View of hollow over original entrance to Grotta Scaloria in June 2010; hollow shows up as area of dark soil where Professor Hamilton is standing.

one obvious question is: what was an encounter with the locale of Grotta Scaloria and the descent to the cave entrance like? Unlike many cave entrances in limestone areas, which are exposed along the vertical, largely vegetation-free faces of gorges and ridges, swallow-holes are invisible from any distance, even in open landscapes. Caves entered through vertical entrances in rock faces are visible and most accessible by looking and climbing upward to the entry point; by contrast, swallow-holes cannot be seen by scanning the horizon and entry necessitates sudden disappearance—falling, descending, or dropping vertically into the ground to an underworld. Even when standing quite near to a swallow-hole, because the entry point is at foot level, the eye will overlook it and awareness of the location will mostly depend on sensory perceptions other than vision, such as sound, smell, and changes in humidity—and, of course, cultural markers and any change in vegetation, such as today's lone fig tree growing out of the dank base of the Grotta di Occhiopinto swallow-hole. Thus, potentially Grotta Scaloria was an invisible place, known only to those who controlled access to it or undertook activities proximate to it.

In spring 2010, when John Robb visited the site, the original entrance area of Grotta Scaloria, as isolated by the 1978 excavation trench, stood out as a slight hollow containing greener vegetation than the surroundings. When we visited the location of this trench in late June of 2010, the ground had been recently plowed and a large amount of artifactual material, from what we take to be the backfilling of the excavation trench, was visible on the surface, largely concentrated within and around the visible hollow—including certain and likely Neolithic pottery, struck chert, and obsidian (Table 3.4.1). Additionally, about 60 m away from the center of the hollow there was a small concentration of sherds of Bronze Age date. The Neolithic pottery incorporated an unusually high proportion (nearly 44%) of levigated fine wares (known as figulina), including some (20%) decorated with red paint (no bichrome pieces were found) (Figure 3.4.6). This affirms the emphasis on figulina that characterizes the cave assemblage as a whole, but was not quantified for the 1978 trench over the cave entrance area/swallow-hole. By contrast, none of the 170-odd ditched villages we visited during the Tavoliere-Gargano Prehistory Project yielded figulina in anything like these proportions. While this could reflect a chronological difference, as Winn and Shimabuku believed, the general pattern of radiocarbon dates does not support this interpretation; the marked difference between the Scaloria material and known settlement assemblages suggests to us a functional rather than chronological explanation. The 1978 excavation report additionally notes finds of daub and quernstone in the entrance area (Winn and Shimabuku 1980). An interpretation that links activities at the entrance point with the use of the cave itself could accommodate an emphasis on high-quality pottery for ritual purposes and perhaps additional symbolic offerings such as quernstones being left around the top of the swallow-

Fig. 3.4.6. Sherds of figulina ware, including many with red-painted decoration collected in area of original entrance to Grotta Scaloria in June 2010.

Table 3.4.1. Neolithic pottery types in area of original entrance to Grotta Scaloria

Pottery type	Number of sherds	%
Figulina	142	43.69
Medium ware	38	11.69
Coarse ware	63	19.38
Calcite-tempered	50	15.38
Prehistoric	32	9.85

hole and at its base at the point of entry into the cave complex. The presence of daub is more puzzling: any form of wattle-and-daub structure seems inappropriate for the dark, dank entrance to the cave, but aboveground ceremonial or feasting structures may be as plausible an interpretation as the domestic buildings assumed by Winn and Shimabuku.

Ancient Landscape Setting of Grotta Scaloria

A consideration of the Neolithic landscape of journeying to and arrival at the ancient site of Grotta Scaloria presents the interpretive sensory archaeologist with numerous problems. Preeminently, there is the gross impediment that we have very little paleoenvironmental information for the vegetative state of the Pedegarganico during the Neolithic. The area lacks adjacent lake sediments of the sort present to the north of the Gargano that have produced regional pollen sequences. The nearest traps of regional paleoenvironmental information are the Salpi lagoon areas of the Gulf of Manfredonia where, on the basis of mollusks, foraminifers, ostracods, and plant macroremains, a sequence of changing marsh conditions and sea levels has been established for the Neolithic to Roman times (Boenzi et al. 2002, 2004), but the karst geology of the Pedegarganico lies geographically beyond this source of environmental evidence. The lack of recognized and excavated Neolithic sites in the Grotta Scaloria area also means that we lack cultural contexts for recovering environmental indicators of local, site-specific plant and animal remains, except for those from the cave itself, which are not conclusive. The faunal remains relating to the Neolithic period (Bartosiewicz and Nyerges, Chapter 3.3, this volume) show dominance of domestic animals, especially sheep and goats, similar to the situation in the ditched villages, but also a higher proportion of wild animals (some 19%, compared to the single figures found in the villages). The wild animal assemblage is dominated by roe deer, which is a predominantly woodland animal, although also able to survive in more open conditions. The presence of red deer, fallow deer, and wild pigs as well, although in smaller numbers, indicates that there was at least some woodland within the range of hunters using the cave. On the other hand, the dominance of the domesticated animals and the presence of hares, an open-ground species, as well as open-ground mollusks (Reese, Chapter 6.5, this volume) suggest that there must also have been cleared ground near the cave. We clearly need more evidence. Possibly the solution and collapse features of the Pedegarganico karst have mollusks entrapped in their stratified sediments, and these could potentially elucidate details of its past environments, but no such studies have been undertaken. Thus, we do not have enough evidence to know whether the Pedegarganico was an opened-up environment or a wooded environment at the time of the Neolithic use of Grotta Scaloria. If the Pedegarganico had major Neolithic settlement, there may have been substantial clearance. Owing to its stone substrate, the area lacks a history of deep plowing, and any ditched enclosures (as on the limestone farther south in the region of Matera) are unlikely to have been disturbed and material from them brought to the surface. Furthermore, material originally deposited on the Neolithic land surface may have been washed underground. This noted, there is no actual evidence of Neolithic settlement from the immediate area of Grotta Scaloria. While the Pedegarganico lacks major coverage by aerial photography, the photos we have had access to show no evidence of ditched enclosures. Together, the latter points suggest to us that the area was not substantively settled.

In contrast with the difficulties of identifying the Neolithic environment of the Pedegarganico, we have much more information for the Tavoliere. We can surmise that in the sixth millennium BCE, the Tavoliere was an extensively open environment. Not only is it self-evident that major clearance was needed in order to construct and then support agriculturally the large density of sites, but we also have environmental evidence recovered through excavation. Excavated environmental remains indicate (1) an emphasis on cereal production; (2) the domestication of cattle, pigs, sheep, and goats; and (3) very low percentages of wild animal remains, with those occurring being open-ground species such as hare (Castelletti et al. 1987; Ciaraldi 2004; Costantini and Stancanelli 1994; Curci et al. 2004) and open-ground mollusks (Thomas forthcoming).

In the sections that follow, we look first at zonation of landscape around Grotta Scaloria, in terms of sensory experience. Then we consider journeying to Grotta Scaloria, interpreted as pilgrimage.

Zonation of Sensory Experience

There seems to be a strong zonation of sensory experiences in relation to Grotta Scaloria. We started by

observing a basic contrast between the sensory experiences in the open ground in the cave area today versus those within the cave itself; we went on to recognize that the swallow-hole would have provided an intermediate zone, with "in-between" sensory experiences, corresponding to the "liminality" defined in classic discussion of ritual (Turner 1967, 1969; Van Gennep 1960). We later came to consider the possibility that the area around the cave was wooded (discussed further below), thus providing a fourth zone, if we assume that the starting point of a journey to the cave was the definitely open ground of the Tavoliere settlements. Thus, we have a sequence of possibly four zones: open ground on the Tavoliere plain, wooded ground on the Pedegarganico, the confined area of the swallow-hole with its particular conditions, and finally the cave itself.

Our observations of sensory differences are of admittedly different types and degrees of certainty, but we believe that the differences are sufficiently marked that they must be valid in a broad sense. Most secure are the observations relating to sensory experiences on the open ground, since over the years of the Tavoliere-Gargano Prehistory Project we have carried out many experiments, especially relating to sound and vision, on a range of Neolithic sites on the Tavoliere, including a base site at Monte Aquilone, where the conditions are not dissimilar from those in the Grotta Scaloria area today (see Hamilton and Whitehouse 2006a and 2006b for a description of some of these experiments).

For the woodland experiences, we conducted a series of sight and sound experiments in September 2007 at the sanctuary of the Madonna at Incoronata on the Tavoliere Plain, southeast of Foggia, where an area of ancient deciduous woodland survives, possibly dating back to the foundation of the sanctuary in CE 1001.

The data for the intermediate zone are based on a single set of experiments, also carried out in September 2007 in the Grotta di Occhiopinto swallow-hole; we use this as a proxy for the now-filled-in entrance to Grotta Scaloria (Table 3.4.2).

For the sensory experiences inside the cave we use proxy data, because we were not able to enter either the Grotta Scaloria or the Grotta di Occhiopinto and so were unable to carry out any sensory experiments in situ. However, it is possible to make use of observations recorded in other cult caves with similar morphologies—for instance, in the Neolithic and Copper Age cave of Grotta di Porto Badisco in the Salento Peninsula and the Bronze Age cave of Sa Cova des Carritx on the island of Menorca (Whitehouse 2001). The main relevant features of these two caves, which also apply to the combined Grotta Scaloria/Grotta di Occhiopinto cave, are (1) restricted entrances; (2) limited penetration of daylight; (3) marked zonation of the cave structure, with some roomy areas large enough for several people to stand up in comfortably, versus other smaller, lower chambers and very narrow, low passages that can only be negotiated on all fours or on one's stomach; and (4) presence of abundant stalactites and stalagmites that seem to have been the focus of cult attention.

The main sensory differences between the zones are presented in Table 3.4.3. In terms of vision, one focus of difference relates to the visibility of other people. In the open, human forms can be distinguished at a distance of between 300 and 400 m, simple sweeping body actions such as waving are recognizable at 250 m, while smaller-scale hand and feet actions become clearer between 150 and 190 m. In wooded areas, while it can sometimes be possible to make out the presence of people at a distance of 20 to 30 m (especially if they are wearing bright-colored clothes), they are clearly visible only in close proximity. In the intermediate zone of the swallow-hole, intervisibility between people in the hole and those outside is possible only if the latter are standing on the lip of the hole itself. Inside the cave, visibility is dramatically reduced in the darkness; even if we assume the use of lamps of some sort, vision would still have been severely restricted. People would have been able to see each other, quite dimly, only a few meters away within individual chambers.

Other aspects of vision also demonstrate marked contrasts. The most obvious is in relation to light and dark. In the open, illumination from the Mediterranean sun is often very bright, while the interior of the cave is in complete darkness. Woodland is intermediate in this respect too, with restricted light, dappled in sunlight and gloomy when overcast. The swallow-hole is intermediate in a different way, with restricted light at the base of the hole, whereas while looking upward and outward, one tends to be dazzled by a bright circle of light (although this would have been reduced if the area was wooded). Another aspect relates to the visibility of space and landscape, with panoramic vistas in the open contrasting with a very limited view in woodland and from the swallow-hole, and none at all inside the cave.

Color also presents contrasts: outside color varies with the seasons but offers whites/grays (limestone), greens/yellows/browns (earth/vegetation), and blues

Table 3.4.2. Sound experiments carried out at and around entrance to Grotta di Occhiopinto

Distance from sound	Small hand-held skin drum	Human voice (speaking pitch; two women separately and together)	Human voice (incantation; harmony of two female voices)
Top of swallow-hole lip	Fully and easily audible	Fully and easily audible	Fully and easily audible
30 m	Faint	Barely audible—individual words heard, not sentences	Faint
50 m	Very faint	Not audible	Very faint
70 m	Boundary of recognizable sound	Boundary of recognizable sound	Boundary of recognizable sound

Note: There was a gentle breeze but it did not recognizably alter the experience of sound whether positioned downwind or upwind of the point of sound dissemination.

Table 3.4.3. Zonation of sensory experiences in and around Grotta Scaloria

Aspect	Open country	Wooded zone	Swallow-hole (liminal zone)	Inside cave
Vision—illumination	Light	Reduced light	Reduced light	Dark
Vision—color	Many colors, varying with season	Mostly greens, browns in many variants	Mostly greens and grays, varying with season	Almost monochrome, some lighter areas, no seasonal variation
Vision—other people	Visible at 200–300 m	Clearly visible only in close proximity	Visible on lip and inside of swallow-hole only	Visible only in close proximity
Sound—human voice shouting	Audible at 350 m	Audible at 300 m	Audible at 30 m	Variable, not locatable
Sound—human voice speaking emphatically	Audible at 120–170 m	Audible at 50 m	Audible on lip and inside of swallow-hole only	Variable, not locatable
Sound—human voice chatting	Audible at 50 m	Audible at 30 m	Audible on lip and inside of swallow-hole only	Variable, not locatable
Sound—drumming	Audible at 500–1000 m (depending on drum type)	Audible at 500 m	Audible at 30 m (small skin drum)	Unknown
Sound—background noise	Abundant, intrusive	Variable, predominantly natural in origin	Reduced, distant	None
Perception of space	Unrestricted movement, only feet touching ground	Very restricted, constrained by vegetation	Restricted movement, body in contact with ground and vegetation	Cramped, many parts of body in contact with rock
Perception of temperature, humidity, and air movement	Varies with season, often very windy	More clement than open country—cooler and moister in summer, less cold in winter	Varies with season, some protection from extremes	Humid, no breeze, little or no seasonal variation

(sky/sea). Woodland offers a predominance of greens and browns, in great variety, changing with the seasons. In the swallow-hole, a more restricted range is visible (no significant areas of limestone, no view of the sea, more limited vegetation) and greens dominate. In the cave, the darkness turns everything more or less monochrome, although with artificial light, lighter areas of stalactite and stalagmite are apparent in places.

In terms of sound, our experiments involved both the human voice and various instruments and activities. In the open, the human voice shouting could be heard at a distance of about 350 m, rather less in woodland (a human whistle could be heard at about the same distance, and on one occasion we recorded an impressive female scream at a distance of some 500 m in dense woodland!). Stressed sentences could be heard at a distance of 170 m (female) to 120 m (male) in the open, but only 50 m in woodland, while normal conversation, both male and female, was audible at a distance of about 50 m in the open, 30 m in woodland.

In terms of other sounds, a simantron (wood-on-wood drum) could be heard at a distance of roughly 950 m, while a stone strike could be heard at 350–300 m. In woodland, a small drum (wood-on-skin) could be heard at 500 m.

For the intermediate zone of the swallow-hole, our sound experiments at Grotta di Occhiopinto involved partly different sounds, based on our guesses about the possibly enacted rites and evocations at the "hidden" base of the swallow-hole (Table 3.4.2). These sounds, involving normal speech (female), incantation (female), and drumming (wood on skin) would not have traveled far, probably no more than 30 m; even at that distance, only our incantations and the sound of the drum were heard, and those quite faintly. If all or any of the activities at the base of the swallow-hole took place with hushed voices, their existence would have remained obscure to outsiders.

Inside the cave, sound would have behaved quite differently. Characteristically, sound is quite variable in caves: in some places it echoes around repeatedly and its source cannot be located, while in others it is absorbed and travels only very short distances, so one cannot hear another human being only a few meters away in a neighboring chamber. The effect, particularly combined with the restriction of vision, is quite disorienting.

Another difference that might have been present is a contrast between the outside world, particularly the area of the villages, where the sounds of everyday life would have been present—dogs barking, people working, children playing, babies crying—and the cult cave and its entrance area, where silence would have provided the background to the prescribed sounds of the rituals themselves. In the intervening woodland, if this was present, natural sounds such as birdsong and trees moving in the wind would have predominated.

Contrasts can be identified in terms of other senses too. In the open, only the feet are in contact with the ground and the rest of the body is able to move freely, whereas in woodland, all parts of the body are constantly coming into contact with obstructive vegetation. Descending into the swallow-hole restricts movement, and the body comes into contact with rock and vegetation. In the cave itself, the contrast is much greater: parts of the body normally exposed to the air are pressed by the cave walls, floor, and roof; this would certainly have been the case in the narrow passage from the upper to the lower cave of Scaloria, while in the lower cave one has to negotiate one's way between stalactites and stalagmites. Movement in this environment is never unselfconscious as it sometimes is in the world outside, particularly in the familiar zone of the villages; instead, it is tentative and exploratory and almost invariably slow. Bruising, scratching, and some level of pain may be part of the experience.

Perceptions of temperature, wind, and humidity show strong contrasts too. In the open, one feels the temperature range from very hot to very cold, depending on the season; one is often exposed to wind, which today at least can create very dry and dusty conditions. Equally, when the area suffers one of its not infrequent violent Mediterranean storms, one rapidly gets soaked to the skin. Woodland mitigates the extremes somewhat, offering relative coolness in the summer, less extreme cold in the winter, and some level of protection from rain. The swallow-hole also provides some protection against the extremes of the weather, especially the wind, while the cave itself offers complete protection from sun, wind, and rain, and, as caves have microclimates of their own one also rapidly loses any feeling for what the weather outside is like. (Temperatures in caves vary by no more than 4° around the annual norm for the area and humidity may be very high.)

It is likely that other senses, such as that of smell, would also have demonstrated contrasts between outside and inside, with the swallow-hole as an intermediate zone, but the above discussion, focusing on the senses that are easiest to document, serves to illustrate the zonation of sensory experience.

Journeying from the Tavoliere

The previous section discusses the zonation of sensory experiences in static terms, expressed as a series of contrasts. In this section, we explore the concepts of moving through the spaces described as people journeyed to and from Grotta Scaloria.

Where did the people who used Grotta Scaloria for rituals come from? Above ground, was it a place that its users were familiar with, or did it constitute the destination of a special journey to a ritual place? Given that nearest known settlements are the *villaggi trincerati* of the Tavoliere, we conclude that this is the likely source area for the communities who used Grotta Scaloria (Figure 3.4.1), a conclusion supported by the evidence of strontium isotope analysis of human bones from the cave (Tafuri et al., Chapter 4.3, this volume). We cannot know the routes that individuals and groups of people may have taken, but they were prob-

ably journeys with practically and ideologically recognized waypoints. For sure, any journey from the Tavoliere to Grotta Scaloria would have involved distinct types and stages of physical endeavor and sensory experience.

We have argued that that in the sixth millennium BCE, the Tavoliere was an extensively open environment, with relatively little surviving woodland. We can envisage a place dominated by the sounds, colors, and smells of people, fires, tool-making, crops, and animals.

Travelers may have had to negotiate passage through, rest at, or actively circumvent the various ditched villages that they encountered on their journey across the Tavoliere. Perhaps individuals from different communities came together during the journey. The journey may have lasted several days—only sites such as Masseria Valente or Monte Aquilone on the eastern edge of the Tavoliere would have been within a day's return (Figure 3.4.1). The precise route(s) taken across the plain may have depended on seasonal conditions. Any south–north travel would have involved crossing the dry, vegetated, or water-filled riverbeds of the major rivers of the Tavoliere—the Carapelle, Cervaro, Celone, Salsola, Triolo, and ultimately the Candelaro. These rivers would have been much more complex to traverse, with multiple braids, than their present-day canalized versions (Delano Smith 1987); some of them may have prompted formalized stopping points of the journey. Alternatively, travelers may have clung to the edge of the Salpi lagoon, which would have been marshy, grass-vegetated, reeking of salt and rotting vegetation, punctuated by the sounds of marsh and seabirds, and difficult going, especially at the mouths of the rivers, which all drain into the lagoon (Caldara et al. 2004). For the majority of the year, the uninterrupted wind of today's treeless Tavoliere comes from the west to the north-northwest, and during the Neolithic would have driven the directional flow of sensory experiences—smells and multiple sounds from settlements, flocks of sheep, barking dogs, human communication, in a generally seaward direction. Ultimately, or quite quickly, there would have been an ascent onto the Pedegarganico plateau, either by first following the scarp of the Pedegarganico in a northeasterly direction or by climbing up onto it at the nearest point of contact. The ascent would require crossing the river Candelaro or approaching the plateau from the edge of the marshes of the lagoon. As such, the ascent would have always constituted a liminal point since, cleared or otherwise, the Pedegarganico would have been a markedly different sensory environment from that encountered on the Tavoliere or the salt marshes.

Below, we present two possible landscape scenarios—open and wooded—for the Pedegarganico and the aboveground sensory world of Grotta Scaloria.

An Open Journey across the Pedegarganico

For us, a contemporary journey from the Tavoliere to Grotta Scaloria seems like a journey to the sea, one that is first revealed on surmounting today's treeless Pedegarganico. Using an idea of the journey to Grotta Scaloria following a horizontal axis of ritualized space, we might conceive of it as a staged journey, from dryness (the Tavoliere) to water. This seaward perspective stands out from our numerous on-foot journeys within the Tavoliere, to and from Neolithic settlement sites, in which the sea is virtually never sighted. Subsequently traveling through the Pedegarganico, the numerous dry valley dissections of the plateau's predominant north–south drainage pattern would repeatedly impede passage. These are mostly steep, dry torrent beds gouged by intense spring rivulets of ephemeral storm waters cascading off the Gargano, which rapidly run their course, dissipate, and disappear underground. The landscape vistas are dominated by the table-like Pedegarganico tilting downward in an easterly direction toward the sometimes blue, sometimes hazy, Adriatic Sea. In a cleared landscape, the sea would have dominated the view southeast and would have formed a permeable visual boundary that blended into the horizon. Nearing Grotta Scaloria, the north perspective is hemmed in by the looming scarp of the Gargano promontory. This description derives from our own visual experience and recording of the site, but it is partly our reconstruction, because where the modern buildings of Manfredonia obscured our view, we took into consideration the topography mapped on the 1:25,000 IGM maps of the 1950s, which are detailed enough to consider this but not refined enough to isolate the details of our phenomenological experiences of the lie of the land around Grotta Scaloria itself.

There are distinct topographic and visual zones, from high to low, associated with the immediate locale of Grotta Scaloria: (1) sky, (2) the face of the Gargano promontory, (3) land—the Pedegarganico plateau and the environs of Grotta Scaloria, (4) the sea, and (5) a hole to an underworld. Drawing upon the prevalence

Fig. 3.4.7. Circular view around Grotta Scaloria. (Central photograph of swallow-hole is the entrance to Grotta di Occhiopinto, here standing in for no-longer-visible entrance to Grotta Scaloria itself.)

of myths of landscape that have structuring principles based on the vertical axis (Cosgrove 1995), we can place Grotta Scaloria at the bottom of a visually stratified ordering of the landscape that leads from the gods on high down to the plateau of the everyday and beyond to the sea and below to the world of the dead. The maximum view that can be encompassed by a person standing still, swiveling just their head, is an arc of 180 degrees. To gain a complete, 360-degree perspective of any location involves turning while standing at ground level or, in the case of the Grotta Scaloria, looking vertically upward when descending/ascending the hole—as illustrated in Figure 3.4.7 (see Hamilton and Whitehouse 2006a for a more extensive discussion of "circular views"). In an open landscape at Grotta Scaloria, there would have been a simple dichotomy between the view on preparing to descend the swallow-hole and the contrasting visual experiences on exiting and returning to ground level. Going in, the backdrop to the swallow-hole is essentially a plateau and seaward view. Arrival at Grotta Scaloria from any direction would involve turning one's back, visually and metaphorically, on the Gargano to enter the cave—entering in the direction of the slope of the land toward the sea as well as continuing downward into the underground. A descent into the swallow-hole would immediately generate new sensations of humidity, close odors, and moldy smells—followed on entry by experiences of treacle-like darkness, disorientation, dripping water, and solidified water (stalactites and stalagmites). Such experiences would have effectively completed a staged journey from lack of water, via punctuated obstacles of rivers, marsh, and solution hollows to, finally, an encounter with the underground, humidity, and wetness. On egress, the opposite occurs—scrambling upward and skyward out of the hole, emerging with one's back to the sea, and instead facing toward the Gargano promontory, which would be seen stretching from west–northwest to east.

The distinctive Gargano profiles of Monte San Angelo and Monte Sacro collectively generate a sense of a looming gray/white and patchy green vegetated mountainous barrier that abruptly obscures vision beyond and is topped by the sky.

A Sylvan Journey

Let us rewind this journey and conjure a sylvan environment on the Pedegarganico; while the trend of the topography and water flows remain, views of the sea and the Gargano would be obscured, the odors would be more localized, and the journey would encompass more numerous obstacles and greater complexity. In this, we can evoke the woodland and experiential qualities from our sight and sound experiments at the sanctuary of Incoronata, described above, and from our visits to the Forestra Umbra—the ancient forest of the Gargano promontory proper. It now becomes an experience of the feet as much as of the eyes, through winding paths between a dense natural forest of oaks, beeches, pines, limes, maples, ashes, hornbeams, cedars, and chestnuts. Progress would be difficult, with fallen and decaying trees barring the way, together with protruding roots clinging to the grikes and swallowholes in the limestone and the slopes of torrent beds. The birdsong would be different, perhaps more intense than on the Tavoliere, and there would be striking differences in light, color, and temperature between it and the Tavoliere—in the summer, the forest would be a place of shade and dappled greens as opposed to the ripening straw-colored cereals and parched scrubby vegetation of the Tavoliere at its highest temperatures. It would have been home to different animals providing glimpses and sounds of deer, foxes, badgers, woodpeckers, owls, and many other birds. There would have been different aromas too, such as wild garlic, not the rocket and camomile, baking bread, and household smoke of the Tavoliere, and sometimes underfoot edible and colorful fungi would be encountered. This journey would generate states of confusion, struggle, disorientation, surprise, and revelation—the feet would unpredictably stumble down the solution hollows and swallow-holes disguised by vegetation. The engulfing totality of woodland would isolate it as a place distinct from the openness, colors, smells, and sounds of the Tavoliere. A swallow-hole encountered in woodland would be the culmination of a disorienting journey, maximized by the final confusion and terror of dropping down a dark and hitherto invisible orifice. On returning aboveground, there would remain a strong sense that a journey was still required to reconnect with the wider world.

Journey as Pilgrimage: Liminality and Heightened Senses of Arrival

Given that the Pedegarganico in which Grotta Scaloria is situated did not, as far as we know, form the focus of settlement in the Neolithic, it may have been a zone of distinctly different activities—perhaps associated with pastoralism, hunting, and ritual. In terms of sensory experience, whether wooded or not, it substantially contrasts with the Tavoliere. Drawing upon Turner's (1969) paradigm of pilgrimage and the idea that ritual is "processual," involving meaningful actions via stages of "liminality" (separation from the everyday of the outside world), "encounter," and "communitas" (the aggregate identity of those on the journey), it is possible to characterize the journey from the world of the Tavoliere and finally across the Pedegarganico to Grotta Scaloria as a ritualized journey. Given the extraordinary contents of Grotta Scaloria's interior, it does not seem farfetched to consider arrival at its exterior to be the culmination of a sensory journey of pilgrimage that took its participants to the threshold of otherworld experiences. While aspects of Turner's "stages," particularly the nature of communitas, have been critiqued and discussed (Eade and Sallnow 1991), the idea of a journey having a narrative structure, and of its cumulative repetition through following in the footsteps of others, is fitting for the characterization of any journey to and into Grotta Scaloria. It would have been an accretional social and a temporal experience negotiated via the liminal environment of the Pedegarganico and culminating in an increased sensory intensity on arrival—experiences that in other contexts characterize pilgrimage (Lehrhaupt 1985).

The locale of Grotta Scaloria has contrasting phenomenological characteristics that are appropriate for the construction of cosmologies, or structured understandings of the world. The visual panorama—or indeed, in a wooded environment the distinct lack of such a panorama—that any person standing at the location of Grotta Scaloria could have accessed may have been important to the choice of the site for underground ritual or have afforded opportunities for ideologically manipulated, heightened understandings of the rituals that were subsequently to be encountered below ground.

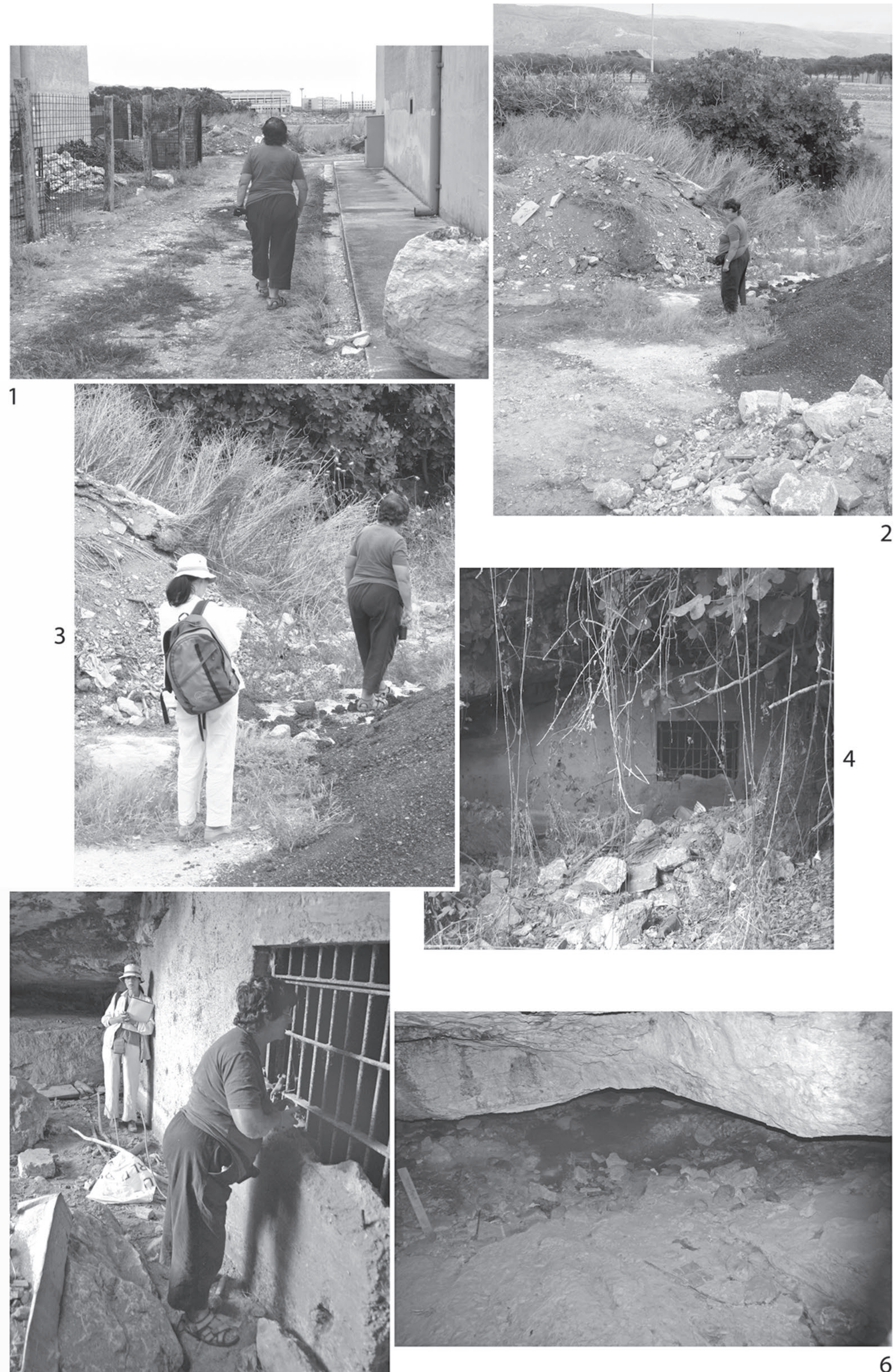


Fig. 3.4.8. Present-day journey to Grotta di Occhiopinto, representing a way of exploring Neolithic experience. (1) Journeying through the landscape; close to site, nothing is yet visible. (2) "I think we're getting there." (3) Moving closer, obscured by fig tree, edge of chasm becomes visible. (4) At base, barred to outsiders by an artificial barrier, is a cave. (5) "Well, can you see anything?" (6) "Yes..., the entrance to the underworld."

Discussion

In 1992, one of us (RW) described some of the cult caves of peninsular Italy and Sicily, including Grotta Scaloria, in terms of anthropological discussions of ritual, especially rites of passage. A chapter devoted to "structural meaning" (Whitehouse 1992:chapter 7), based on the precepts of classical structuralist anthropology, identified a series of structural contrasts between the secular sphere (identified in this case with the Tavoliere settlement sites) and the sacred sphere (identified with cult sites). These contrasts included, among others, location (aboveground/underground, open/hidden), accessibility (easy/difficult), illumination (light/dark), and space (abundant/restricted). However, in 1992 these contrasts were considered in conceptual rather than experiential terms. What our current study adds to that discussion is an account of the corporeal, sensory experiences of being in those different places and in moving from one to another. In the process, it also adds a whole range of senses that were not considered in the earlier work and possible interpretations of the specific landscape context of Grotta Scaloria. And finally it adds the in-between zone of the swallow-hole/entrance area, understood as a liminal zone between the secular outside world and the sacred underground world. A 2001 article, in relation to two other caves, argued that the physical context of the caves—their tunnels, passages, and corridors to be negotiated and thresholds to be crossed—provides a metaphor for the journey of the rite of passage (Whitehouse 2001). The sensory experiences of the individual moving through the caves during such a rite would serve to instill a feeling of irrevocably changed personhood, matching the change of status being socially marked by the rite. In our study of Grotta Scaloria, we interpret the sensory experiences of the cave in the same kind of way but have extended our understanding of its context and role with an exploration of the site as a ritual center exploited by people based in communities some kilometers away and their journey to the cave understood as a pilgrimage.

Other interesting insights are provided by new data from the study of the human bones excavated in Grotta Scaloria (Knüsel et al., Chapter 4.1, this volume), which show that almost all the bodies were defleshed before or during deposition. Moreover, strontium isotope analysis (Tafuri et al., Chapter 4.3, this volume; Robb et al. 2015:49), involving comparison with the village sites of Masseria Candelaro and Passo di Corvo indicates that some of the bones belonged to people who lived part of their lives in zones unlike the immediate geological zone of the cave, but in areas with similar geology to Passo di Corvo—the largest of the ditched villages, situated on the Amendola plateau, some 26 km southwest of Grotta Scaloria. One explanation of this phenomenon is that people moved during their lifetimes, perhaps as part of a marriage exchange system. However, we are attracted by an alternative explanation: that the bones were moved after death, carried there in pilgrimages for deposition in the sacred cave of Grotta Scaloria, where they became part of an ancestral collective, along the lines described by Bloch for the megalithic tombs of the Merina of Madagascar (Bloch 1971).

In conclusion, we do not present the above as a precise reconstruction but as a way of thinking in the present about what the experience of visiting Grotta Scaloria during the Neolithic might have been like (Figure 3.4.8). For us, this works: the process of writing this account has led us back to the geography and the archaeology to ask new questions, some that had not even occurred to us before. In this spirit, we hope that our work may contribute to future research.

Riassunto

Il capitolo si apre con un apprezzamento personale di Santo Tiné, scomparso nel maggio 2010, da parte di Ruth Whitehouse, che conosceva l'eminente studioso da 35 anni ed è grande estimatrice del suo lavoro.

In questo capitolo esploriamo il contributo che può venire da una prospettiva sensoriale per la comprensione della Grotta Scaloria come luogo di culto. Una tale indagine si inserisce in uno studio più ampio basato su un approccio sensoriale che abbiamo adottato nel nostro progetto Preistoria del Tavoliere-Gargano, che tende ad esplorare gli aspetti sensoriali dei luoghi ed i modi in cui possiamo elucidare il loro utilizzo culturale nel passato. Nella parte del progetto incentrata sul Neolitico, la nostra attenzione si è concentrata sugli aspetti domestici dei villaggi trincerati e le pratiche quotidiane a loro connesse. Nel presente studio estendiamo alla Grotta Scaloria l'approccio ed i metodi adottati in quel lavoro, un sito molto diverso situato appena oltre i confini del Tavoliere sul basso altipiano calcareo del Pedegarganico. Questa grotta è stata utilizzata come luogo di deposizione dei resti dei defunti, così come, nella grotta inferiore, per attività di culto associate a stalagmiti ed all'acqua di stillicidio; questa attività è avvenuta nello stesso arco di

tempo dei villaggi trincerati ed è probabile che rappresentasse un luogo speciale come meta di viaggi, forse con offerte e reliquie dei morti, per le persone che abitavano in quei villaggi.

Viene adottato un approccio fenomenologico, in cui la fenomenologia è vista non come onni-comprensiva ma come un particolare metodo di pratica interpretativa, impiegato accanto ad un gamma di metodi tradizionali di indagine archeologica. Il nostro scopo è di ricostruire—ovvero di ri-immaginare—le esperienze sensorie di vivere nel Tavoliere e nella zona della Grotta Scaloria durante il Neolitico e di viaggiare dall'uno all'altra. Le osservazioni su cui si basano le esperienze sensorie descritte derivano da una serie di esperimenti, relativi in particolare al suono e alla vista, effettuati nel quadro del Progetto Preistoria del Tavoliere-Gargano, con l'aggiunta di evidenze indirette (proxy) derivate da esperienze in ambienti simili al di fuori dell'area di studio. In primo luogo esaminiamo la zonazione del paesaggio attorno alla Grotta Scaloria, in termini di esperienze sensorie; in seguito consideriamo il viaggiare verso la Grotta Scaloria, intrepretato come un pellegrinaggio. Uno dei problemi maggiori per un'archeologia sensoriale della zona è quello di comprendere quanto l'ambiente possa essere cambiato dal Neolitico. Ci sono indizi sufficienti per dire che entro la metà del VI millennio BCE il Tavoliere stesso era un paesaggio piuttosto aperto; tuttavia non abbiamo abbastanza evidenza per sapere se anche il Pedegarganico fosse in larga parte deforestato, o se rimaneva boscoso: abbiamo pertanto incluso due versioni alternative di esperienze sensorie in quest'ultima zona.

Il viaggio dal mondo del Tavoliere ed attraverso il Pedegarganico fino all'entrata della Grotta Scaloria, e poi dentro la grotta stessa, è interpretato come un viaggio ritualizzato di pellegrinaggio. Nel corso di questo viaggio le esperienze sensorie dei viaggiatori dovrebbero aver fornito una metafora per il viaggio del rito di passaggio, instillando sentimenti di trasformazione personale, in corrispondenza del cambiamento di status segnato socialmente dal rito di pellegrinaggio.

Non offriamo questa interpretazione come una ricostruzione precisa di avvenimenti del passato, ma piuttosto come modo di pensare nel presente come saranno state le esperienze del passato—una sorta di descrizione in dettaglio della vita nel Neolitico—un esercizio che offre spunti diversi da quelli forniti da studi di cultura materiale di tipo tradizionale.

3.5. Cults and Rites at Scaloria Cave: The Contextual Evidence

Eugenia Isetti, Antonella Traverso, and Anna Maria Tunzi Sisto

Introduction

This chapter reviews the contextual evidence for cult and ritual in Scaloria Cave. As noted elsewhere (Tiné and Isetti 1982; Winn and Shimabuku 1980), Scaloria Cave forms a complex underground system that, at least until the end of the Neolithic, was easily accessible, unlike its situation today, in which the Upper Chamber is a narrow, dark space, very difficult to find and penetrate. In fact, the identification of calcified roots in the Upper Chamber sediment confirms that it was characterized by bright conditions, limited moisture, and high evaporation. Micromorphological analysis suggests that the ancient entrance was partially blocked following a massive rock/soil collapse after human occupation in the Serra d'Alto–Diana period. This natural event transformed the environment in the Upper Chamber. Recent research reveals that the Upper Chamber was finally closed in historical times, around AD 800 (Rellini et al., Chapter 3.1, this volume). In contrast to the changing environment of the upper part of the cave, the Lower Chamber enjoyed relative stability, as demonstrated by the placement of pottery. These artifacts were originally positioned in selected areas, along difficult passages and below intentionally broken stalactites. They remained in these positions for millennia and were often found still embedded in stalagmitic material.

We suggest that the cave had two broad categories of use, as was already suggested at the site's discovery (Tiné 1972). The first was a steady occupation of the cave's Upper Chamber over time, as demonstrated by stratigraphic units characterized by multiple sequences of hearths in place (Rellini et al., Chapter 3.1, this volume). Radiocarbon dates obtained from charcoal from these levels (5470–5290 BCE and 5480–5310 BCE) relate well to the various dates published for the Gimbutas-Tiné 1978–1979 excavations (Linick et al. 1984) and with the latest dates carried out on 15 human skeletal samples from trench 10 of the Upper Chamber (see Robb, Chapter 2.3, this volume). This quotidian usage can be inferred as well from the artifacts, including the high percentage of debitage in the chipped stone industry (cf. Conati Barbaro, Chapter 6.1, this volume; Elster, Chapter 6.2, this volume), the significantly higher average weight of ceramic materials from the lowest levels of most trenches excavated within the Upper Chamber (cf. Traverso and Isetti, Chapter 5.4, this volume), the domestic fauna, showing significant differences in the size at slaughter (cf. Bartosiewicz and Nyerges, Chapter 3.3, this volume), and some daub fragments with timber and tree branch imprints (cf. Figure 2.1.18b). The second category of cave usage is for targeted activities and/or special functions. This is demonstrated in the Lower Chamber by the absence of skeletal deposits and by the recovery of more than 50 vessels[1] and, for the Upper Chamber, by the presence of burials and depositions of varying cultural materials. These reflect two different spheres of cult activities, the first in the Lower Chamber, linked to vessels and the presence of water, and the second in the Upper Chamber, related to funeral rites.

The Archaeology of Ritual Practices in the Lower Cave

The deposition of pottery vessels along the passage leading to the Lower Chamber and within the Chamber itself is believed to be linked to cult activities. Because these medium to large vessels were often set beneath stalactites and above the related (and intentionally broken) stalagmite stumps, Tiné (1972) immediately associated them with the collection of water dripping from the ceiling. He inferred that the rectangular basin carved into bedrock in the center of where these vessels were most densely concentrated had to be

[1] In fact, the collected materials are only a part of what was recovered at that time, and this corpus, by itself, is just a sample of the identified vessels left on the cave bottom.

related to a water cult. Certainly Scaloria Cave is characterized by a strong presence of water, both dripping from the walls and ceiling and in the form of small pools on the cave floor, including a large “lake” or pool at the very bottom of the cave. This water is still present even in very dry seasons, as is true of other cave complexes in southern Italy, such as Santa Croce Cave (Radina and Ronchitelli 2002), Sant’Angelo Cave near Ostuni (Quagliati 1936), the complex of Porto Badisco (Graziosi 1980), and Latronico (Cremonesi 1978).

Without discussing the role of water in the first farming communities, we note the particular categories of vessels collected along the path toward the Lower Chamber. Certain vessels had been placed under the ceiling where liquid dripped from stalactites; in some cases, ritual participants broke off stalagmites to form a stool for the vessel when a flat surface was difficult to locate. Later, after having been discarded or fallen into disuse, these vessels were filled by regrowth of a new stalagmite, a regrowth that sealed them onto their base. These have either open or closed necks. They were always suitable for collecting water (e.g., the large hemispheric bowls), containing and carrying (e.g., the amphoras), and pouring liquids (e.g., the ovoidal beakers). In some cases, they may have been formed specifically to be used in a narrow, small space, as is suggested by the curious presence of two single handles on a hemispheric bowl; these handles were placed close together on the same side to allow the passage of a shoulder strap, which could have been used to carry the vessel or to ensure its stable position once it was set beside a stalagmite. This anomalous vessel, with its close-set and asymmetric handles, seems to have been produced exclusively for this site, or at least for a specific function different from that fulfilled by similar forms in contemporary villages such as Catignano. At habitation sites, this form is produced with two pairs of normal handles evenly spaced and placed at the four sides of the vessel. The presence of repair holes on some of the Scaloria pots does not exclude this specific ritual function but could represent an effort to restore a particular object serving that precise function.

The large, narrow-necked amphoras, some with a maximum circumference of almost 1 m, have been found not only in the Lower Chamber but also along the passageway. Because they weigh about 5 kg when empty and 20 to 25 kg when filled, they would not have been easy to carry along the steep, narrow paths inside the cave. The large number of these amphoras might be associated with the patera, usually richly decorated only on their external side, and might have served as covers.

Biconical vessels with closed mouths were not suitable for collecting, drawing, or pouring liquids, but they were certainly capable of containing liquids. Such vessels are present all along the passageway toward the lower part of the cave but especially on the Lower Chamber bottom, where, together with hemispheric bowls, they appear frequently. All the vessels collected in the lower part of the cave belong to a well-defined chronological facies, the Catignano-Scaloria Bassa facies. Only sporadic elements of later facies can be found along the first stretch of the diaclasi; they are part of a postdepositional colluvium from the upper part of the cave.

Pottery is the only significant material recovered from the Lower Chamber. The first discoverers did not report traces of organic remains, nor of stratigraphy, except for “a few remains of charcoal and burnt animal bones” (Tiné 1975a). Burned soil from the Lower Cave, dated to 4470 ± 4160 BCE (Alessio et al. 1969) uncalibrated, seems to represent sporadic burning and occasional food remains (organic material) close to the basin. However, this burned material was not found in association with burials or anything else, and the date is substantially later than the Lower Chamber pottery, which displays an absolute chrono-typological homogeneity that firmly dates it within the sixth millennium BCE, both within the Tavoliere pottery typology and the “Lower Scaloria/Catignano facies” (Tozzi and Zamagni 2003). It may be erroneous, or it may represent a sporadic, otherwise unattested frequentation of the Lower Cave long after its use as a Neolithic cult site ceased.

Human remains were found in the Lower Cave in two distinct kinds of depositions. The Lower Cave’s discoverers and explorers, Tiné and Perotti, mention the presence of a human skeleton in the lowest part of the cave, which they describe explicitly as “in a seated position.” They describe the skeleton as having a fractured leg and suggest that it may represent an incidental prehistoric visitor who suffered an accident, injuring his or her leg and, unable to negotiate the steep climb back up, perished there. Fragments were recovered in January 2011 for radiocarbon dating (although repeated attempts yielded no datable collagen, an unsurprising result, given that it had been subjected to prolonged leaching in a highly alkaline environment). However, the suggestion of a fractured leg should be treated with caution, as the bones would have been fragile and easily broken long after death, and they

were never examined by a paleopathologist. Moreover, as noted above, there is no indication of a time frame for this deposition or of whether it coincides with the ritual use of the Lower Cave at all. The other deposition of human bones in the Lower Chamber consists of a small group of disarticulated bones, including mandibles, placed near the small rectangular pool. This was noted by Tiné (1975a) and recorded photographically (see Figure 2.1.10). However, too little detail is recorded to interpret this deposition, and, again, we have neither dates for it nor knowledge of whether it coincides with the ritual use of the area.

The archaeological evidence suggests that the Lower Cave was used only in connection with water rituals. It is possible that this use was related to symbolic motifs on the pottery (curved lines, bands, and triangles) as suggested by Gimbutas (1989:222), although Skeates (2005: 214) suggests that some of the Scaloria Bassa motifs could relate instead to textile patterns. In any case, the Lower Cave attests a ritual life in which water would have had a central role and where the difficulty of moving down through the narrow passage toward the Lower Chamber would have been a significant challenge and, perhaps, related to the meaning of the cult.

The Archaeology of Ritual Practices in the Upper Cave

Whereas the ritual activities in the Lower Chamber involve a limited period of time, related to a single archaeological facies, the Upper Chamber shows evidence of burial practices dating from the Middle to the Late Neolithic. Adjacent to the entrance, the Upper Chamber was an open space at least until the Serra d'Alto facies. Beyond this space, in the cave area not suitable for domestic activities due to the limited ceiling height, was an area used for funeral rites, as documented by numerous finds of human bone.

The anthropological study (Knüsel et al., Chapter 4.4, this volume) places the numerous human remains found in trench 10 to the two or three centuries between 5500 and 5200 BCE (see Chapter 4.4). This corresponds well with the Catignano–Scaloria Bassa facies. However, the ceramic material, found during the various excavation campaigns, including Quagliati's survey, seems to be connected with burial goods belonging to a broader time frame, extending from Catignano-Scaloria Bassa to the Serra d'Alto facies. A date (LJ-4983) from trench 5, level 3, that goes down to 4847 BCE could refer to these later moments.

More extensive documentation is available for the 1978 field season (e.g., trenches 1–3; see Appendix 2 [online]),[2] which is described in Winn and Shimabuku (1980). In contrast, our understanding of trenches 4–10 is based on an incomplete record of daybooks of varying quality, photographs, brief and not always accurate preliminary reports, participants' selective memories, and what can be reconstructed from the finds, labels, and incomplete finds registers (see Appendix 5 [online]). Based on the meager extant documentation, already partially described (Chapter 2.1), we summarize here the archaeological features of the burial depositions in the Upper Cave. For a detailed analysis of the human bone collection, see Knüsel et al., Chapter 4.1.

The Trench Summaries

Trench 1

One isolated skull was set in "a rectangular tomblike trench in the bedrock . . . [,] probably a natural formation" (Winn and Shimabuku 1980:9; Appendix 2 [online]). It is difficult to relate this skull to any datable pottery, as none was associated directly with it, but the statistical analysis of pottery may tentatively suggest that this skull could belong to the Scaloria Alta facies (see Traverso, Chapter 5.2, trench 1). A radiocarbon date from charcoal around the skull (6490 ± 140 BP, 5174–5081 BCE calibrated) had too large a range of variation to provide any useful guidance. A second date, from level 8, near the skull, of 6330 ± 90 BP (5479–5064 calibrated), fails to clarify the time frame within the Neolithic, as its range of variation spans both the Scaloria Bassa and the Scaloria Alta facies. The skull was covered "with countless elongated tubular shells . . . [that] displayed evidence of burning" (Winn and Shimabuku 1980:9; Appendix 2 [online]). A fair amount of scattered fragments of human bone from the area of the skeleton also come from the same trench. One sample of human bone yielded an AMS date of 6303 ± 33 BP (5344–5216 BCE calibrated), in line with the main period of deposition of the human bone.

Trench 2

This trench contained a single tightly flexed burial on the right side, the upper arms placed under the jaw and the head bent forward (see Figure 2.1.20a, Chapter

[2] Appendices are available online at www.dig.ucla.edu.

2.1). A narrow flint blade lay below the left temporal bone, while an antler was placed behind the head. A large bovine vertebra was adjacent to the pelvis. As noted above, Winn and Shimabuku report this skeleton as a male, but reexamination suggests it was a female. No pottery was associated with this burial. In the overlying strata, some sherds from the Scaloria Alta phase were found (in level 5 and above). In the level of the burial itself (level 6), Scaloria Bassa-Catignano phase pottery is found, but it is characterized by the carinated and troncoconic bowls typical of its final phase. An AMS date on bone from the burial itself is of 6230±40 BCE (5310–5060 BCE calibrated) (see Chapter 2.3 and Table 2.3.1). This is slightly later than most of the dates for the human bone and, together with the ceramic evidence, may tentatively suggest that complete, articulated burials characterize the later part of the sequence in the cave. A pebble with faint traces of ocher comes from this stratigraphic level. Although its function is unknown, it recalls the painted pebbles from the ritual deposition at the nearby site of Masseria Candelaro, where one of the painted pebbles was a speleothem (Curci and Muntoni 2008), and at the Grotta di Sant'Angelo sulla Montagna dei Fiori, where a similar object has been found in Catignano levels associated with human remains (Di Fraia and Grifoni Cremonesi 1996).

Trench 3

In a pit about 1 m in diameter, cut into the sterile soil, excavators found two left jaws, fragmented human bones, and evidence of fire and burning. No pottery related to the Upper Scaloria facies has been found in this trench. Since a deposition late in the sequence might have incorporated Scaloria Alta pottery, it seems likely that these human remains have to be related to previous phases. A radiocarbon date on charcoal from trench 3 (LJ-4649) of 6720 ±100 BP (calibrated 5808–5479 BCE) is among the earliest in the Neolithic series, although the association between the charcoal and the human bones is not certain.

Trenches 4 and 5

Both of these trenches yielded a small number of fragments of human bone. The extant archaeological documentation is not adequate to reconstruct what these burials represent. However, the bones from both trenches are isolated and broken, and it is safe to assume that had they been anything other than sporadic finds of disturbed or casually redeposited bone, it would have been noted in the site daybooks or, minimally, in the finds catalogues and labels. Two radiocarbon dates, run as duplicates on a single sample from trench 4, date to between about 5470 and 5220 BCE (calibrated), in close agreement with the major period of bone deposition in the Upper Cave. No dates are available for human bone deposition in trench 5.

Trench 6

Trench 6 contained a few skull fragments in mid-trench, and some sporadic fragments from all parts of the skeleton. A disturbed child's burial was apparently found along the south side of the trench in level 6. No photographic record or field notes of this burial survive, and hence nothing is known about the exact details of the burial's taphonomy and mode of deposition. Charcoal from near this skeleton produced a radiocarbon date of 6290 ± 80 BP (5468–5055 BCE calibrated). Some well-preserved red-painted figulina and impresso pottery may relate to this burial.[3]

Trench 7

Trench 7 yielded only a few scattered fragments of human bone on or near the surface. A radiocarbon-dated charcoal sample dating to the later sixth millennium BCE (calibrated) is labeled as coming from "Trench 7, Level 1, near Gravesite 12" (cf. Section 2.1.4, Trench 7), but this provenience must be in error, as the daybook reports no evidence of any grave in this trench.

Trench 8

This trench contained Neolithic levels with disturbed earlier levels dating to the Late Upper Paleolithic (cf. Figure 2.1.23). The Neolithic levels yielded a fair number of fragmented, disarticulated human bone from all parts of the skeleton. An AMS radiocarbon date run on a human bone sample from trench 8 (6339 ± 33 BP, 5463–5221 BCE calibrated) confirmed that the human

[3] The only carefully made small greenstone ax coming from the 1978–1979 excavation was found on the surface of trench 6. Its relation to the burial must, however, be regarded as unknown.

skeletal material was of the Neolithic period rather than the Late Upper Paleolithic period and placed it in the main phase of human bone deposition.

Trench 9

This trench apparently did not yield any human bone at all.

Trench 10

Trench 10 yielded the most evidence for funerary ritual; about three-quarters of the entire human bone collection originated in this trench. Numerous radiocarbon dates are available for trench 10; except for those whose range of variation is too large to provide any useful date, they all fall in the second half of the sixth millennium BCE, and they cluster quite homogeneously around the period 5450–5250 BCE. Starting at level 3, excavators noted nine concentrations of human remains, which they interpreted as evidence of originally tightly flexed burials, subsequently disturbed. Reassessment in the lab shows that none of these groups contains anything representative of a complete skeleton, and most contain random fragments from more than one individual. Among these concentrations, number 8 presented a skull contained in a huge vase, of which only the base was recovered; the pot apparently also contained ocher and a retouched flint blade. In the surrounding area, "close" to the skull, were found two extraordinary pendants made of pierced and engraved wild boar's tusks (see Pian, Chapter 6.4, and Figures 2.1.25 and 2.1.26), together with long broken blades and two more vase bases. In group 5, a skull was covered by the base of a vase. Excavators assumed that these associations represented intentional ritual depositions; however, the nature of such associations is unclear. Depositional practices in trench 10 are discussed in detail below

Other Ritual Depositions

In addition to the burials, Winn and Shimabuku (1980: 10) recognized several other depositions of ritual objects , which we group together here. In trench 1, they identified a small cavity bordered by flat, slab-like stones containing three animal vertebrae, one polished stone ax, and one Campignian tool. In trench 2, they found another cavity bordered by flat, slab-like stones containing three animal vertebrae and Campignian tools, including a pick-ax, a broad blade, a polished stone ax, and a bone awl (Figure 2.1.20b), and an additional cavity containing Campignian tools, including a spearhead and a tranchet, and two animal vertebrae. The greenstone axes in these cavities (see Garibaldi et al., Chapter 6.3, this volume), if Calabrian raw material, originated more than 200 km from Scaloria. There are also small pits containing large quantities of different kinds of shells: cardium, farellidi, and Solenidae (see Reese, Chapter 6.5, this volume). The absence of detailed information in the daybook prevents us from being more precise about the nature of this deposit.

Comparisons and Interpretations

The review of material and recent cave surveys allow us to highlight two major uses of the cave. In the Lower Cave, there was a cult deposition of more than 30 vessel groups, which were placed carefully to collect water dripping from the ceiling. We would agree with the original discoverers' interpretation: they saw this basin as the cultural center and the symbolic representation of this portion of the cave. There were, however, no clearly intentional burial depositions. Although both Tiné and Perotti clearly confirm the finding of a skeleton in a seated position, this was at a great distance from the vessel groupings and of unknown date, and hence it cannot be considered to have formed part of the ritual. As for the remains of the jaw and other bones close to the basin, we cannot substantiate the hypothesis of an intentional, primary or secondary deposition based on such exiguous data, unfortunately lost today. Moreover, the date of this bone deposition is unknown, and there is no clear evidence of stratigraphic contextual linkage of the vessels with the basin.

Upper Chamber: Undisturbed Burials

Two tightly flexed skeletons lying on one side were found, in trench 2 and in trench 6, in one case with arms placed in the "praying" position under the jaw. Moreover, one undisturbed, tightly flexed burial was reported by Quagliati in the 1930s and left in the cave's upper part in "a place where the rock goes up at about a meter from its top" (Quagliati 1936). Quagliati also found many whole, fine pottery vessels and greenstone axes. These probably originated in burials, which may have been accompanied by artifacts and animal remains (stone tools and ornaments seem to

be connected to grave goods). The absence of Upper Scaloria pottery in trench 2, where a burial was found, is significant to confirm that burials were in evidence in the previous Scaloria Bassa phase. This has been confirmed by the sequence of dated anthropological remains, from trench 10, which show a short interval of time. Antler and bovine vertebrae were found in trench 2 and a pair of boar's tusk pendants of exceptional workmanship were found close to a skull in trench 10. Although we can not prove any social differentiation in this finding, we are dealing with an individual buried with distinctive, very personal objects, perhaps markers of status in the community.

Upper Chamber: Disturbed Burials

The great majority of the human bone from Scaloria Cave was found scattered and disarticulated. It is not clear whether this is due to unintentional disturbances or dismemberment for secondary burial use. This question is discussed in detail in Chapter 4 of this volume (Knüsel et al.). Here, it is worth noting several depositions that show evidence of manipulation or curation. These include selected skeletal parts placed in a pit about 1 m in diameter, intentionally dug in the sterile soil, with multiple evidences of fire, and an isolated skull, covered by shell. Some other cultic depositions noted by Winn and Shimabuku include various "offerings" of selected objects, likely with different economic and symbolic meanings that might be connected to a devotional cult possibly unassociated with graves. Alpine jadeite is more prevalent in ritual caves than in open sites, and seven pieces of jadeite have been found in Scaloria Cave, presumably related to burial goods or more generically cult-related depositions (see Garibaldi et al., Chapter 6.3, this volume). Some jadeite samples show evidence of unfinished perforations, highlighting the recognized social value of these objects and perhaps justifying their deposition in cultic practice. Some fragments of terracotta slabs in trench 2 were interpreted by Winn and Shimabuku (1980:11; Appendix 2 [online]) as burial protection ("tomb bricks"). These objects have not been found among the Scaloria collections, and it seems likely that they actually were fragments of several large pithoi, several centimeters thick, externally decorated with rough oblique incisions, whose very slightly curved sides may have seemed to be flat. These are particularly frequent in trench 5 from levels 8 and 10. However, their association with cult or burial practices is uncertain.

Concluding Remarks

As was already highlighted by Tiné in his first report (1972), Scaloria Cave is a unique site, above all for the exceptional amount and repetition of pottery depositions, even if they recall similar contemporary situations. The cave's lower part seems to relate to a single ritual cult; it lacks many elements sometimes occurring in other Italian Neolithic cult caves, such as pottery (including miniature vessels, carinated bowls and jars), traces of depositional activity such as pits and stone circles, and painted representations on the walls.

This cult seems not to have any relationship to the cultic symbolism elsewhere documented by the presence of clay figures, usually female, found in contemporary settlements of neighboring areas (e.g., Passo di Corvo). It is similar, however, to other ritual sites dedicated to water and water collection: Grotta Lattaia, Pozzi della Piana, Grotta dei Meri sul Monte Soratte, Grotta del Leone, and the classic case of Zinzulusa.

In Scaloria, this cult of waters was restricted to the Middle Neolithic. In the other, interconnected branch of the cave complex, Occhiopinto Cave, occupation continued through the Bronze Age (see Bianchi et al., Chapter 2.2, this volume). This may be related to a continuation of cave use closely tied with the water cult even during the Bronze Age, as confirmed by recent findings at Madonna di Loreto, close to Trinitapoli, reported by one of the authors. Here several underground structures were found, dating from at least the early stages of the Middle Bronze Age until the Late Bronze/Early Iron Age. These include hundreds of holes possibly in alignment with star movements, structures representing evidence of cyclical celebrations possibly to mark certain times of the agricultural cycle, and several wells interpreted as a shrine connected to a water cult.

Riassunto

Grotta Scaloria è un complesso ipogeico molto articolato i cui spazi e modalità d'accesso dal Paleolitico Superiore fino all'età del Bronzo erano sicuramente molto differenti rispetto ad oggi.

Infatti la parte alta della grotta era, almeno fino alla fine del Neolitico, molto simile ad un riparo con un accesso facilmente agibile. Al contrario la parte bassa della grotta ha mantenuto invece per oltre settemila anni condizioni di sostanziale stabilità.

Siamo dunque in presenza di due macro tipologie di frequentazione: la parte alta frequentata per tempi prolungati e con differenti destinazioni d'uso (domestico, rituale e funerario), quella bassa utilizzata solo in un determinato periodo (intorno alla metà del VI millennio BCE) per scopi unicamente cultuali.

La galleria e la camera inferiore di Grotta Scaloria offrono senz'altro uno degli esempi più straordinari e scenografici del culto delle acque per il Neolitico Medio: in assenza di deposito e direttamente concrezionati sul fondo roccioso, una cinquantina di vasi erano deposti a raccogliere le acque di stillicidio della volta, con la massima concentrazione nei pressi di una vaschetta rettangolare intagliata nella roccia e considerata il centro del culto. Le tipologie vascolari rappresentate sono molto particolari e legate alle funzione di raccogliere, attingere e versare, così come anche la loro ricca decorazione dipinta era certamente in relazione con una possibile destinazione culturale.

Nella parte alta invece, in una situazione stratigrafica molto complessa, sono documentati riti funerari di varia natura e deposizioni rituali, "offerte" di oggetti selezionati la cui eccezionalità e ruolo simbolico sono dati principalmente dalla loro associazione.

Chapter 4

The Cave's Occupants in Life and Death

4.1. The Human Skeletal Remains from Scaloria Cave

Christopher Knüsel, John Robb, and Mary Anne Tafuri[1]

Introduction: The Human Bone Assemblage from Scaloria Cave

From the beginning of the 1978 excavations, it was clear that Scaloria was not only a burial site but also a place where complex and unusual rituals may have been practiced. Understanding burial rituals was a major focus of the 1978–1979 excavations, and the resulting human bone assemblage is central to any interpretation of the site.

Knowing the importance of the human bone deposition, the excavators of the Upper Cave had osteologists on site for at least some of the dig (Robert I. Gilbert in 1978, János Nemeskéri in 1979). Although surviving field notes on bone deposits are minimal and some of the on-the-spot interpretations seem dubious today, some photographs of skeletal remains in situ are available, and much of the collection was carefully provenienced to trenches and levels. Although one would inevitably dig such a site differently today, the excavations have given us the information needed to reach new interpretations.

The complex history of the Scaloria human bone assemblage has shaped how our analysis was conducted. The assemblage of human bones available for analysis has never been comprehensive, stable, or fully documented. Archaeological research at the cave has disturbed and excavated human remains on many occasions since Quagliati's original investigations in the 1930s. A summary history of human skeletal material from the cave is thus:

- Quagliati's research in the 1930s appears to have discovered burials, and there is some indication that these consisted of articulated burials with grave goods dating to the Scaloria Alta and Serra d'Alto phases. But either Quagliati did not recover any of the skeletal material he observed (many excavations before the 1960s did not), or if any was retained, it has since been lost in the Taranto museum.
- The same is true for Drago's intervention in the cave in the 1950s. (Some bone may have been studied by scholars at the University of Bari, but no collections, publications, or notes seem to be extant.)

[1] For valuable help in this research, we are grateful to Dr. Jeremy Skepper (Department of Anatomy, University of Cambridge) for providing SEM imagery, and to Nicola Leone and Luigi Coppolecchia and their fellow speleologists in Manfredonia for a tour of the cave. Funding was provided at various points by the McDonald Institute for Archaeological Research, the EC Marie Curie Fellowship program, and the National Endowment for the Humanities.

Fig. 4.1.1. Mandible and other bones in situ in Lower Cave. Note heavy stalagmitic concretion and difficulty distinguishing long bones and fragments of stalactite (Winn Archive, no. 150).

Fig. 4.1.2. Long bones in situ in Lower Cave (Winn Archive, no. 159).

■ In the original exploration of the Lower Cave in the 1960s by speleologists, and in Tiné's subsequent research, two distinct groups of human skeletal remains were noted: a complete skeleton and a few scattered bones situated near the ritual basin (cf. Isetti, Chapter 2.1, this volume). Photographs of some of this material survive (Figures 4.1.1, 4.1.2). As noted in previous chapters, the bones near the ritual basin presumably date to the Scaloria Bassa cult use of the area; the complete skeleton may be unassociated and may relate to some later frequentation. However, these explorations apparently did not bring back any skeletal material to the surface; bones observed in the Lower Cave were apparently left in situ, perhaps because they were concreted in place by stalactitic formations.[2]

[2] Attempts were made in 2013 to obtain a radiocarbon date for this material, using a small sample taken from remains left in position and subsequently disturbed by clandestine visitors. However, in spite of two attempts by Beta Analytic using a normal AMS procedure and extended counting, and one by the Oxford radiocarbon laboratory using micro-filtration, the bone was too poorly preserved to yield sufficient collagen to do so. This is undoubtedly an effect of extended leaching in a highly alkaline environment.

- Gimbutas's excavations in 1978 and 1979 recovered a large quantity of human remains, which form the subject of this report (see below).
- Although human remains are still visible on the cave floor and no doubt have been disturbed by clandestine visitors from time to time, no further excavations have been undertaken.

The human remains from the 1978–1979 collections themselves have a complex history, which can be summarized briefly as follows:

- August–September 1978, the first excavation season: Human skeletal remains were recovered from trenches 1, 2, and 3, and from surface areas of the cave. Remains recovered in the middle part of the season were studied preliminarily by Robert I. Gilbert, whose results are summarized in his report (Gilbert 1980; cf. Appendix 2 [online]).[3] After Gilbert left the excavation, some further remains were recovered, which are not described in his report.
- When Gilbert departed for the United States in late August 1978, he took with him a sample of material for further anthropological study. This included a group of mandibles and long bones for chemical sampling. At least some and perhaps all of this material, which was never analyzed, was reunited with the remainder of the surviving collection in 2009.
- August–September 1979, the second excavation season: A much more extensive human skeletal assemblage was excavated and added to the first. It was apparently subjected to some ongoing analysis during excavation by János Nemeskéri, whose notations in Hungarian appear on some provenience labels. As they were excavated, finds bags were recorded in a human bone catalogue. However, this cataloguing was incomplete, and many finds of human bone were not included.
- 1980: The University of California-Los Angeles team was present in Manfredonia to study the finds from the excavations. Nemeskéri continued his study of the human bone assemblage (Figure 4.1.3). A German dentist and amateur speleologist, Dr. Wolfgang Götte, was present as an untrained crew member and wrote a brief report on tooth morphology. No report or database from Nemeskéri's work has survived. Nemeskéri's photographs from this time are historically interesting. They show a particular interest in several skull specimens with cribra orbitalia and/or quite thick cranial vault bones, which at that time were widely interpreted as a paleopathological sign of malaria or a similar anemia. This apparently is the basis for sometimes-quoted claims, no longer credible, that the skeletal evidence supports a view of the site as a burial place following epidemics. Nemeskéri also appears to have been explicitly interested in some taphonomic signs of funerary ritual, although at that time very few methods for studying funerary taphonomy had been developed. Information subsequently used by Gimbutas in her preliminary reports and books apparently derives from his work during this period. For example, her estimate that the skeletal assemblage consisted of 120 to 130 individuals (Gimbutas, preliminary report on excavations, UCLA archive; Gimbutas 1989, 1991) apparently reflects his working assumption that each group of bones was

Fig. 4.1.3. János Nemeskéri laying out juvenile skeleton from trench 6 during 1979 study season; UREP volunteers look on (Winn Archive, no. 0578).

[3] Appendices are available online at www.dig.ucla.edu.

a separate deposition of a separate individual that should be tabulated distinctly from all the others. It is unclear whether this represents a considered judgment based on laying out all the remains and considering their provenience, or simply a rough preliminary tally of the bones as they emerged from ongoing excavations.

- Sometime around 1980–1981, a second subgroup of remains was subtracted from the collection. Nemeskéri's photographs show two complete skulls (one presumably from the trench 2 burial, and the other from the trench 1 stone "cist" described in Winn and Shimabuku's [1980] account of the 1978 excavation); neither of these was ever located in the extant collections during Robb's 1990 inventory or in Robb and Knüsel's 2010 re-inventory. During 1980–1981, a small exhibition on the cave was mounted at the Manfredonia museum or tourist office. A handwritten list of objects displayed in this exhibition (Gimbutas archives, UCLA) lists a "pithos with bones," a "skull from 1978," and a "skeleton from Tr 6 Level 2" (apparently in error; the skeleton was actually found in level 6 of trench 6). These skeletal materials, and possibly others, as photogenic "special finds," were taken to be displayed in this exhibition. The child's skeleton from trench 6 was subsequently returned to the collection, accompanied by a label reading "Azienda Autonoma Soggiorno e Turismo, Mostra Gr. Scaloria, Vetrina 9." However, it is possible that other skeletal remains exhibited, such as the "skull from 1978," were never reunited with the rest of the collections.

- In 1990, J. Robb visited the Manfredonia museum to study the collection. At this point, the collection was found to be in a state of moderate neglect, with some provenience labels missing; some boxes had gone astray and were found elsewhere in the storerooms in unlabeled boxes, and it is possible that other boxes had gone missing. Although Robb collected data on all the available remains, his published description (Robb 1991) intentionally covered only the 1979 collection, as it was clear at that time from Gilbert's account that important components of the 1978 collection were missing and unavailable for study, and a study of the 1978 remains based on his work would thus be incomplete.

- In 2007–2008, E. Isetti, A. Traverso, and M. Tafuri visited the Manfredonia museum, relocated the human bone assemblage, and shipped it to Tafuri's laboratory at the Museum of Anthropology, University of Rome, and thence to the University of Cambridge for restudy. In the process, the collection was reboxed, and a determined effort was made to resolve provenience problems. Between 1990 and 2007, the collections had been moved within the museum, and comparison with Robb's previous notes shows clearly that at least two crates of remains from the 1978 excavation had been lost between 1990 and 2010. In spite of repeated searches of the Manfredonia storerooms, these have never been relocated. Moreover, many bags of finds became separated from their provenience labels during this interval.

- In 2009–2010, the collection was increased by the newly rediscovered collection taken to the United States by Gilbert in 1978 (see above), which proved especially important for augmenting the number of mandibles available for study and for biogeochemical sampling of dental enamel.

The point of rehearsing this history, beyond personal catharsis, is fourfold. First, it may help the reader understand why different and often conflicting interpretations about Scaloria's human bones have been put forth over the years. They may be based on different groups of bones as well as on different methods and concepts in use at different times. Second, it may help the reader understand why there are discrepancies—for instance, between findings of human bone described archaeologically and the remains described in this study. For example, the only two fairly complete skulls known from the site disappeared from the collection before the analyses reported here took place. Third, this background may be useful to future researchers working on the collection.

Finally, this history explains some complex decisions we have had to make during this analysis. Most obviously, Robb's 1990 inventory was made using a common methodology later published by Buikstra and Ubelaker (1994), which entailed traditional counting of MNE and MNI; our 2010 inventory was collected with a zonation methodology following Knüsel and Outram (2004); the taphonomic data analyzed below were also collected during the 2010 restudy. But the two inventories also cover slightly different collections, and used different methods as well. About 20 percent of find bags recorded in 1990 could not be relocated in 2010, but the 2010 inventory included many bags not

recorded in the previous inventory. Since most of these latter newly appearing bags lack provenience labels, we have assumed that they are the missing bags from 1990 that have simply become separated from their identifying provenience information in the meantime. However, the 1990 inventory also included two crates of about 55 bags from the 1978 excavations that are definitely known to have been lost since then, and the 2010 inventory includes 40 bags recovered from R. I. Gilbert that were previously unavailable for study. In this analysis, the data on each of these subcollections has been patched into the other inventory in an attempt to make both inventories as comprehensive as possible for their respective analyses. The result should be understood as currently the best possible inventory, and one that represents the main features of the assemblage well, but not in any sense as a definitive inventory of a bounded, stable, and complete collection.

Contexts of the Material Studied (1978–1979 Excavations)

Only three depositions are groups of associated bones from known depositional contexts. The depositional characteristics of these are described later in this volume (Chapter 4.4); here we give only their biological characteristics.

Trench 1: An adult cranium found in a natural trench or concavity in bedrock (Figure 4.1.4a). Gilbert described this skull as probably of a female about 18 years age old at death. The cranium is not in the extant collection; it is probably, but not certainly, the skull depicted in archive photograph 0536 (Figure 4.1.4b).[4]

Trench 2: An articulated burial (Figure 4.1.5a; Winn and Shimabuku 1980:11). Three archive photos survive of the skull (Figure 4.1.5b–d), which is no longer extant. The post-cranial skeleton is extant and was reexamined in this study. Gilbert described this individual as a male about 20 years old at death. Our reexamination suggested that it is a probable female, with gracile post-crania and a female pelvic morphology. It is an adult, with all epiphyses fused, but no other age determination indicators are available. Although the skull and mandible are not available for study, the photograph shows that at least one mandibular molar is missing due to antemortem loss. It displays moderate degenerative joint disease in the cervical vertebrae, spondylosis in the fifth lumbar vertebra (Figure 4.1.5e), an auxiliary facet for the sacrum on the right ilium, and squatting facets on the right tibia (Figure 4.1.5f). Stature was estimated at 154 cm (see below for details).

Trench 6: A child's skeleton, complete except for cranium and mandible. As described in Chapter 4.4, this lack of a skull reflects how the skeleton was originally uncovered, not subsequent loss. The child was aged six to seven years old at death, based on epiphyseal fusion. No pathologies were evident.[5]

Other collections of bone were sometimes identified as "bone groups" or "individuals" during excavation. This was particularly the case for trench 10, which excavators perceived as containing 10 discrete "bone groups," sometimes seen as the residues of disturbed individual burials, sometimes seen as redepositions of bones deriving from several individuals. There is little photographic evidence that such bone groups were discrete and intentional groupings (see Chapter 4.4 on funerary taphonomy), and when reexamined in the laboratory, such "bone groups" virtually always appear to contain rather random assortments of bones from several skeletons, frequently of different ages and sizes.

Basic Descriptive Osteology[6]

In this section, the basic biological characteristics of the Scaloria assemblage are described. Because the

[4] As none of the specimens depicted in the archive photos of bone taken in 1979–1980 remain in the collection, it is likely that this series of photographs was taken when these selected specimens were removed for the museum exhibition noted above.

[5] Nemeskéri's photographs include several images of the well-preserved cranium of a child of about this age with evident cribra orbitalia. However, there is no label indicating the provenience of this cranium, the cranium itself is no longer in the Scaloria skeletal collection, and the field notes for trench 6 explicitly say that the child's burial did not contain a cranium. Hence, we omit any discussion of this cranium here. It is possible that it did not actually originate in Scaloria. It may have been found, for example, at Passo di Corvo, which was being excavated at the time, and Nemeskéri may have photographed it as an example of cribra orbitalia in a nearby, contemporary population.

[6] This discussion draws substantially upon Robb's (1991) published discussion of the 1979 collection for some aspects of health and lifestyle, though observations have been confirmed and, where necessary, modified in light of the recent restudy of the collection.

Fig. 4.1.4. Trench 1. Adult cranium (a) in situ (photo: S. Winn); (b) rebuilt (photo: J. Nemeskéri).

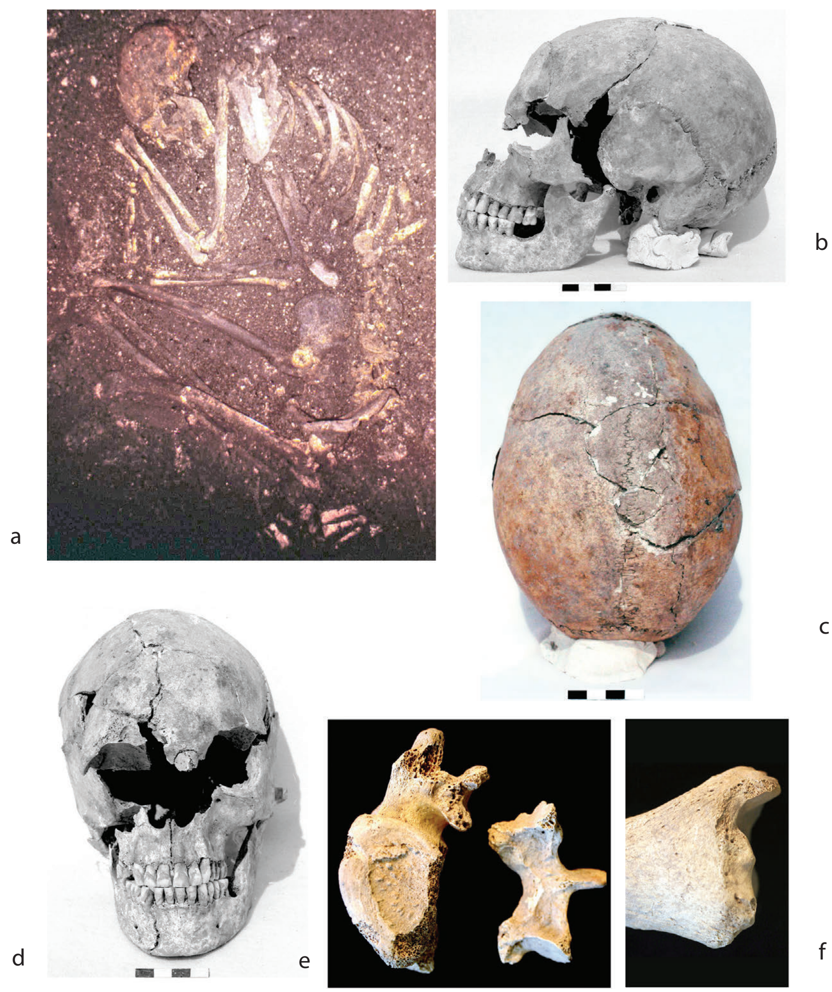


Fig. 4.1.5. Trench 2. (a) Burial (photo: S. Winn); (b–d): skull (photos: J. Nemeskéri); (e) spondylosis, L5 (photo: J. Robb); (f) squatting facets, distal right tibia (photo: J. Robb).

extant bone assemblage is highly fragmented and commingled, it is treated here as an undifferentiated aggregate. With such a mixed and fragmented collection, analysis of health and lifestyle is inevitably limited. Nevertheless some observations are possible.

MNI and Demographic Characteristics

How many individuals does the extant assemblage contain? There are alternative ways to calculate this, none of them satisfactory. The standard technique is to calculate the minimum number of individuals (MNI). We did this in two ways:

1. A widely used standard technique (Buikstra and Ubelaker 1994) is to conduct a census of all skeletal elements present, breaking each bone down into several anatomical subregions (e.g., the long bones are tabulated as five zones: the proximal end, proximal shaft, midshaft, distal shaft, and distal end). Each zone is recorded by the amount actually present. This is used to calculate a minimum number present for each zone, counting only those specimens for which more than half of the region is present in order to avoid duplication (counting fragments from a single bone twice). This is used to calculate a minimum number of elements present (MNE), which is the smallest number of a particular bone one would need to supply all the regions of that bone present. This, in turn, is used to calculate a minimum number of individuals (MNI), which takes into account all the elements and determines what the smallest number of complete skeletons it would take to provide all the elements observed. Typically, this is carried out separately for adults and juveniles, and separately for each area of the site considered a closed context.
2. Knüsel and Outram's zonation method (2004) is the alternative. This method follows a similar logic, except that it tabulates bones in terms of a greater number of smaller anatomical zones, and it does not record how much of each zone is present. The logic is that, because it tabulates smaller zones, in order for a zone to be identifiable, enough of it will have to be present that duplication with other identifiable fragments is unlikely. Once the number of regions of each bone present is obtained, the MNI is calculated in the same ways as above.

The two methods have complementary advantages and disadvantages. The Buikstra and Ubelaker method is generally more conservative and will yield a lower MNI. In a highly fragmented collection in which many fragments represent only a small proportion of an anatomical zone, the method may represent a radical underestimate. On the other hand, the Knüsel and Outram method may result in overestimates for elements which may break into many pieces, most of which remain identifiable to bone and side (notably the parietal, the pelvis, and the fibula). It should be noted, too, that these calculations of the MNI incorporate archaeological judgments about the site. Most notably, in calculating the MNI, we have aggregated bones from all the trenches, since with scattered, mixed remains, it is possible that bones from a single individual may have been transported to different areas of the cave. If it were assumed that different areas of the excavation were closed depositions and could not contain remains from the same individual, one would calculate the MNI separately for each area and then add them up, resulting in a much higher MNI. This appears to have been Nemeskéri's working method, which was based on the assumption that each small group of bones recovered must represent a separate deposition of a distinct individual; for archaeological reasons that will be apparent in the taphonomy section below, we do not feel this is a good approach to understanding the site.

Overall element counts are given below in the taphonomic discussion of element representation. MNI results using both methods are given in Table 4.1.1. For collections so fragmented and commingled as that from Scaloria Cave, the MNI will always be a serious underestimate. The MNI represents the smallest number of individuals needed to supply the extant bone assemblage. It provides a realistic approximation

Table 4.1.1. Minimum number of individuals in human skeletal assemblage

Method	Sample	Adults	Juveniles	Total
Buikstra and Ubelaker method	Bones inventoried in 1990 plus Gilbert collection	11 (based on crania and mandibles)	11 (based on right femur)	22
Knüsel and Outram method	Bones inventoried in 2010 plus two boxes inventoried in 1990 and lost thereafter	19 (based on right femur)	12 (based on right and left os coxae)	31

of the true number of bodies present only if all skeletons are reasonably complete. Aside from the evident fragmentation of the Scaloria remains, the collection does not include sets of remains that might be reconstructed into relatively complete skeletons. For example, we laid out all the femur fragments available in the Rome laboratory in 2008; almost none of them provided matching pairs or could be conjoined into more complete femora.[7] The MNI should also be understood as representing only a fraction of the dead interred at Scaloria, since (at a conservative estimate) no more than 10 percent of the Upper Chamber's area has been excavated to date.

Age and Sex

Because the skeletal sample is so fragmented, reliable age-at-death indicators were scarce. A reliable age determination could be obtained for only one adult pubis fragment, only one or two highly fragmentary juvenile dentitions were present, and almost no dentitions had enough molars to use wear patterns as an age determination criterion. Age estimation thus remains at the most basic level. Bones were identified as adult or subadult depending upon epiphyseal fusion, size, and form. "Subadult" in this case is based on multiple criteria and is to be understood very generally as including individuals younger than their late teens (the attainment of adult body size and the eruption of all adult teeth) or in some cases slightly later (for late-fusing epiphyses such as the proximal clavicle and the iliac crest).

Using the MNI as an indicator of individuals present in the assemblage (Table 4.1.1), between 38 and 50 percent of those deposited in Scaloria Cave were not yet adults. In the overall assemblage, 25.4 percent (393 of 1,545) of all specimens catalogued were from subadults. These figures suggest that between a third and a half of the population died before reaching full maturity. Juvenile mortality was probably even higher than this. Almost no infant remains were identified. Given that in pre-modern populations, one would expect at least 10 to 20 percent of the population to die as infants (Chamberlain 2006), and at Scaloria, given the high level of juvenile mortality, it is difficult to believe that infant mortality was low. This implies that there is a substantial number of infant dead who were disposed of somewhere else. The skeletal sample thus results from ritual selection that excluded infants: people dying as infants were buried in some other way and place.

Among juveniles, all ages above infant seem to be present, with some specimens representing children as young as 2 to 3 years of age at death. Among adults, while we lack reliable age estimators and at least one middle-aged-to-old individual is present, most people whose age can be assessed informally through their general degree of tooth wear appear to have died as fairly young adults, without severe enamel loss. In approximate terms, probably about half the sample was below puberty, about 30 to 40 percent were between puberty and around 30 years old, and 10 to 20 percent were older than 30 years. This suggests a pattern of ongoing mortality throughout adulthood, rather than the low young adult mortality typical of many modern groups with "j-shaped" demographic curves (Chamberlain 2006). Thus, the people living around Scaloria Cave suffered from the quite high mortality typical of the Southern Italian Neolithic burial record; the living population would have been quite young (cf. Robb 2007:40, 63).

Sex determination could not be performed for most of the collection, because of its extensive fragmentation and commingling. In the aggregate sample, various sexing indicators such as femur and radius head diameters and mandible, frontal and occipital morphology suggest that both females and males were present, in approximately equal proportions.

Stature

Only one adult male specimen and one adult female specimen were complete enough to give a stature estimate. The female was the trench 2 burial (see above; and Table 4.1.2), whose bones gave an estimated stature of 154 cm using Trotter and Gleser's formulae (Bass 1987). Stature estimates made using equations based on modern "white" samples yielded estimates that varied much more than estimates using a modern "black" equation. This has no implications at all for the "race/ethnicity" of the skeleton; it simply means that the body proportions of the Scaloria woman approximated more closely those of the modern "black" sam-

[7] Parenthetically, the only attempt to create a method for estimating the "most likely number of individuals" in commingled remains is that of Adams and Konigsberg (2004), which relies on rematching paired elements. We attempted this but found that far too few of the surviving bones could be rematched in pairs for it to be a useful method in this situation. The lack of symmetry in homologous bones also means that "matching" varies by element and observer (Mota et al. 1996).

Table 4.1.2. Stature estimation for adult female from trench 2 burial

		Trotter and Gleser "white" equations		Trotter and Gleser "black" equations	
	Length (cm)	**Stature**	**±**	**Stature**	**±**
Left humerus	28.2	152.7	4.5	151.5	4.3
Right radius	22.0	159.2	2.8	155.0	5.1
Left radius	21.7	157.8	2.8	154.2	5.1
Radius (mean)	21.9	158.5	2.8	154.6	5.1
Right femur	40.9	155.1	3.7	153.0	3.4
Right tibia	34.2	160.7	3.7	156.4	3.7
Overall (average) estimate		156.8		153.9	
Standard deviation of estimates		3.5		2.1	

ples (e.g., with distal limb segments relatively longer compared to proximal limb segments), and thus the "black" equations furnish a more accurate estimate of stature. This finding is known from other Italian Neolithic samples as well (cf. Robb 1994). The male was represented by an isolated right femur with a maximum length of 445 mm (its sex was estimated using general robusticity and femoral head diameter). This yields an estimated stature of 168.8 ± 3.94 cm ("white" equations) or 165.7 ± 3.91 cm ("black" equations, which are probably more appropriate) (Robb 1994). This is close to the average for male stature in the Italian Neolithic (Formicola 1993, 1989; Robb 1994).

Fig. 4.1.6. Carious lesion in buccal surface of mandibular molar (specimen 306-909; photo: J. Robb).

Dental Health

Dental diseases of various kinds (carious lesions, antemortem tooth loss, abscesses, and periodontal disease) are among the most common paleopathological conditions, visible in virtually any human skeletal collection above a certain size. They are often associated with cariogenic diets, and increases in dental disease are commonly seen with the transition to agriculture and, much later, with the advent of a high-sugar diet in the 17th century. Carious lesions and antemortem tooth loss are visible in the Scaloria teeth (Figure 4.1.6), although no abscesses or periodontal disease were observed. Among adults at Scaloria, dental wear proceeded rapidly, with teeth showing distinct wear facets soon after eruption, and the crowns of teeth beginning to be worn flat by around the age of 30. Some 13.3 percent (4 of 30) of teeth were lost antemortem; as is commonly the case, these principally consisted of molars almost certainly lost to dental disease. Moreover, 10 percent (3 of 30) of teeth displayed carious lesions. This reveals a significant amount of dental decay, particularly given the relatively young age at death of the adults in the sample. This is typical of the peninsular Italian Neolithic (Robb 1994). It matches the isotopic evidence for the high consumption of vegetable foods as well, as such foods are more cariogenic than a mixed diet.

Paleopathological Conditions: Signs of Systemic Stress

The most common paleopathology present is cribra orbitalia (Figure 4.1.7), as Gilbert already remarked on the basis of the 1978 remains (Gilbert 1980:31). Cribra

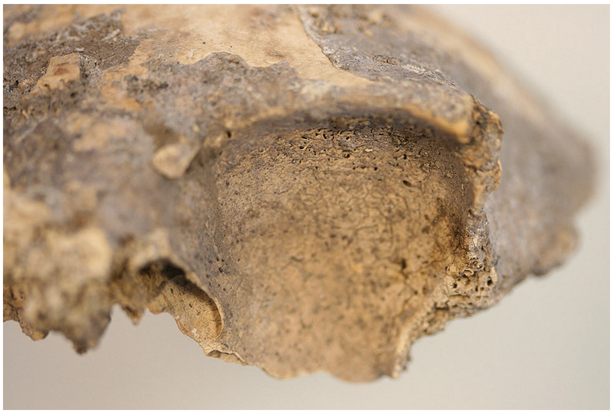


Fig. 4.1.7. Cribra orbitalia: healed lesion in adult frontal bone, specimen bag 113 (photo: J. Robb).

orbitalia is the formation of porous new bone on the roof of the orbits. Its proximate cause is a deficiency of iron in the blood. Almost all cases were slight to mild in severity and at least partially resorbed. No cases of porotic hyperostosis on the cranial vault were observed. Although researchers in the 1970s and 1980s often considered cribra orbitalia a sign of anemias, whether due to dietary deficiency, diseases such as malaria, or inherited maladies such as thalassemia, such interpretations have generally been superseded. Cribra orbitalia's real causes vary widely and may include dietary anemia, various factors that lead to the loss of iron through gastrointestinal illness or difficulties in absorbing it, and loss of blood due to internal parasites (Stuart-Macadam 1989; Walker et al. 2009). It is particularly common among the young. In Italy, it has been noted at a number of Neolithic sites (Robb 1994), including the Tavoliere (Mallegni and Fornaciari 1980). At Scaloria, combining specimens tabulated by Gilbert (1980:31) and Robb (1991), cribra orbitalia is evident in 8 of 17 observable sets of orbits (47%). This very high prevalence probably reflects both the relative youthfulness of the population and the conditions of life on the Neolithic Tavoliere.

None of the dental remains examined (of 42 observable teeth) displayed enamel hypoplasia. It is unusual to find hypoplasia entirely absent from a prehistoric group, but this probably reflects principally the small size of the sample, exacerbated by the fact that most of the observable teeth came from only three dentitions.

Osteoarthritis, usually the most common pathological condition in a skeletal population, was evident only in low frequencies: 4 of 21 (19%) cervical vertebrae, 3 of 8 (37%) thoracic vertebrae, and 2 of 8 (25%) lumbar vertebrae. Virtually all examples were mild rather than moderate or severe. Osteoarthritis is a normal consequence of aging, and, as the data for vertebrae make clear, the principal reason for the low frequency of osteoarthritis at Scaloria is the large component of juveniles in the sample and the generally young adult age at death. No Schmorl's node lesions (resorptive cavities indicating a herniated intervertebral disk) were observed in the thoracic or lumbar vertebrae.

One paleopathological condition notable for its absence is infectious disease. Subperiosteal lesions from inflammation associated with infections are often observed in skeletal material, particularly on the tibial midshaft. Their absence here may imply a generally low level of infection, but it may equally be due to incidental causes, particularly the fragmentation and incompleteness of the material (indeed, only 37 tibial midshafts were present for observation, and most of these were largely incomplete). It may also be due to the generally young age at death of the population, which means that people may have died from acute health problems before long-standing, low-level chronic conditions such as infections leading to bone remodeling had time to accumulate in the skeleton (cf. Wood et al. 1992).

Paleopathological Conditions: Individual Cases

Aside from these conditions, the collection displayed relatively few paleopathological lesions.

- Trauma, broken rib, healed (66-219) (Figure 4.1.8). The only clear evidence of skeletal trauma was a fractured adult left rib. The rib had broken at the angle, and was fully healed with slight angulation and a visible fracture callus.
- Trauma, probable perimortem cranial trauma (Figure 4.1.9). One fragment of a cranial vault (95-1503-1)[8] displayed a possible perimortem depressed fracture. This was a small, sporadic fragment of parietal bone located near the asterion; it

[8] These specimen numbers are composed of find bag numbers and individual specimen numbers assigned during the 2010 inventory (e.g., this number indicates specimen 1503-1 found in find bag 95). In most cases, they can be correlated with original provenience designations, but about a quarter of the extant collection cannot be associated with original proveniences for various reasons, and hence a new, comprehensive designation was devised.

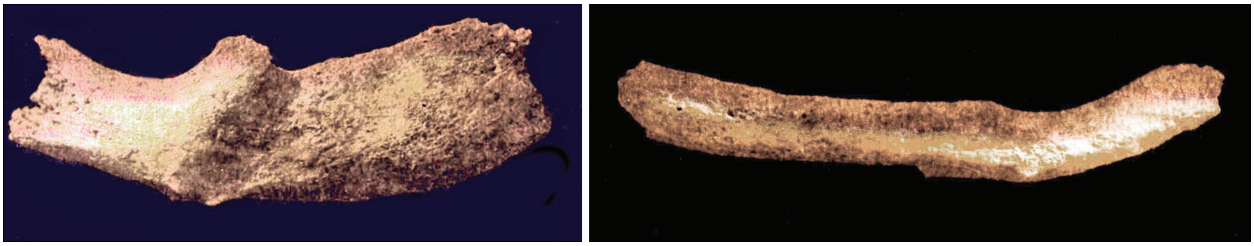


Fig. 4.1.8. Fractured rib, specimen 66-219: (a) anterior view; (b) inferior view (photos: J. Robb).

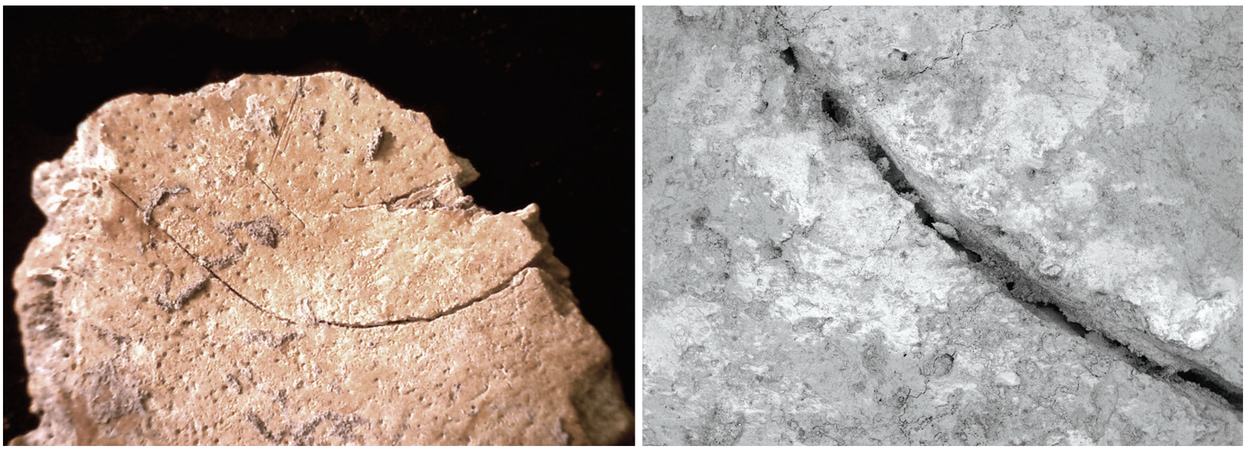


Fig. 4.1.9. Potential perimortem trauma, specimen 95-1503-1: (a) macroscopic view (note also cut-marks perpendicular to margin of fragment uppermost in fragment (photo: J. Robb); (b) SEM image of fracture line (photo: J. Skepper).

also displayed cut-marks (see Chapter 4.4). The possible fracture line has a curving, circular shape that cuts across the whole of the fragment. The curving shape suggests a concentric force administered when the bone was still elastic, and the fracture line, examined microscopically, has old concretions in it. No trace is visible on the interior of the cranium, suggesting that the force creating this fracture line was limited and only sufficient to push in the outer table and compress the diploe. No signs of healing are visible.

- Tarsal coalition (11-578) (Figure 4.1.10). This is a developmental condition of unclear etiology that results in fusion of tarsal bones via bone, cartilage, or fibrous tissue. This case appears to have been a fibrous or cartilaginous coalition between the medial process of the navicular and the calcaneus from the left side. This condition has a possibly familial distribution and can result in potentially painful flat foot stiffness (Case and Burnett 2012; Villotte et al. 2011).

Fig. 4.1.10. Tarsal coalition, left navicular, specimen 11-578 (photo: J. Robb).

- Cyst (272-481). One intermediate manual phalanx displayed a small, smooth-sided cyst that probably resulted from a minor local infection or trauma.
- Spondylosis. The adult female burial from trench 2 displays spondylolysis of the fifth lumbar vertebra (Figure 4.1.5e). Spondylosis is a condition of non-union of the vertebral arch; it is commonest at the base of the vertebral column. It is sometimes associated with mechanical stress during lateral flexion of the vertebral column (Fibiger and Knüsel 2005; Merbs 1996).

It is difficult to assess what these cases mean for overall health and lifestyle. They do not appear to reflect a significant health burden; on the other hand, it is unusual to find many serious paleopathological conditions in highly fragmented material, and the relatively young general age at death means that we should expect to see relatively few traumatic lesions, infection, and similar conditions; these tend to accumulate in the skeleton with age, and younger populations, however unhealthy, typically display low prevalence of such conditions.

Metric and Nonmetric Signs of Activity

Frequencies of various nonmetric traits in adults are listed in Table 4.1.3. The etiology of nonmetric traits is varied (Tyrrell 2000), and here we do not separate those that are epigenetic from those whose incidence is related to habitual activities. Post-cranial traits were recorded following Finnegan (1978); activity-related modifications of the ankle (tibial and talar articular surface extensions and facets) follow Trinkaus (1975), while metatarsal kneeling facets follow Ubelaker (1979). Modifications of the hip joint were not common, except for slight extensions of the proximal femoral articular surface onto the neck of the femur.

It is interesting that the majority of tibiae and tali display some alterations due to habitual hyperdorsiflexion. Such alterations (Figure 4.1.5f) have traditionally been seen as traces of a squatting posture (Boulle 2001). Trinkaus (1975) suggests that they may also be due to other activities involving hyperflexion of the ankle, such as walking in rough terrain. In this connection, modifications of the talus at Scaloria generally take the form of anterior extension of the

Table 4.1.3. Frequency of selected epigenetic and activity-related traits in adults at Scaloria

Bone	Trait	Frequency	%
Temporal	Auditory exostoses	0/7	0.0
Frontal	Metopic suture	0/4	0.0
Frontal	Supraorbital foramen	1/8	12.5
Innominate	Accessory sacroiliac articular facets	0/10	0.0
Humerus	Supracondylar spur	0/9	0.0
Humerus	Septal aperture	3/9	33.3
Femur	Allen's fossa	0/7	0.0
Femur	Poirier's facet	0/7	0.0
Femur	Extension of femur head	2/7	0.0
Femur	Exostoses, subtrochanteric fossa	1/5	20.0
Femur	Third trochanter	2/16	12.5
Tibia	Medial squatting facet	3/4	75.0
Tibia	Lateral squatting facet	5/5	100.0
Talus	Medial talar trochlear extension	5/9	55.5
Talus	Lateral talar trochlear extension	2/7	28.6
Talus	Three separate calcaneal facets ("A")	0/9	0.0
Talus	Anterior facets semi-fused ("B")	5/9	55.5
Talus	Anterior facets fused ("C")	4/9	44.4
Calcaneus	Three separate talar facets ("A")	6/9	66.7
Calcaneus	Lateral talar facets fused ("B")	3/9	33.3
Calcaneus	All three talar facets fused ("C")	0/9	0.0
Metatarsals	Metatarsal kneeling facets	4/16	25.0

Table 4.1.4. Long-bone cross-sectional indices for adults

Bone	Index	Mean	Standard deviation	N
Clavicle	Midshaft cross-section (5/4)	82.6	9.5	9
Humerus	Maximum diameter/minimum diameter (6/5)	85.7	3.5	3
Radius	Midshaft cross-section (5/4)	79.4	2.9	8
Ulna	Midshaft cross-section (12/11)	83.4	7.6	5
Femur	Subtrochanteric A-P diameter/M-L diameter (10/9)	83.7	4.0	3
Femur	Midshaft A-P diameter/M-L diameter (6/7)	114.0	5.6	5
Tibia	Minimum diameter at nutrient foramen/maximum diameter at nutrient foramen (9a/8a)	68.1	11.5	3
Tibia	Minimum diameter at midshaft/maximum diameter at midshaft (9/8)	67.1	6.0	3

Note: Numbers in parentheses designate measurements in the Martin and Saller (1957) system.

trochlear surface to varying degrees, rather than discrete facets on the talar neck. This may suggest that they are due to activities involving a range of moderate hyperflexion, such as walking in hilly terrain, rather than a single posture of extreme hyperflexion. "Kneeling facets" on the head of the metatarsal were also observed. In Neolithic populations from the Near East, these have been related to kneeling while carrying out tasks such as grinding grain (Molleson 1989, 1994; Ubelaker 1979), but they may also reflect other tasks or hyperflexion of the toes while walking over steep terrain.

In such a fragmented sample, metrical analysis is limited. Here, we report only selected long-bone cross-sectional indices, usually from quite small samples (Table 4.1.4). These values fall well within the range of variation for the Italian Neolithic (Facchini 1983:146; Facchini et al. 1984:113). Both the humerus and the radius are slightly rounder in cross section than the average. In contrast, the lower limb bones are slightly flatter. The high pilasteric index corresponds to a well-developed pilaster, which in adult specimens usually displays evident rugosity due to muscle attachments extending below the midshaft. Particularly in the context of specimens of indeterminate sex, however, little can be said about the implications this had for mobility.

Conclusions

In summary, the Scaloria human bone assemblage from the 1978–1979 excavations displays the following characteristics:

- A cross section of the population is represented, including substantial numbers of both males and females, and of adults and juveniles. The only segment of the population not well represented is the infant dead, who may have been disposed of in some other place or way.
- The MNI ranges from 22 (11 adults, 11 juveniles) to 31 (19 adults, 12 juveniles) depending on which method is used to calculate it. In either case, this is certainly an underestimate of the number of people actually contributing to the assemblage.
- The population tended to die young, with one-third to one-half dying before adulthood and many adults dying in their 20s or 30s.
- Patterns of skeletal health are difficult to see due to fragmentation and commingling and young age at death. But paleopathological examination shows common Neolithic conditions, principally dental disease, osteoarthritis, and particularly cribra orbitalia. A few sporadic cases of other pathological conditions are known. No enamel hypoplasia was observed, nor were Schmorl's nodes.
- Skeletal signs of activity reveal hyperflexion of the ankle and toes, possibly related to habitual postures or to locomotion in rough terrain.

In most of these features, the Scaloria sample fits well into the context of other Italian Neolithic samples from the area (Robb 1994, 2007; Salvadei and Santandrea 2003).

RIASSUNTO

Questa sezione descrive il complesso antropologico e le sue caratteristiche biologiche relative a un sito articolato.

- *Le ricerche di Quagliati del 1930 e di Drago del 1950 probabilmente hanno messo in luce sepolture con inumati articolati e corredi funerarii databili alla fase Scaloria Alta e Serra d'Alto (materiale scheletrico non disponibile per lo studio).*
- *L'esplorazione della parte bassa della grotta nel 1960–1970 ha notato uno scheletro completo (non sicuramente datato) e poche ossa sparse, situate in prossimità della vaschetta rituale (probabilmente riferibili alla fase Scaloria Bassa Questi materiali non sono più disponibili per lo studio recente.*
- *Scavi Gimbutas del 1978 e del 1979 hanno recuperato i resti umani descritti nella presente relazione, nel quale si riconoscono quattro contesti deposizionali:*

Trincea 1: un cranio di adulto trovato in una trincea naturale o in una concavità della roccia, descritto da Gilbert come una probabile giovane donna adulta (non più disponibile per lo studio).

Trincea 2: un scheletro completo articolato di adulto, probabilmente di sesso femminile con alcune malattie dentali, osteoartrite, e spondilosi di L5 (statura circa 154 cm) (soltanto la porzione postcranica è stata disponibile per lo studio).

Trincea 6: bambino (6–7 anni), completo tranne che per cranio e mandibola apparentemente rimossi dopo la sepoltura durante il Neolitico).

Deposizione disorganizzata e mescolata di ossa umane, quasi interamente disarticolate (la più consistente trovata nella Trincea 10, ma presenti in molte aree del camerone superiore).

L'assemblaggio della parte superiore di grotta Scaloria presenta le seguenti caratteristiche:

Il numero minimo d'individui varia tra 22 (11 adulti, 11 giovani, contato con il metodo di censimento Buikstra e Ubelaker) e 31 (19 adulti, 12 giovani, contato con il metodo di zonazione Knüsel e Outram). Poiché le ossa sono altamente mescolate e frammentate e meno del 10 percento della parte alta della grotta è stata scavata, il vero numero di persone lì depositate è certamente sottostimato.

Sulla base del tessuto osseo utilizzato per valutare l'età, una percentuale tra il 38 percento e il 50 percento degli individui era costituita da subadulti. Non ci sono praticamente resti infantili. sono presenti alcuni individui di età matura, ma la maggior parte sono giovani. Sia i maschi che le femmine erano presenti in proporzioni più o meno uguali.

Le stime sulla statura sono disponibili per una femmina (154 cm), e per uno femore di un maschio (165,7 cm) (Trotter e Gleser "black" equations) Le misurazioni di ossa lunghe e gli indici rientrano nell'ambito di normalità per il Neolitico italiano e, sono stati osservati tratti non metrici relativi alla flessione della caviglia.

Il 13,3 percento dei denti adulti sono stati persi ante-mortem, e il 10 percento dei denti mostra lesioni di carie.

Cribra orbitalia è molto comune (8/17, 47%). Al contrario, non è stata osservata ipoplasia dello smalto.

Osteoartrite è stata osservata su 9/37 vertebre (24%). Nessun nodo di Schmorl è stato notato.

Nessuna malattia infettiva è stata diagnosticata, forse a causa della giovane età e l'alta frammentazione del campione. Casi individuali di paleopatologie osservati hanno incluso una frattura di una costola guarita, una probabile peri-mortem frattura cranica, un difetto di sviluppo (coalizione? tarsale), una cisti falangea, e uno spondilosi di L5.

4.2. Diet during Life: Paleoeconomic Studies of Human Diet Using Stable Carbon and Nitrogen Isotopes

Mary Anne Tafuri, Tamsin C. O'Connell, Ellon Souter, Nunzia Libianchi, and John Robb

Introduction

The scientific analysis of archaeological remains has the potential to inform us about the diet of past individuals. Isotopic analysis gives insight into the daily practice of food consumption and thereby diet's relationship to individual, familial, and cultural organization. Paleodietary reconstruction using light stable isotopes is based on the principle that "you are what you eat"—that molecules consumed as food are incorporated into the consumer's body tissues and therefore that a chemical signal passing either unchanged or altered in a quantifiable fashion from food into the body can provide dietary information. The natural variation in the distribution of stable isotopes of carbon and nitrogen throughout different ecosystems makes it possible to use them as natural dietary tracers. When interpreted in relation to the isotopic signatures of available food sources, the combination of carbon and nitrogen isotope ratios[1] of archaeological bone (usually of the protein collagen) provides an objective and direct measure of the diet of an individual over a long time period (years) (Lee-Thorp 2008). Due to the way that bone collagen is formed, only a long-term average is indicated, with no possibility of detecting seasonal variation (Hedges et al. 2007).

An individual's carbon isotope signal can be used to indicate the plant types at the base of their ecosystem, due to isotopic changes during different types of plant photosynthesis (C_3 or C_4). In Europe, where C_4 plants (such as millet) are of less importance, carbon isotopic values are most useful in distinguishing the intake of marine versus terrestrial foods, since marine environments are enriched in ^{13}C relative to temperate terrestrial ecosystems. This marine/terrestrial carbon isotopic difference is passed up the food chain and allows us to distinguish whether humans were eating marine or terrestrial foods. Nitrogen isotopic values show the "trophic level effect," whereby at every step in the food chain (plant to herbivore, herbivore to carnivore, etc.), there is an approximate 3 to 5‰ increase in $\delta^{15}N$ (Hedges and Reynard 2007; Minagawa and Wada 1984). An individual's nitrogen isotopic values indicate their position in the terrestrial food chain (herbivore, omnivore, carnivore), which for humans can be used as an indication of the relative importance of plant or animal protein in the diet (O'Connell and Hedges 1999). The type of animal protein, however, cannot be distinguished—that is, the difference between meat and secondary products such as milk, cheese, or eggs—nor its quality (Katzenberg and Krouse 1989; Privat et al. 2005). Nitrogen isotopic values can also distinguish marine/freshwater versus terrestrial food intake, since aquatic food chains entail many more steps than terrestrial ones, resulting in marine/freshwater foods having much higher nitrogen isotopic values (Schoeninger et al. 1983).

There are very few isotopic studies carried out for prehistoric Italy (Craig et al. 2006; Lelli et al. 2012; Tafuri et al. 2009) or for the Mediterranean in general (Francalacci and Borgognini Tarli 1988; Le Bras-Goude et al. 2006, 2010; Lightfoot et al. 2011; Papathanasiou 2003). For the Neolithic, isotopic investigations in northern Europe have traditionally focused on the Mesolithic–Neolithic transition, which corresponds, isotopically, to evidence of an abrupt change in the diet of human groups from one predominantly composed of marine resources to a terrestrial-based

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[1] Carbon and nitrogen isotopic values are reported as the ratio of the heavier isotope to the lighter isotope relative to an internationally defined scale, VPDB for carbon, and AIR for nitrogen (Hoefs 1997). Isotopic results are reported as δ values ($\delta^{13}C$ and $\delta^{15}N$) in units of parts per 1,000 or per mil (‰) values, where $^{15}N_{AIR} = [(^{15/14}N_{sample} / ^{15/14}N_{AIR}) - 1] \times 1{,}000$. The more positive the d value, the more enriched the sample is with the heavier isotope.

diet (Schulting 1998; Schulting and Richards 2002; Richards et al. 2003a, 2003b; Tauber 1981). In the Mediterranean, the pattern is less clear, but there is still a shift toward a more terrestrial diet (Le Bras-Goude 2006; Lightfoot et al. 2011).

The archaeological evidence of southeastern Italy is crucial for understanding several aspects of Neolithic lifestyles in the peninsula: sites are abundant, diverse, and often well preserved, especially in Apulia, where, during the Middle Neolithic, data point to a strong reliance on farming and herding (Tiné 1983). There is much evidence of Neolithic food practices in this area in terms of faunal assemblages and botanical remains, but they leave several important questions unanswered. The isotopic investigation of Neolithic sites in Apulia can help us to reconstruct such practices through reconnecting the archaeological record with individual biographies. In particular, while we know what general range of resources was consumed, we have little information on important questions such as the balance of plant and animal food in the diet. Moreover, there is little evidence about how much in the way of marine resources that Neolithic people consumed, as this potentially important source of nutrition may leave little on-site evidence. Our isotopic study at Scaloria, while exploring diet in the Middle Neolithic of the Tavoliere Plain, will also focus on the use of the cave during this phase.

Materials and Methods

Human and animal skeletal remains in the cave were commingled; this raised the question of sampling single individuals for isotopic studies. We sampled all femurs that could be sided. This strategy posed the potential risk of having multiple samples from the same individual (e.g., from their right and left femurs). However, the assemblage was highly fragmented, and it seems unlikely in most cases that specific fragments came from the same individual; this was checked by laying out and comparing all samples, differentiating them by age and skeletal morphology as well. We judged that the risk of multiple samples probably affects only a very small number of specimens and is far outweighed by the advantage of maximizing the data available, which would be severely reduced if (for instance) we used only the right or left femur. Using commingled remains also meant that we produced a data set on individuals that could not provide associated skeletal data. To the extent possible, we have counterbalanced this by trying to collect as much data of different kinds (e.g., C, N, Sr isotopes, and ^{14}C dates) from each sample, but this consideration prevents us (for example) from comparing male and female patterns of isotopes.

We collected 47 samples of human bone and 24 of terrestrial animals for analysis (Table 4.2.1). Collagen extraction followed a modified Longin (1971) method (Brown et al. 1988). In brief, cortical bone (0.5 g) was cleaned by sand abrasion and demineralized in 0.5 M aq. HCl at 4 °C for at least four days. The samples were then rinsed to neutral pH and gelatinized in pH 3 HCl at 70 °C for 48 hours. The collagen solution was filtered off with 5- to 8-μm Ezee filters, frozen, and then freeze dried. Each of the collagen extracts was weighed (ca. 1 mg) in triplicate into tin capsules, and stable carbon and nitrogen isotope ratios were measured using an automated elemental analyzer coupled in continuous-flow mode to an isotope-ratio-monitoring mass spectrometer (Costech elemental analyzer coupled to a Thermo Finnigan MAT253 mass spectrometer). Analysis was carried out at the Godwin Laboratory, University of Cambridge. Based on replicate analyses of international and laboratory standards, measurement errors are less than ±0.2‰ for δ^{13}C and δ^{15}N.

The collagen yield, the percentage of carbon and nitrogen, and the atomic C/N ratio of each sample were also recorded to check collagen quality (Ambrose 1990; DeNiro 1985; van Klinken 1999).

Results and Discussion: Diet

The results of the stable isotope analysis of animal and human collagen are shown in Table 4.2.1, together with quality control indicators. Four human and two animal samples yielded no collagen (GS-1, 10, 15, 36, 53, 64). The collagen yield was acceptable for 43 human and 22 animal samples: for humans, a mean of 3.9 percent, minimum of 1 percent; for animals, a mean of 4.2 percent, and 20 of the 22 samples with a yield of more than 1 percent (exceptions are GS-50 and GS-56, with 0.5 and 0.7%, respectively). The extracted collagen was of acceptable quality, based on atomic C/N ratios (Table 4.2.1).

The stable isotope signatures obtained for the 43 humans in the cave (Figure 4.2.1) show a tight distribution of carbon isotopic values (−19.9‰ to −18.9‰) and a wide range of nitrogen isotopic values (from 6.8‰ to 10.6‰). Similarly, the animals show a greater distribution in the nitrogen isotopic values (from

Table 4.2.1. Stable carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) isotope data of bone collagen, with strontium isotope ratios ($^{87}Sr/^{86}Sr$) of bone and enamel bioapatite for human and animal specimens

Sample	Species	Age	Provenience	% Collagen	$\delta^{13}C$ PDB	$\delta^{15}N$ AIR	C:N	$^{87}Sr/^{86}Sr$ bone	$^{87}Sr/^{86}Sr$ enamel
GS-1	Human	Adult	Unprov	*No yield*	—	—	—	—	—
GS-2	Human	Subadult	Tr 10	5.0	–19.6	7.5	3.2	0.70836	—
GS-3	Human	Subadult	Tr 10	1.3	–19.5	7.9	3.3	0.70827	—
GS-4	Human	Subadult	Tr 10	1.2	–19.8	6.9	3.2	0.70836	—
GS-5	Human	Adult	L 16	5.1	–19.6	9.0	3.2	0.70829	—
GS-6	Human	Adult	Unprov	1.0	–19.5	9.4	3.3	0.70823	—
GS-7	Human	Adult	Tr 10	1.9	–19.3	6.8	3.2	0.70842	—
GS-8	Human	Infant	Tr 4	3.6	–19.2	8.7	3.2	0.70844	—
GS-9	Human	Adult	Tr 6	1.5	–19.4	8.3	3.2	0.70834	—
GS-10	Human	Adult	Tr 6	*No yield*	—	—	—	0.70823	—
GS-11	Human	Infant	Tr 8	3.3	–19.0	7.7	3.2	0.70813	—
GS-12	Human	Infant	Tr 8	4.4	–19.3	7.9	3.2	0.70815	—
GS-13	Human	Adult	Tr 10	5.1	–19.1	8.6	3.2	0.70834	—
GS-14	Human	Adult	Tr 10	3.6	–19.1	8.9	3.2	0.70826	—
GS-15	Human	Adult	Tr 10	*No yield*	—	—	—	*No yield*	—
GS-16	Human	Subadult	Tr 10	6.3	–19.2	8.1	3.2	0.70851	—
GS-17	Human	Subadult	Tr 10	2.4	–19.4	7.9	3.2	0.70827	—
GS-18	Human	Adult	Tr 10	4.0	–19.1	8.9	3.2	0.70833	—
GS-19	Human	Subadult	Tr 10	6.6	–19.2	7.3	3.2	0.70846	—
GS-20	Human	Subadult	Tr 10	4.5	–19.5	7.3	3.2	0.70836	—
GS-21	Human	Adult	Tr 10	7.9	–19.5	8.1	3.2	0.70832	—
GS-22	Human	Subadult	Tr 10	6.2	–19.1	7.3	3.2	0.70844	—
GS-23	Human	Subadult	Tr 10	3.9	–19.5	8.2	3.2	0.70835	—
GS-24	Human	Infant	Tr 10	6.6	–19.9	8.2	3.2	0.70840	—
GS-25	Human	Subadult	Tr 10	6.9	–19.2	8.8	3.2	0.70853	—
GS-26	Human	Subadult	Tr 10	3.7	–19.0	8.2	3.2	0.70833	—
GS-27	Human	Adult	Tr 10	3.0	–19.0	8.8	3.2	0.70833	—
GS-28	Human	Adult	Tr 10	3.6	–19.3	8.7	3.2	0.70852	—
GS-29	Human	Infant	Tr 10	3.8	–19.1	8.2	3.2	0.70836	—
GS-30	Human	Subadult	Tr 10	3.8	–19.2	8.1	3.2	0.70836	—
GS-31	Human	Subadult	Tr 10	5.2	–19.4	8.6	3.2	0.70849	—
GS-32	Human	Adult	Tr 10	1.6	–19.2	8.6	3.2	0.70837	—
GS-33	Human	Adult	Tr 10	2.5	–19.0	9.2	3.2	0.70875	—
GS-34	Human	Subadult	Tr 10	4.3	–19.5	8.9	3.2	0.70852	—
GS-35	Human	Infant	Tr 10	2.6	–19.8	8.1	3.2	0.70859	—
GS-36	Human	Adult	Tr 10	*No yield*	—	—	—	—	—
GS-37	Human	Adult	Tr 10	1.0	–19.0	9.0	3.2	0.70877	—
GS-38	Human	Subadult	Tr 10	3.8	–19.5	8.0	3.2	0.70837	—
GS-39	Human	Subadult	Tr 10	2.9	–19.8	8.1	3.3	0.70843	—
GS-40	Human	Adult	Tr 10	8.0	–19.1	8.5	3.1	0.70829	—
GS-41	Human	Adult	Tr 10	8.6	–19.3	8.3	3.2	0.70845	—
GS-A	Human	Adult	Unprov	2.5	–19.6	9.2	3.4	0.70835	0.70867
GS-B	Human	Adult	Tr 3	4.6	–19.3	9.0	3.3	0.70835	0.70827
GS-C	Human	Adult	Unprov	1.1	–19.8	8.6	3.3	0.70862	0.70856

Continued on next page

Table 4.2.1, continued. Stable carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) isotope data of bone collagen, with strontium isotope ratios ($^{87}Sr/^{86}Sr$) of bone and enamel bioapatite for human and animal specimens

Sample	Species	Age	Provenience	% Collagen	$\delta^{13}C$ PDB	$\delta^{15}N$ AIR	C:N	$^{87}Sr/^{86}Sr$ bone	$^{87}Sr/^{86}Sr$ enamel
GS-D	Human	Adult	Tr 3	1.9	−19.8	10.6	3.3	0.70820	0.70844
GS-E	Human	Adult	Tr 2	1.5	−19.4	8.8	3.4	0.70828	0.70865
GS-F	Human	Adult	Surface area	3.8	−18.9	9.5	3.3	0.70821	0.70838
GS-4-19	Human	Adult	Tr 6	—	—	—	—	0.70825	—
GS-18-9	Human	Adult	Tr 6	—	—	—	—	0.70826	—
GS-124	Human	Adult	Tr 10	—	—	—	—	0.70833	—
GS-190	Human	Adult	Unprov	—	—	—	—	0.70828	—
GS-209	Human	Adult	Tr 6	—	—	—	—	0.70824	—
GS-216	Human	Adult	Tr 6	—	—	—	—	0.70825	—
GS-42	Sheep/goat	Tr 4	8.5	−17.7	7.2	3.2	—	—	—
GS-43	Sheep/goat	Tr 4	3.2	−19.4	5.6	3.2	—	—	—
GS-44	Sheep/goat	Tr 4	2.9	−19.7	5.4	3.2	—	—	—
GS-45	Sheep/goat	Tr 4	1.1	−20.4	7.7	3.3	0.70820	—	—
GS-46	Sheep/goat	Tr 4	3.0	−20.4	5.1	3.2	—	—	—
GS-47	Cattle		Tr 2	3.5	−20.8	6.3	3.2	—	—
GS-48	Cattle		Tr 2	3.5	−20.0	6.4	3.2	—	—
GS-49	Horse		Unprov	1.0	−20.5	6.9	—	—	—
GS-50	Horse		Unprov	0.5	−18.8	5.8	—	—	0.70844
GS-51	Pig		Unprov	2.0	−20.7	6.3	3.2	0.70830	—
GS-52	Red deer		Unprov	3.1	−20.3	5.0	3.1	—	—
GS-53	Red deer		Unprov	*No yield*	—	—	—	—	—
GS-54	Sheep/goat	Tr 6	4.5	−18.7	6.5	3.2	—	—	—
GS-55	Sheep/goat	Tr 6	8.6	−20.3	6.9	3.2	—	—	—
GS-56	Cattle		Unprov	0.7	−17.6	5.8	3.2	—	—
GS-57	Sheep/goat	Tr 2	6.6	−17.7	6.2	3.2	0.70832	—	—
GS-58	Roe deer		Tr 2	3.8	−21.2	4.7	3.2	—	—
GS-59	Red deer		Tr 2	1.0	−20.5	4.8	3.3	—	—
GS-60	Red deer		Tr 10	6.5	−21.1	5.3	3.2	—	—
GS-61	Sheep/goat	Tr 10	5.4	−20.4	6.4	3.2	0.70817	—	—
GS-62	Sheep/goat	Unprov	8.6	−20.2	7.9	3.2	—	—	—
GS-63	Sheep/goat	Unprov	10.0	−20.7	6.0	3.2	—	—	—
GS-64	Sheep/goat	Unprov	*No yield*	–	—	—	—	—	—
GS-65	Red deer		Unprov	3.3	−21.1	4.1	3.3	—	—
GS Soil	Soil		Tr 1 L 2	*No yield*	—	—	—	0.71043	—
GS Leachate	Leachate		Tr 1 L 2	*No yield*	—	—	—	0.70820	—

Note: L = level; Tr = trench; Unprov = unprovenienced.

4.1‰ to 7.9‰) than in the carbon ones (−21.2‰ to −17.6‰). For the humans, $\delta^{13}C$ reflects a predominantly terrestrial diet based on C_3 plants. This is unsurprising, as the only prehistorically consumed plant with a C_4 metabolic pathway known in the central Mediterranean is millet, which was not used until the Bronze Age (Tafuri et al. 2009).

Nitrogen isotopic enrichment of the humans compared with the animals averages around +2‰, which is lower than for many Neolithic populations that have been studied. Moreover, it implies a very limited contribution of animal protein to the diet, if we consider that the trophic level enrichment is approximately +3‰ to 5‰ (Hedges and Reynard 2007). It suggests, important-

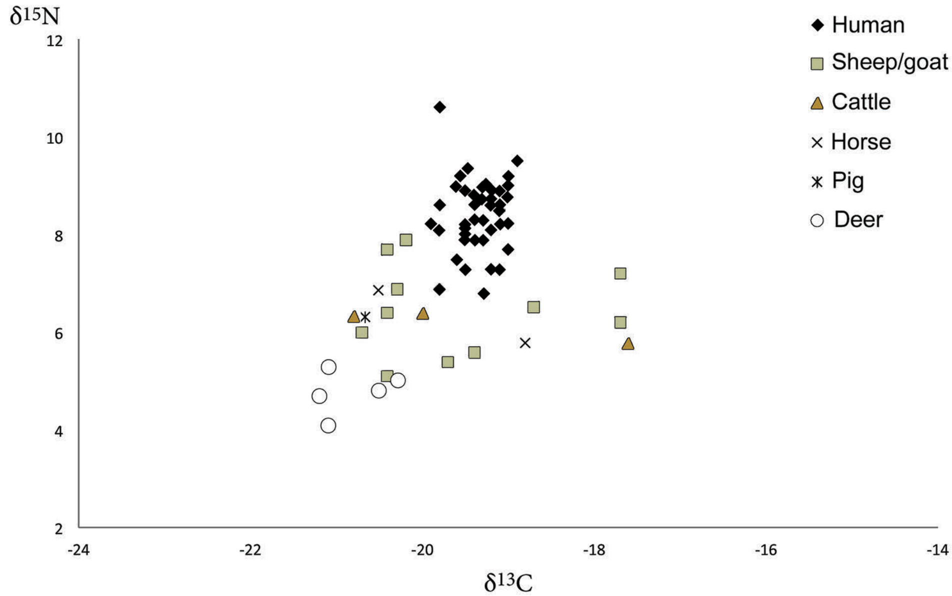

Fig. 4.2.1. Stable carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) isotope ratios of human (n = 43) and animal (n = 22) bone collagen samples from Scaloria Cave.

ly, that although the people buried at Scaloria Cave raised livestock, they ate relatively little meat or dairy products. As it was certainly possible to have kept large herds in the Tavoliere and Gargano, this poses the question of the organization of labor and the role of animals in the Neolithic economy, which may have been social as well as simply nutritional (cf. Robb 2007:chapter 4).

The $\delta^{13}C$ as well as $\delta^{15}N$ indicate very little if any marine protein intake (Chisholm et al. 1982; Schoeninger and DeNiro 1984). This finding seems anomalous in light of the fact that Scaloria Cave lies only 1 to 2 km from the Adriatic Sea, and may have been closer in prehistory. But it is in fact typical of Neolithic groups throughout the central Mediterranean and indeed Europe in general (Richards et al. 2003a, 2003b). Marine shells found at Scaloria Cave were brought there for non-culinary uses (see Reese, Chapter 6.5, this volume), and although shellfish seems to have been eaten at the nearby sites of Coppa Nevigata (Cassano et al. 1987) and Masseria Candelaro (Cassano et al. 2004), they may have made only a negligible overall contribution to nutrition.

Other Comments on Isotopic Variation at Scaloria

Among the animal samples (Figure 4.2.1), ovicaprids are the most abundant in our set (n = 11), as a reflection of the composition of the faunal assemblage dominated by sheep/goat specimens. They show a wide range of isotopic values, both for $\delta^{13}C$ (–20.7‰ to –17.7‰) and $\delta^{15}N$ (5.4‰ to 7.9‰). Similar patterns have been observed at other sites (Hedges et al. 2008; Richards et al. 2003a), while at Fontbrégua, a cave located on the French coast that shows great similarities with Grotta Scaloria, ovicaprids, which were similarly abundant in the faunal assemblage, had extremely consistent isotopic values (Le Bras-Goude et al. 2010). If we assume that all animals at Scaloria are largely coeval, we could argue that individuals may have eaten in diverse environments (i.e., reflecting possible differences between the lowland pastures of the Tavoliere and those in the mountains of the Gargano), with different proportions in the contribution of C_3 and C_4 plants to their diet. This could be supported by the strontium isotope ratios (see Chapter 4.3) of the ovicaprids, which are more varied than the other samples; however, we would need a larger set of data to rule out other possible explanations for such a pattern.

The three cattle specimens have similar nitrogen isotopic values but different carbon isotopic values, which suggest, for GS-56, a higher contribution of C_4 plants. Similarly, the two samples of equid bone have comparable nitrogen isotopic data but slightly different carbon isotopic values. The only specimen of pig sampled shows $\delta^{15}N$ values that are lower than those of some of the cows, indicating a predominantly herbivorous diet. Unsurprisingly, both species of deer (*Cervus elaphus*, *Capreolus capreolus*) plot together, with low

$\delta^{13}C$ and $\delta^{15}N$ values, as often seen in animal assemblages (Hedges et al. 2008), possibly due to the canopy effect in forests, particularly considering that the only roe deer sampled shows the most depleted ^{13}C values (Drucker et al. 2008).

As stated, the humans at Scaloria show a tight range of carbon isotopic values (1‰) and a greater spread in nitrogen signature (3.8‰). Isotopic data from other Neolithic sites in Italy (Tafuri et al. forthcoming) suggest that the Middle Neolithic is characterized by little deviation in the $\delta^{13}C$ values of human collagen and greater variation in the $\delta^{15}N$, a pattern that does not apply to earlier or later phases (Figure 4.2.2). For one outlier (GS-D), the $\delta^{15}N$ values are higher than for the other humans by approximately 2‰; this might suggest a greater contribution of animal proteins to the diet, especially when considering that the carbon isotopic values are coherent with those of the rest of the sample. The strontium isotope ratios in the bone and dental enamel of the same specimen (see Chapter 4.3) are indicative of a "local" origin of the individual and cluster with the rest of the population. Interestingly, nitrogen isotopic data for this individual are coherent with mean values at Ripa Tetta (Lelli et al. 2012), a coeval site located on the western border of the Tavoliere.

When comparing Scaloria humans with those from other contemporary sites (Figure 4.2.3), we see overall similarities in their carbon isotopic values, both with Neolithic individuals at nearby Passo di Corvo (Tafuri et al. 2014) and at Ripa Tetta (Lelli et al. 2012); likewise at Arene Candide (Le Bras-Goude 2006), a coastal site in Liguria, but also at Fontbrégua (Le Bras-Goude et al. 2010) and inland and coastal sites of Croatia (Lightfoot et al. 2011). Nitrogen isotopic values are significantly different from those of both Passo di Corvo—although $\delta^{15}N$ at this site is exceptionally high—and Fontbrégua (given differences in sample size, we used a Kruskal-Wallis test; in both cases, P-values are lower than 0.0001). It is difficult to call on ecological reasons for differences in the wide range of both carbon (for the animals) and nitrogen (for the humans) isotopic signatures at Scaloria, especially when considering data from sites located only a few kilometers from the cave. Instead, we would suggest that this reflects use of the sites in the Gargano-Tavoliere during the Middle Neolithic.

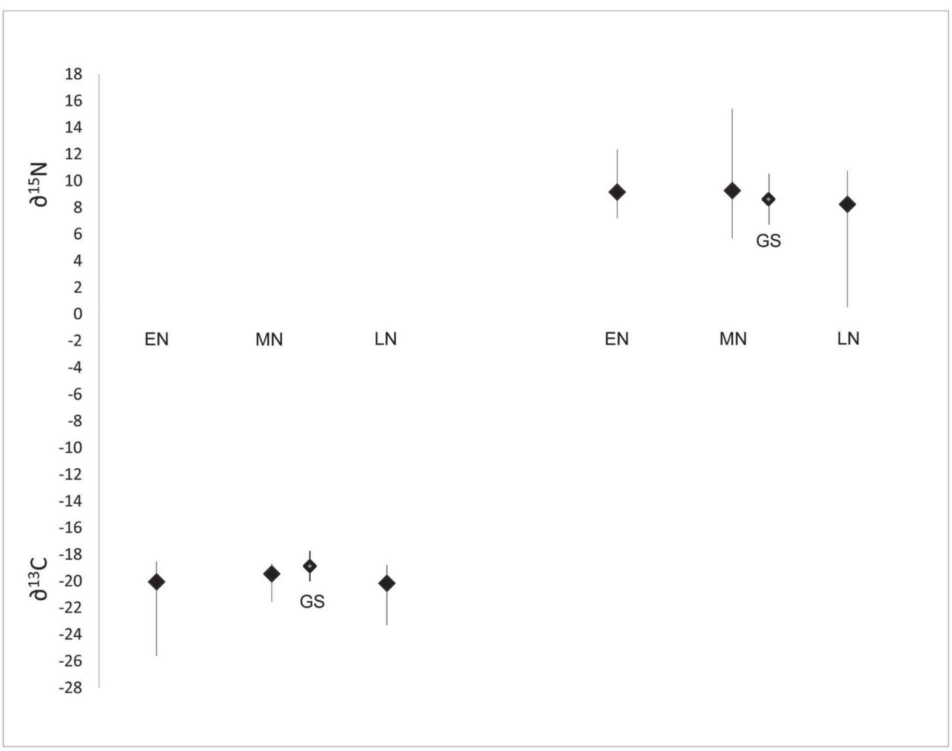

Fig. 4.2.2. Stable carbon and nitrogen isotope ranges of human collagen for pooled data from Early (EN), Middle (MN), and Late (LN) Neolithic sites in Italy (Tafuri et al. forthcoming; n = 241); Grotta Scaloria (GS) ranges are plotted separately.

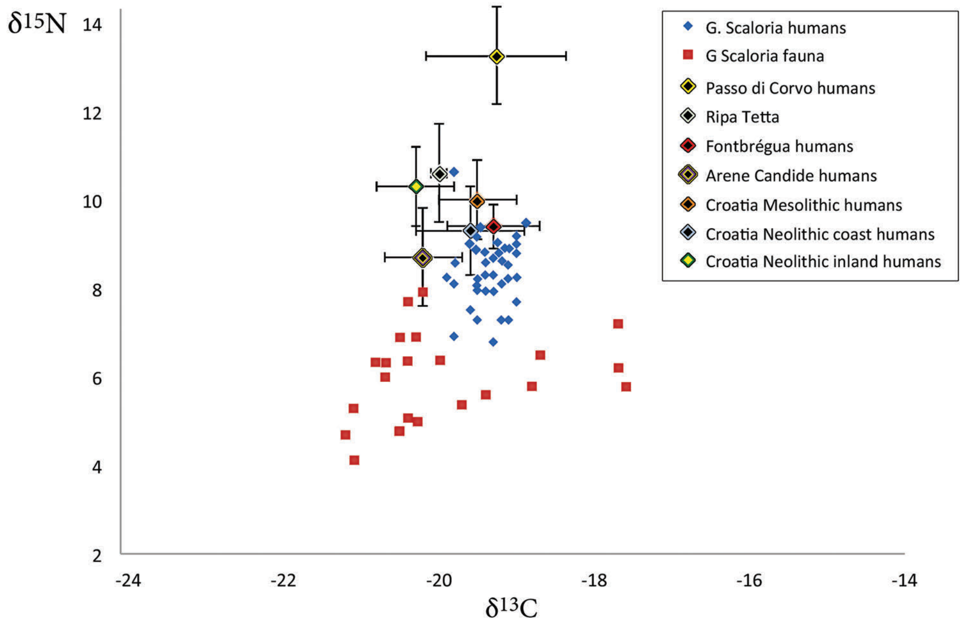

Fig. 4.2.3. Stable carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) isotope data of humans and animals from Scaloria and other comparison sites: Passo di Corvo (Tafuri et al. 2014) and Ripa Tetta (Lelli et al. 2012) in the Tavoliere Plain; Arene Candide in Liguria (Le Bras-Goude et al. 2006); Fontbrégua, France (Le Bras-Goude et al. 2010), and Croatia (Lightfoot et al. 2011).

Conclusion

Stable carbon and nitrogen isotope data of human and animal collagen at Scaloria Cave allowed us to explore subsistence at the site. Carbon and nitrogen isotopic data reveal a predominantly terrestrial (C_3) diet, with limited consumption of animal proteins. This seems to confirm the idea of a discontinuity with the Mesolithic, for which isotopic data revealed reliance on marine resources (Francalacci and Borgognini Tarli 1988; Le Bras-Goude et al. 2006; Lightfoot et al. 2011).

Comparison with coeval sites in the Tavoliere Plain seems to indicate the use of the cave as a gathering place that may have drawn in people from various nearby environments. This would explain the wide range of $\delta^{15}N$. Unlike at Fontbrégua, where the tight cluster of isotopic values was interpreted as evidence of use of the cave by a restricted community (Le Bras-Goude et al. 2010), the combination of relatively consistent radiocarbon dates (see Chapter 2.3) and the range of isotopic data at Scaloria call for a different explanation. People and animals whose bones were exposed inside Grotta Scaloria relied on different foods and/or environments in a way that makes it difficult to explain their provenience from a single community or population.

Acknowledgments

We thank Giorgio Manzi, at the Museum of Anthropology "G. Sergi," University of Rome La Sapienza, for allowing us to use the museum to store and study the human bone collection from Scaloria Cave. We are grateful to Giovanna Belcastro and Valentina Mariotti for sharing Passo di Corvo isotope data. We thank Mike Hall and James Rolfe at the Godwin Laboratory, Department of Earth Sciences, University of Cambridge, for help with isotopic analyses, and Catherine Kneale, McDonald Institute for Archaeological Research, for help in sample preparation and analysis.

Riassunto

L'analisi isotopica al carbonio e all'azoto sui resti umani è stata condotta per studiare l'equilibrio di alimenti vegetali e animali nella dieta e il ruolo dei cibi marini. Poiché i resti umani erano tutti molto frammentati e mescolati, sono stati campionati tutti i femori il cui lato poteva essere determinato. Sono stati analizzati 47 campioni di ossa umane e 24 animali terrestri, fornendo dati accettabili per 43 campioni umani e 22 animali.

Valori isotopici di carbonio per i 43 campioni umani mostrano una stretta distribuzione dei valori isotopici di carbonio (da –19.9 ‰ a –18,9 ‰) e una vasta gamma di valori isotopici di azoto (dal 6,8 ‰ a 10,6 ‰). Allo stesso modo, gli animali mostrano una maggiore distribuzione nei valori isotopici di azoto (dal 4,1 ‰ al 7,9 ‰) rispetto a quelli di carbone (–21,2 ‰ per –17,6 ‰). Per gli umani, $\delta^{13}C$ riflette una dieta prevalentemente terrestre basata su piante C_3.

L' arricchimento isotopico di azoto dei resti umani rispetto a quelli animali è mediamente intorno +2 ‰, che è inferiore rispetto a molte popolazioni neolitiche che sono state studiate. Questo suggerisce, cosa molto importante, che anche se le persone sepolte a Scaloria allevavano bestiame, mangiavano relativamente poca carne o latticini.

Il $\delta^{13}C$ nonché $\delta^{15}N$ sono poco indicativi in riguardo alle proteine marine introitate. Questa scoperta sembra anomala alla luce del fatto che Scaloria si trova a soli 1–2 km dal mare Adriatico forse ancora più vicino a quell'epoca. Ma ciò è in realtà tipico dei gruppi neolitici di tutto il Mediterraneo centrale e anzi dell' Europa in generale. Le conchiglie marine trovate a Scaloria sono state portate lì non per uso culinario, e anche se i molluschi sembrano essere stati mangiati nei siti vicini di Coppa Nevigata e Masseria Candelaro.

4.3. Mobility, Landscape, and the Function of the Cave: Evidence from Strontium Isotopes

Mary Anne Tafuri, Tamsin C. O'Connell, John Robb, Christopher Knüsel, and Paul Fullagar

Introduction

The strontium isotopic ratio ($^{87}Sr/^{86}Sr$) measured in the inorganic matter of skeletons is used in archaeology to assess past mobility and residential patterns. The bioavailable strontium in the tissues reflects that of the plants eaten, which in turn replicates that of soil and water as derived by the geological background of the lived-in environment. The ^{87}Sr content of bedrock is formed by decay of rubidium (^{87}Rb), so that old rocks will have higher ^{87}Sr than younger ones (for discussion, see Bentley 2006).

Early strontium isotope studies of archaeological skeletons concentrated on the use of strontium isotopes to detect human mobility, often in relation to cultural phenomena such as kinship organization and marriage patterns (Bentley et al. 2002; Ericson 1985; Ezzo et al. 1997; Price et al. 1998, 2001). Debate on diagenetic disturbances altering the biogenic composition of archaeological skeletons has resulted in the focus, at least over the past decade, of Sr studies on dental enamel by virtue of its mainly inorganic matrix and better resistance to contamination. Balasse et al. (2002) and Bentley and Knipper (2005) used sequential C and O analysis and associated $^{87}Sr/^{86}Sr$ to explore seasonal mobility and transhumance, respectively, in pastoral South African herders and Neolithic Linearbandkeramik (LBK) groups. Recent studies on LBK of Early Neolithic Central Europe have been directed to the investigation of broad phenomena such as the emergence of social complexity at the transition between the Mesolithic and Neolithic (Bentley et al. 2013).

In prehistoric Italy, strontium isotope investigations have never been applied, despite the enormous contribution that this type of approach would make in the discussion of patterns of mobility, especially at the transition to the Neolithic and Bronze Age.

The strontium isotopes ratio of human tissues is normally built up through a multitude of sources (Montgomery 2010). Due to complexity of the mechanism of absorption of biologically available strontium, its concentration in human tissues is particularly important to archaeological investigations when data from a site, or a series of sites, are seen in relative terms (cf. Pollard 2011). In this study, we thus do not necessarily focus on mobility and residence patterns per se, but rather investigate strontium isotopic differences as the possible reflection of cultural practices among the Neolithic people of Grotta Scaloria. Specifically, we wish to investigate the composition of the burial assemblage: Can "local" and "non-local" components be identified? Does it reflect a geographically homogeneous or heterogeneous sample? Does this tell us anything about how people came to be deposited in the cave?

Materials and Method

We have performed $^{87}Sr/^{86}Sr$ analysis on human bone and dental enamel samples to detect possible differences in the Sr signature of the individuals buried in the cave. The sampling followed three main lines of reasoning: we selected the same individuals chosen for the stable carbon and nitrogen isotope study so as to combine data and isolate possible patterns. In the first instance, this meant systematically sampling all the available femora. The vast majority of these samples came from trench 10. This criterion had the obvious advantage of providing a multitude of data on the same set of individuals, particularly as the dental material available at the cave is limited. However, it did not contain enough samples to investigate the possible relation between taphonomic evidence (i.e., cut-marks) and the origin of the individuals buried at Scaloria. Furthermore, it remained based on the analysis of bone tissue, for which diagenetic disturbances are subject to debate.

Hence, the sampling was subsequently expanded to a selection of individuals that could provide dental enamel together with bone (most of the mandibles in

the sample; almost no maxillae were available for sampling).

In addition, we added samples from a set of bones other than the femur that showed traces of cut-marks (Figure 4.3.1). These samples were selected specifically to represent the range of cut-marked bones. Many of them came from trenches 1 to 9.

We also sampled materials from two nearby, approximately contemporary, sites for comparison (Tafuri et al. 2014). One, Masseria Candelaro (Cassano et al. 2004), is a large ditched village located approximately 7 km southwest of Scaloria, near a now-filled-in marshy lagoon. The other site, Passo di Corvo (Tiné 1983), is one of the largest and best known of the Tavoliere ditched villages. It is located about 15 km southwest of Scaloria on the clay plains of the Tavoliere proper.

Analyses were carried out at the Department of Geological Sciences at the University of North Carolina. Strontium was separated from dissolved samples by ion exchange chromatography using Eichrom Sr-Spec resin. Strontium was analyzed in dynamic multi-collector mode with a VG Sector 54 thermal ionization mass spectrometer. Internal precision, percent standard error for $^{87}Sr/^{86}Sr$ is typically 0.0006 to 0.0009 percent; hence, data are reported to four decimal places. Sr carbonate standard SRM 987 was analyzed 62 times during the year of analysis: mean $^{87}Sr/^{86}Sr$ ratio = 0.710270 ± 0.000018 (2 standard deviations). All $^{87}Sr/^{86}Sr$ ratios from the UNC-CH laboratory are reported relative to a value of 0.710250 for SRM 987. Due to instrumental limitations, we could not calculate Sr ppm concentration; however, while we focus our interpretation on dental enamel data, we use Sr ratios in the bone only in relative terms, with the belief that any contamination would have affected the bones equally.

RESULTS: SR ISOTOPES, MOBILITY, AND SOCIAL GEOGRAPHY

The deep geological background of the Tavoliere and the Gargano areas is fairly uniform, made of Mesozoic

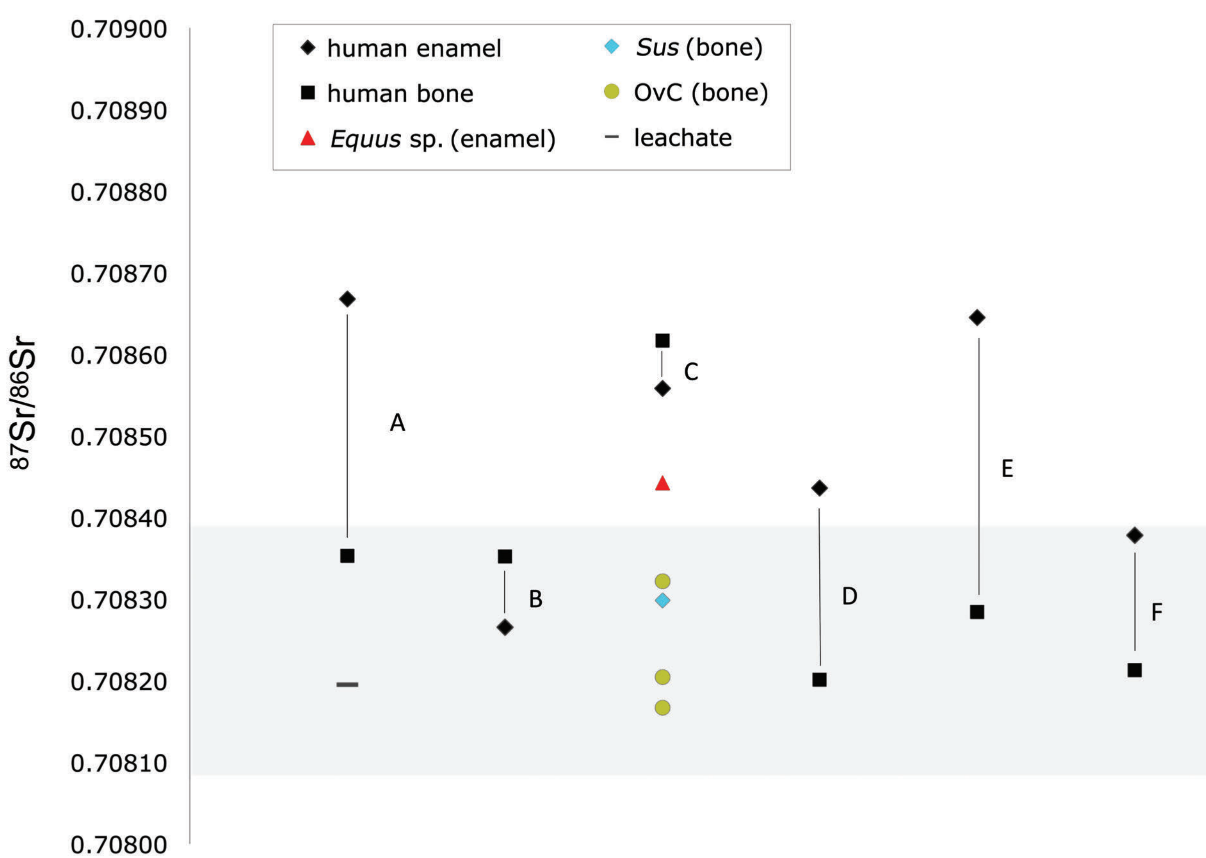

Fig. 4.3.1. $^{87}Sr/^{86}Sr$ of human enamel sample with associated bone data at Scaloria. Local range (in gray) is defined by two standard deviations of mean bone values for faunal sample.

limestone overlain by Pliocene and Pleistocene deposits (Mastronuzzi and Sansò 2002). However, more superficial geology shows considerable diversity. The Tavoliere proper—encompassing Passo di Corvo, while Candelaro lies at its margin—is covered mostly with Pliocene and Pleistocene clays and alluvial deposits. The Gargano is a limestone massif uplifted through faulting and covered thinly with recent soil. Scaloria lies at the foot of the Gargano, in a geology dominated by the same limestone, called here Calcarenite di Gravina; indeed, it is faulting and dissolution of the limestone that is responsible for the cave itself. Our three sites analyzed here thus are located in at least two geological zones (Tafuri et al. forthcoming).

The range of the $^{87}Sr/^{86}Sr$ ratio in all of the bone and enamel samples examined at Scaloria seems to reflect the overall homogeneous geological background of the area, so that any differences within the assemblage should be measured in relative terms within a generally homogeneous Sr signature. For the humans (N = 50), the mean bone value is 0.70837 ± 0.00010, while the mean bone value for the animal samples (N = 4) is 0.70825 ± 0.0007. The human samples that could provide tooth enamel (six on a minimum number of individuals [MNI] count) gave Sr signatures that range from 0.708265 to 0.708668; the only animal sample that provided tooth enamel (a Late Pleistocene or early Holocene specimen of *Equus* sp. associated with the Late Upper Paleolithic occupation) had a signature of 0.708442 (Figure 4.3.1). It is unsurprising that mean enamel values of human and animals are consistent. What emerges from the Sr isotope ratios data is summarized below.

At all sites, a variable proportion of individuals appears to be "non-local," here defined following Bentley (2006) as more than two standard deviations from the mean faunal value. This suggests that within every community, a proportion of people moved to another village community during their lifetime. At Scaloria in particular, for six adults (the mandible specimens A to F), we could sample both dental enamel and cortical bone to measure possible differences in the Sr signature at two distinct moments of individuals' histories (with early life represented by enamel formed during childhood vs. adult life represented by bone, which is continuously remodelled) (Figure 4.3.1). While most animals fall within the "local" range (with the unsurprising exception of the equid, a highly mobile species), three of our six human individuals (A, D, E) have enamel values that fall outside the "local" range, with one individual (C) outlying for both enamel and bone signatures. The relative comparison of the six individuals clearly shows heterogeneous origins for the people buried at Scaloria, with possible intra-life mobility for at least three outliers.

Grotta Scaloria, Passo di Corvo, and Masseria Candelaro all have different ranges of Sr isotope ratios for the enamel (Figure 4.3.2). This might suggest that they are drawing their population from distinct local geological and social catchments. It may further suggest that, if we can see distinctions between communities less than 10 km distant, each community had a relatively small territory within which most of its "local" residents lived.

Scaloria Cave has a greater range of variation than the other three sites (Figure 4.3.2). If all three sites drew people to be interred from the same kind of catchment, we would expect them to have about the same range of Sr isotope variability. Alternatively, if Sr isotope variability depends on the local geological variability, we might expect Candelaro to have the highest variability, as both Scaloria and Passo di Corvo lie in relatively homogeneous geological zones and Candelaro's territory might straddle a geological border. The fact that Scaloria has greater isotopic variability might in turn suggest that Scaloria was not simply a burial site for a local community analogous to the villages; instead, it might confirm our hypothesis on the use of the cave as a gathering place for a number of people settled in the Gargano-Tavoliere area during the Middle Neolithic.

Results: Sr Isotopes and Funerary Practices

Sr isotope analysis revealed one of the more striking potential results of the entire excavation. Given the presence inside the cave of a large number of human bones with signs of cut-marks (see Chapter 4.4), we analyzed Sr isotope ratios on 16 out of 98 of the identified cut-marked samples to explore possible differences in the origins of individuals that showed signs of post-mortem alteration. In all, 16 cut-marked samples of bone were analyzed, and these were compared with 34 non–cut-marked samples. We minimized damages to the cut-marked bone fragments by sampling a very small quantity of cortical bone (<0.5 g). The assemblage contained dental material from very few individuals and, commingled as it was, the great majority of cut-marked specimens had no dental remains associated with the bone; thus Sr isotope ratio data from enamel

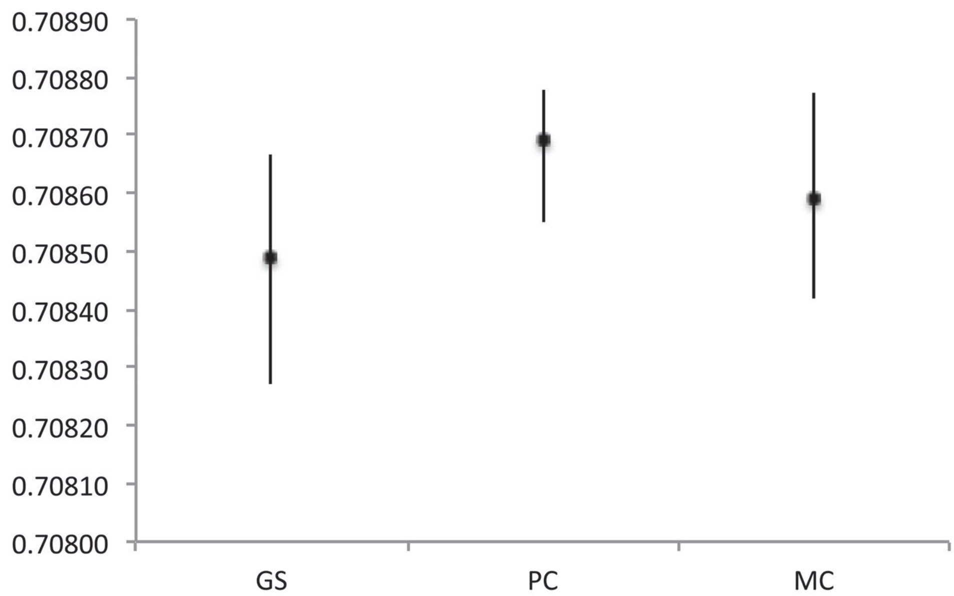

Fig. 4.3.2. Range of Sr isotope ratios of dental enamel at Grotta Scaloria (GS), Passo di Corvo (PC), and Masseria Candelaro (MC); mean values are indicated.

for cut-marked specimens were very limited. We mention this because we specifically needed to consider the possibility that diagenetic disturbances might have altered the original biogenic composition of the bone samples. For the reasons noted above, we were unable in this analysis to obtain ppm data on the absolute concentrations of Sr isotopes in the bone samples, which would conclusively address questions of diagenesis. Such data may become available in future analyses. However, we feel we can provisionally exclude diagenetic causes for the pattern discussed below, in which cut-marked and non–cut-marked bone display different Sr isotope ratios. This is because the cut-marked and non–cut-marked specimens generally represent similar size fragments, they were excavated commingled indiscriminately together, and they derive from the same, homogeneous geological environment, the Upper Cave of Scaloria. This makes it quite difficult to imagine a geological cause that would alter the Sr isotope signature of cut-marked specimens and not do so for non–cut-marked specimens too (or vice versa). We have also considered a second model, that Sr isotope differences may reflect diagenesis not during the 7,000 years the bones lay buried in the cave but during the first year or so after death, when cut-marked and non–cut-marked bones may have experienced different micro-environments due to different funerary ritual pathways. But again, it is difficult to imagine a specific scenario in which rites such as defleshing or secondary burial would have had such a specific and long-lasting taphonomic signature.

This resulted in an apparent striking pattern: when plotting $^{87}Sr/^{86}Sr$ against taphonomic data, most samples showing traces of cut-marks cluster within the "local" range. In contrast, non–cut-marked specimens include both local and non-local individuals (Figure 4.3.3). When the data are formally coded as "local" or "non-local" and analyzed statistically rather than graphically, a correlation persists, but it is a weaker, statistical pattern (cf. Chapter 4.4, this volume). At first sight, this suggests that defleshing was done principally for individuals who were geographically "local," at least in the 10 to 20 years prior to death. There are multiple possibilities for interpreting this apparent pattern. For instance, suppose that Scaloria Cave represents a local community whose remains included some individuals who lived all of their lives there and some individuals who moved from other communities at some point in their lives. The former were considered more fitting for defleshing rituals; perhaps it was a mark of respect and they were considered more socially central (if, for example, members of local kin groups were more socially central than married-in affinities). It is also possible that Scaloria Cave represents an assemblage drawn from several communities, as may be tentatively suggested by its greater range of Sr values than

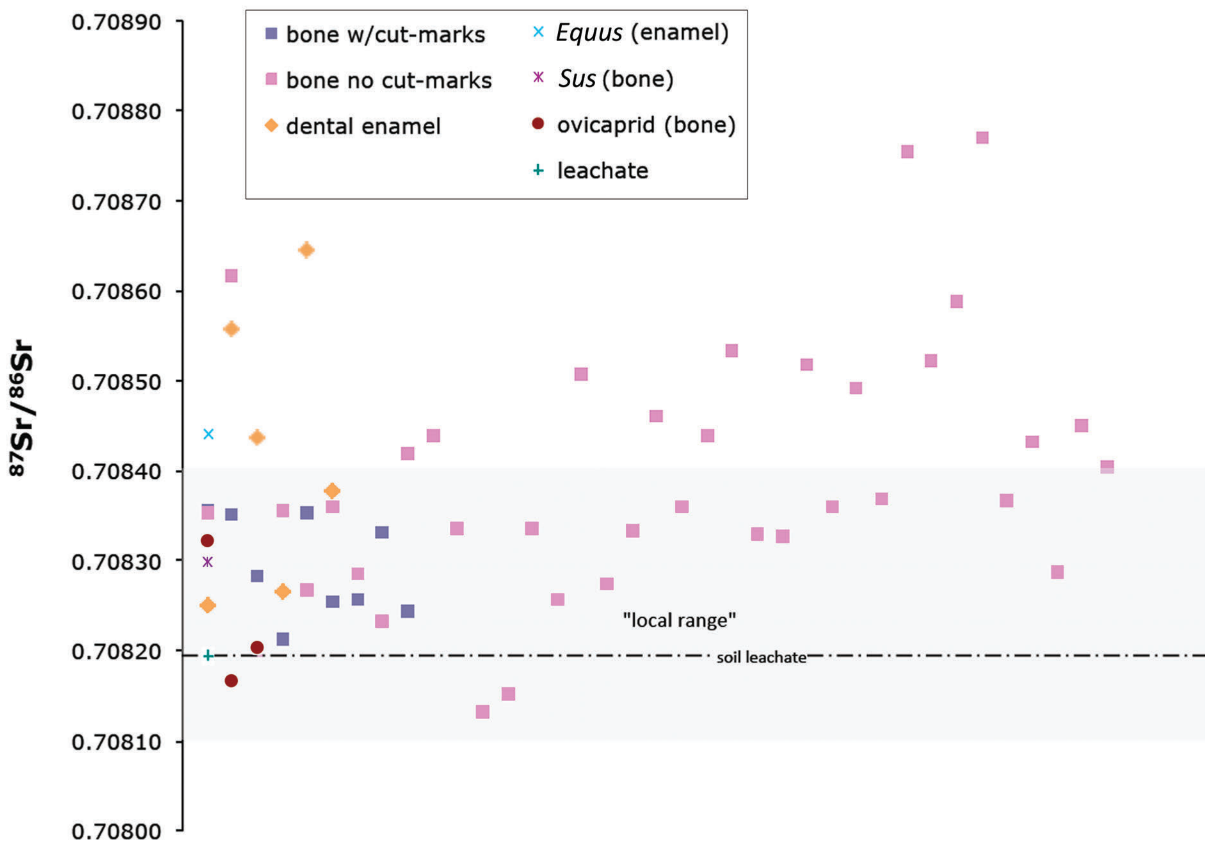

Fig. 4.3.3. $^{87}Sr/^{86}Sr$ of human and animal bone samples, with indication of samples showing cut-marks and samples with no signs of cut-marks. Local range is defined by two standard deviations of mean bone values for faunal sample.

the village samples—and there is some reason why more local communities defleshed their dead and more distant ones did not. It would not seem simply to be a local micro-tradition, given that it is unattested elsewhere to date. Perhaps, when communities gathered their dead for redeposition here, there was a symbolic reason having to do with local cult practices why local groups reduced their dead to bare bones. Perhaps there was a simple functional reason, that the dead brought from more distant communities were already in a more advanced state of decomposition and did not need interventions leaving cut-marks.

However, as discussed in Chapter 4.4 (this volume), the pattern may be more complex. On one hand, when bones are tabulated separately for trench 10 and other trenches, the apparent correlation between cut-marking and a "local" signature becomes much more attenuated. On the other hand, there is a clear correlation between parts of the body and a "non-local" signature, with femora more likely to be "non-local." Hence, it is possible that the correlation really is between "local" signatures and specific parts of the body (which might be expected if bodies from "non-local" places were brought to the cave as selected parts), or between areas of the cave representing different burial practices or perhaps historic moments.

Since a resolution of this matter would require further sampling and analysis (for instance, to obtain systematic data for different parts of the body), we prefer here to report the possible pattern and its interpretations and defer further discussion until more data become available.

Acknowledgments

We thank Giorgio Manzi at the Museum of Anthropology "G. Sergi", University of Rome La Sapienza, for allowing us to use the museum to store and study the human bone collection from Scaloria Cave. We thank Giovanna Belcastro, Valentina Mariotti, and Paola Iacumin for sharing data on Passo di Corvo and Masseria Candelaro.

RIASSUNTO

Il rapporto isotopico dello stronzio ($^{87}Sr/^{86}Sr$) misurato nella matrice inorganica degli scheletri è utilizzato in archeologia per ricostruire la mobilità dei gruppi umani del passato e i modelli residenziali ad essi associati. Lo stronzio biodisponibile nei tessuti rispecchia quello delle piante consumate, che a loro volta replicano quello del suolo e dell'acqua come derivato dal background geologico dell'ambiente in cui hanno vissuto. Questo studio utilizza le differenze isotopiche dello Sr per indagare se i gli individui analizzati sono "locali" o "non locali" e quali sono le implicazioni per il rituale funerario a essi associato.

L'analisi di $^{87}Sr/^{86}Sr$ su ossa umane e su campioni di smalto dentale è stata effettuata utilizzando gli stessi campioni di femore scelti per le indagini di carbonio e di azoto, con alcuni campioni supplementari aggiunti allo scopo di rappresentare individui con evidenze di cut-marks. Sono stati altresì testati, a scopo comparativo, materiali provenienti da due siti vicini, relativamente contemporanei, Masseria Candelaro e Passo di Corvo. Benchè gli strati geologici profondi del Tavoliere e delle zone del Gargano siano abbastanza uniformi, la geologia superficiale mostra una notevole diversità, in particolare tra il Tavoliere (dove è situato Passo di Corvo) e il massiccio del Gargano che include Scaloria. Per gli umani (N = 50), il valore medio osseo di $^{87}Sr/^{86}Sr$ è 0,70837 ± 0.00010, mentre il valore medio osseo per i campioni di animali (n = 4) è 0,70825 ± 0,0007. Per smalto dentale umano, la firma isotopica dello Sr va da 0.708265 a 0.708668. Emergono alcuni punti chiave:

- *In tutti e tre i siti una percentuale variabile di individui sembra essere "non-locale," qui definita da più di due deviazioni standard dal valore medio faunistico. A Scaloria, su sei adulti abbiamo potuto testare sia lo smalto dentale sia la parte corticale ossea per misurare le possibili differenze nella presenza di Sr nell'infanzia come nell'età adulta; ciò ha rivelato una possibile mobilità durante la loro vita per almeno tre valori anomali. D'altra parte, all'interno di ogni comunità, esiste una percentuale di persone che si trasferisce nel corso della propria vita in un altro villaggio.*
- *Scaloria, Passo di Corvo, e Masseria Candelaro hanno diversi rapporti isotopici dello Sr per quanto riguarda lo smalto. Questo potrebbe suggerire che le rispettive popolazioni derivassero da bacini geologici e sociali localizzati e distinti fra loro. Inoltre, se emergono distinzioni tra comunità che si trovano a meno di 10 km di distanza, è verosimile supporre che gli individui trascorressero la maggior parte del proprio tempo molto vicino al luogo di residenza.*
- *Scaloria ha una più ampia gamma di variazione rispetto agli altri siti. Ciò potrebbe suggerire che la grotta non fosse semplicemente un luogo di sepoltura per una comunità locale; piuttosto, potrebbe confermare la nostra ipotesi sull'uso della grotta come luogo di ritrovo per un numero di persone insediate nella zona durante il neolitico.*

4.4. The Upper Cave: Taphonomic Analysis of the Treatment of the Dead

Christopher Knüsel, John Robb, and Mary Anne Tafuri[1]

Introduction

Archaeologists have been thinking about the taphonomy of human skeletons for at least a hundred years, but most interpretations were based on common sense or anecdotal observations. There is less contention surrounding such observations when a skeleton represents the remains of a largely complete, undisturbed body; departures from this assumed norm have usually simply been dismissed as meaningless disturbance or ascribed to some simple, generic, and usually ungrounded cause such as "excarnation" or "cannibalism" (see Knüsel and Outram 2006). It is only in the last two decades that anthropologists and archaeologists have realized that by closely observing a wide range of taphonomic indicators, one can make reliably founded inferences about how a deposit of human bones had been created and altered (Duday 1978, 2006, 2011; Duday et al. 1990). Taphonomic methods have made a great difference to the sophistication and reliability of our understanding of ancient funerary practices. As a site where funerary practices patently defy the simple category of "burial," Scaloria Cave is a very promising place to apply taphonomic methods. The goal is simply to understand how the human bones got into the cave. Neolithic funerary rites varied immensely (Robb 1994, 2007). This has proved typical throughout Neolithic Europe, including in places where it once seemed that Neolithic burial simply consisted of flexed single inhumations (see Jeunesse 1986). As Alasdair Whittle (Benson and Whittle 2006:358) remarks, why did we think there was only one Neolithic deathway?

In this chapter, we address the following questions: What sort of funerary practices were carried out at Scaloria Cave? Were there multiple ways of dealing with the dead? How were these distributed among the population?

Models for Interpreting Burial Processes at Scaloria Cave

Chapters 2.1 (history of excavations), 3.5 (cult and rites), and 4.1 (human osteology) in this volume provide the reader a view of the prima facie evidence for funerary treatment at Scaloria as it presents itself prior to this taphonomic analysis. This evidence bears a range of interpretations, some of which have been proposed for Scaloria, and others of which draw upon comparable sites from throughout the European Neolithic. Critically, each model has different implications for the taphonomic data we consider in this chapter (Table 4.4.1). The following heuristic models guide us in interpreting Scaloria Cave. Of course, it is possible, and indeed very likely, that Scaloria contains distinct deposits resulting from several different processes.

Undisturbed and Disturbed Burials

"Burials" (single primary inhumations) are straightforwardly recognized when they are undisturbed. What about when disarticulated bone is found? It is normally assumed in Italian prehistoric studies that the usual fate of archaeological sites is to be disturbed by later activities or natural processes, particularly in caves where human activities over many years are repeated in a confined space. Hence, for example, when "sporadic" human bone is encountered around Tavoliere

[1] For valuable help in this research, we are grateful to Dr. Jeremy Skepper (Department of Anatomy, University of Cambridge) for providing SEM imagery, and to Nicola Leone and Luigi Coppolecchia and their fellow speleologists in Manfredonia for a tour of the cave. Funding was provided at various points by the McDonald Institute for Archaeological Research, the EC Marie Curie Fellowship program, and the National Endowment for the Humanities.

Table 4.4.1. Interpretive models for human bone deposition and their taphonomic consequences

Model	Taphonomic expectations
"Burials"—undisturbed single primary inhumations	Completely articulated skeletons with all regions of skeleton represented, and showing no other burial treatment or disturbance. Small elements, such as those of the hands and feet, are present and in articulation.
"Disturbed burials"—single primary inhumations, disturbed by later activities or natural processes	All regions of the skeleton are represented, including small and fragile bones; skeletal material is found in discrete concentrations, with some residual articulations. Taphonomic features such as burning and fractures occur in ways suggesting long-term, casual disturbance, and there should be contextual evidence for processes of disturbance such as intercutting pits and features, erosion of archaeological deposits, and so on.
Secondary deposition	Skeletal material is disarticulated or semi-articulated, either chaotically or with intentional spatial patterning; it contains few small or fragile elements. Taphonomic features may suggest how body was processed before deposition, and specific bones may be treated differently.
Multiple burial following an epidemic	Many mostly articulated bodies deposited simultaneously in contact with each other; unusual demographic profile; palaeopathological evidence for infection vectors, infections or no lesions at all in instances of acute infection such as bubonic plague.
Mass burial following warfare	Many mostly articulated bodies deposited simultaneously in contact with each other; evidence for perimortem traumatic injury; demographic profile may indicate that particular groups are included or omitted.
Cannibalism	Evidence for disarticulation and processing of bodies, combined with evidence for selection of specific soft tissues, cooking, and consumption.
Ritual processing	Complex, multi-stage funerary process distinct from normal disposal of the dead; persistent, distinct taphonomic signature showing that a concerted attempt was made to achieve specific goals or effects in processing bodies.

villages, the background or default assumption is that this results from the accidental disturbance of earlier burials; it is rarely asked how those bones actually came to be there. During early work at Scaloria Cave, Quagliati observed what appeared to be whole burials. As discussed elsewhere in this volume, these probably date to a later period within the Neolithic than the main bone deposition in trench 10, but this created the expectation that intact burials would be found in the cave, an expectation heightened when an intact burial was found early in the 1978 field season. Thus, comments in the field notes and the designations given to bone depositions during excavation show clearly that Winn and his 1978–1979 excavators often assumed that the human bone in the cave resulted from the disturbance of single primary burials, and when a distinct concentration of bone was encountered, it was typically designated a "burial" (or "sepoltura" [grave]).

Re-deposited Secondary Burials

"Secondary burials," in which human bones are re-deposited after a first stage of funerary ritual, are widely known. A famous example is the "feast of the dead" and similar ceremonies in which the indigenous peoples of Northeastern North America periodically gathered together the remains of people who had died recently and re-interred them ceremonially in a collective ossuary (Trigger 1976; Ubelaker 1974; Williamson and Pfeiffer 2003). Similarly, in the death rites of rural Greece, the dead were unburied after a year or two, their bones were washed and re-deposited in ossuaries, and this marked the end of mourning (Danforth 1982). Another form of secondary deposition may occur in the collective tombs common in the European Neolithic and Copper and Bronze Ages (as in British Neolithic tombs; Smith and Brickley 2009). In such tombs, people are deposited as single primary inhumations, and earlier burials may be disturbed or intentionally rearranged, leaving them in secondary depositions. Such collective secondary depositions were normal throughout peninsular Italy, Sicily, and Sardinia from the final Neolithic through the late Bronze Age.

At Scaloria, it was quickly realized that some human skeletal material may have been re-deposited intentionally—for instance, the placed cranium found in trench 1 early in the 1978 field season (Winn and Shimabuku 1980; and Appendix 2 [online]),[2] and interpretation of trench 10 seems to have moved toward this view; thus depositions were labeled "bone groups" rather than "burials," and it was recognized that they normally contained bone from more than one individual. The excavators also coupled this with observations of cut-marks and breakage patterns according to the

[2] Available online at www.dig.ucla.edu.

methods of the time. Although circumstances prevented them from following this line of reasoning through, we basically continue that foresighted line of enquiry here.

The hallmark for recognizing secondary burials archaeologically is finding most of the remains in a disarticulated or semi-articulated state, either chaotically or in a way suggesting intentional patterning; this is combined with incompleteness of the skeletons, which may be missing small elements (particularly hand and foot bones) that are lost when the remains are moved and/or fragile elements (e.g., corpus sterni, sacra, os coxae, vertebrae) that are easily destroyed mechanically during disturbance (Duday 1998:figure III). There may also be evidence from cut-marks, breakage, burning, or weathering for processing the body in situ or in earlier stages through exposure, excarnation, an earlier burial, or cleaning the bones, as well as contextual evidence for the particular selection, removal, placing, or treatment of specific bones (most often the cranium).

Mass Burial following an Epidemic

S. Tiné (Tiné and Isetti 1975–1980) proposed that Scaloria Cave represented a mass burial following an epidemic of malaria. This was tied into a complex historical scenario in which the ditched villages of the Tavoliere were threatened by climate change, particularly flooding, which would favor malaria (see geoarchaeological evidence from the 1970s for the existence of a marshy lagoon south of Manfredonia during the Neolithic [Delano Smith 1983], and Tiné's [1983 interpretation that ditches were intended to help drain villages). The key elements at Scaloria cited to support this view were the presence of many bodies, as opposed to the single burial often found in contemporary villages, and the high frequency of cribra orbitalia, often seen in the 1970s and 1980s as evidence of malaria and related anemias (cf. Angel 1966).

The criteria for mass burials following an epidemic are twofold. First, it has to be a mass burial. Knüsel (2005) defines mass burial based on the following features: (1) the presence of a body mass or masses within a grave cut or cuts; (2) the presence of disorder in the orientation of the bodies indicating an apparent disregard for the manner of deposition that is often outside the bounds of normative practice; (3) skeletal remains in anatomical connection (and, importantly, labile connections retained); (4) bodies that are in contact with one another; and (5) a common pattern for a trait or traits related to cause, manner, and mechanism/mode of death (see Rogers 2004 for definitions of these). Medieval plague pits provide examples of multiple interments that are not disturbed by the addition of other corpses; they typically contain articulated skeletons, even if in they are interred in an unusual way, such as in stacks, or in a manner that does not reflect the norm for the majority of the dead (Castex and Kacki 2013; Grainger et al. 2008; Hawkins 1990; Margerison and Knüsel 2000). In the prehistoric Tavoliere, the site of Diga di Occhito (Tunzi Sisto 1999) provides a fairly clear example of a mass burial, the jumbled deposition of about a dozen complete and articulated bodies in a single episode, although there is no indication of whether it results from an epidemic, violence, or another cause.

Next, evidence should suggest a medical manner of death for the multiple burial. In general, this can be problematic, as many epidemic diseases (such as bubonic plague and cholera) do not leave any trace on the skeleton; it is often pointed out that epidemic assemblages may have a different demographic profile than normal death assemblages (Castex 2005, 2008; Chamberlain and Gowland 2005; Margerison and Knüsel 2000). Although the age profile of the Scaloria dead cannot be established with any precision, it does not seem radically different from the cumulative picture emerging from Neolithic burial sites as a whole (Robb 2007:chapter 2). In the case of the malaria hypothesis, as noted in Chapter 4.1, the idea that cribra orbitalia is diagnostic of anemia, such as malaria, has been generally discredited since the 1970s (Walker et al. 2009), seriously weakening this hypothesis; thus, identifying malaria here would really require identifying the pathogen through its ancient DNA.

Mass Burial following Conflict

The other common reason for mass burial is warfare. Mass burials following violence are known not only from historic European wars, particularly World War I, and massacres in the former Yugoslavia, but from Neolithic Europe as well; the most famous example is that of Talheim (Wahl and König 1987), an LBK site in southern Germany approximately contemporary with Scaloria Cave where several dozen individuals were thrown casually into a common grave. In a variant, the dead may not be gathered together and buried but simply buried where they were killed (Asparn-Schletz: Teschler-Nicola et al. 1999; and Velim Skalka: Harding

et al. 2007). The general criteria for a mass burial are the same as noted above, but additionally, there should be skeletal evidence of perimortem violent trauma. At Talheim, for example, the skeletons bore numerous blows from axes; at the LBK massacre site of Asparn-Schletz in Austria, skeletal trauma from clubs was common (Teschler-Nicola et al. 1999), and at the Copper Age site of San Juan Ante Portam Latinam in Spain numerous arrow points were found mixed with the bodies (Vegas et al. 2012). Mass burials from warfare often select or exclude particular demographic groups; war burials often include mostly adult males, but Talheim included a cross-section of an entire community except for young adult females, who may have been taken as captives rather than killed. At Scaloria Cave, a massacre scenario is seriously weakened by the lack of evidence for widespread unhealed violent trauma; as mentioned in Chapter 4.1, there is only one example of possible perimortem violence. As will be discussed below, although cut-marks are common on the bones, they are not associated with high force blows aimed at harming or disabling a living person.

Cannibalism

Cannibalism is controversial archaeologically, and consequently many works discuss methods for its identification (Boulestin et al. 2009; Villa et al. 1985, 1986; White 1992). At points in the history of European archaeology, cannibalism was considered a common trait of pre-civilization peoples, and little more than the finding of scattered, broken, or burned bones was required for archaeologists to identify it (see Knüsel and Outram 2006). Gimbutas herself proposed this in a brief preliminary report (unpublished report in UCLA archive, p. 4): "Many of the dead must have been killed for ritualistic purposes as skulls have cuts through the forehead or at the back, indicating that human brains may have been ritualistically extracted and eaten. Trephined [sic] skulls (with artificially cut out holes) were also found." Although this presumably was based on J. Nemeskéri's field observations, it is not entirely clear what evidence inspired it, as there are no examples of sectioned, perforated, or trepanned skulls (see below). As an interpretation, it has a distinct mid-century flavor; up through the 1960s, European archaeologists often asserted that the ritual consumption of human brains was common among "primitive" people. For example, A. C. Blanc ascribed damage to the Neanderthal skull found at the Grotta Guattari (Monte Circeo) in 1939 (Blanc 1939, 1961) to ritual cannibalism; however, such ritual cannibalism of brains was more of an ethnographic myth than a common occurrence, and careful taphonomic re-evaluation later showed that these marks were probably created by hyenas scavenging Neanderthal bodies (White and Toth 1991). The cannibalism hypotheses may have been suggested to Gimbutas by Nemeskéri, and she seems to have retreated from it in her understanding of the cave a decade later (see below).

We are now in a much more critical era, where claims of cannibalism generally require detailed taphonomic justification. In a well-known and widely accepted example, White (1992) identifies dietary cannibalism at Mancos Canyon, Colorado, by using a detailed examination of cut-marks and breakage patterns to show that whole bodies were cut up and stripped of flesh, and the bones were then intentionally and forcefully smashed further to extract the marrow. The best-documented case from prehistoric Europe is that of the Neolithic site of Fontbrégua, France (Villa et al. 1985, 1986): here Villa et al. argue that human bones were found mixed with animal bones, with very similar patterns of cut-marks and breakages to those shown by animal bones; they infer that human bodies were treated identically to animal bodies. A similar argument has been made for the Neolithic German site of Herxheim (Boulestin et al. 2009). Clearly the most difficult step in such an argument is documenting that human tissues were actually eaten; this may be definitively possible only through evidence that bones were cooked like food (though even then they may have been heated in order to clean them or burned in order to destroy them), through finding human tooth marks on the bones themselves (Fernández-Jalvo and Andrews 2011), or on finding histological evidence for human tissues in coprolites (Marler and Marler 2000). Without such evidence, patterns of breakage, cut-marks, and disarticulation can be misleading. One may treat humans like animals to make a symbolic point without eating them, or consume human flesh while burying the body ceremonially. Furthermore, there are many kinds of cannibalism, including dietary cannibalism as a normal practice, survival cannibalism in emergency situations, and ritual cannibalism (including consumption of enemies for ritual purposes and consumption of a group's own dead in funerary rites).

Clearly, the archaeological signature of cannibalism will vary according to its particular scope and purpose, and it is probably best to argue it on a case-by-case basis, rather than lay down generic criteria. If the goal is to understand ancient societies rather than simply to find cannibalism, it is probably also more useful to always specify what kind of cannibalism is being discussed, since the mass slaughter and eating of enemies will not only have a different taphonomic signature but will lead to a different social interpretation than the value-laden ritual ingestion of selected bits of one's ancestors.

Ritual Use of Human Skeletal Material

Finally, this leads to the broad topic of the ritual use of human bodies. Many, perhaps most, societies have some variant ritual treatment that involves processing the dead body in elaborate ways. Such treatments are often invoked in special circumstances of death. For example, while simple cremation or inhumation is normative for "normal" deaths today, people dying in unusual medical or forensic circumstances may be autopsied in a medically ritualized way. Medieval Christians had special treatments for saints' bodies and for executed people (particularly for high-profile crimes such as treason); Aztecs retained enemy skulls for public display, and Andean peoples kept mummified ancestors as venerated members of the household. The best-known example in European prehistory is the German LBK site of Herxheim (Orschiedt and Haidle 2006), where in some periods the dead appear to have been brought to the site from a wide surrounding region and their crania reduced by systematic breakage to produce highly patterned skull caps. There can be varied motivations for such ritual pathways, including a need to explain or deal with unusual circumstances, the cultural value of human bone as a substance, veneration, fear of the dead (necrophobia; Tsaliki 2008), and anger or the humiliation of enemies.

Gimbutas seems to have endorsed a ritual-processing view of the assemblage in her later, very brief summary statements on Scaloria:

> One hundred and thirty-seven skeletons, most of which were in a mass burial and had traces of peculiar cuts at the base of their skulls, were found in the upper cave close to the entrance to the lower cave. (Gimbutas 1989:292–293)

> At the entrance to the narrow cave, as many as 137 persons were buried on top of each other without any order. Most of the skeletons belonged to young individuals, particularly to women 20 to 22 years old who probably died at childbirth, and to children. Some skulls had been removed before the rest of the bodies were deposited and some had cut marks. This discussion can now be understood within the context of ancient and widespread burial practices in which the heads of the dead were removed to receive special ritual attention before being buried separately. (Gimbutas 1991:223)

We return to evaluate these interpretations at the end of this chapter.

Ritual processing is a highly varied category of funerary process, and its taphonomic signature is likely to be equally varied. The two criteria we would particularly note are (a) the bones result from a complex, multi-stage process, with differential loss or modification of different elements at each stage, and (b) the resulting taphonomic data show highly consistent patterning which shows that bodies were reduced systematically according to a persistent idea of what the ritual aimed to accomplish (for instance, the specific sequence of cuts involved in a traditional medical autopsy, trophy retrieval, or mummification process).

The Overall Assemblage

The assemblage analyzed here consists of 4,105 fragments (Table 4.4.2), of which about two-thirds were identifiable to element. About 15 percent of it was unprovenienced due to loss of labels during or since excavation. Of the provenienced bones, almost 80 percent came from trench 10. This suggests that the area of trench 10 is the principal Middle Neolithic depositional area, with bone in other areas either deriving from this area or from alternative kinds of deposition. Most of the human bones in trench 2 derive from a single burial (described below), and most of the human bones in trench 6 derive from a single deposition of a relatively complete child's body (see below).

Although these figures describe the overall assemblage, subsequent analyses concentrate upon a subsample of bones identifiable to element, anatomical zone, and side (for instance, not including cranial fragments that cannot be assigned to a specific cranial

Table 4.4.2. Distribution of specimens in assemblage

Provenience	Unidentified fragment	Identified specimens	Total	Provenienced assemblage (%)
Unknown	176	353	529	
Trench 1	22	137	159	5.4
Trench 2	31	244	275	9.3
Trench 3	7	53	60	2.0
Trench 4	3	2	5	0.2
Trench 5	0	11	11	0.4
Trench 6	2	97	99	3.4
Trench 7	0	0	0	0
Trench 8	0	21	21	0.7
Trench 9	0	0	0	0
Sum of trenches 1–9	65	565	630	21.4
Trench 10	942	1374	2316	78.6
Total	1248	2857	4105	

bone). We use available photographs and field notes for taphonomic features that must be observed during excavation (e.g., articulation and contextual associations). Data were systematically collected in the laboratory on part representation, burning, cut-marks, breakage patterns, and animal damage. These data were then analyzed statistically, both through univariate data exploration and through bivariate comparisons; where appropriate, the statistical significance of any relationships was tested.

Burials, Possible Burials, and Placed Bone

Only in four contexts can the human bone from the Upper Cave be regarded as either true burials or intentionally placed depositions of some other kind. Aside from these four specific contexts, all the other human bone deposition in the cave share a homogeneous set of characteristics described in the statistical analysis below.

Burials Found by Quagliati

Although the evidence is scanty, Quagliati's exploration of the Upper Cave appears to have encountered at least one complete burial as well as scattered bone (Quagliati 1936:143, translation by Robb):

> Here and there among the sediments fragments of human bones and skulls appeared, from which it is certain that the dead were buried in the cave. In one point where the bedrock rose in a slope, at about a meter from the top of this, on the 23rd of November, 1931, we were able to explore and bring to light an adult skeleton, deposited up against the rock itself, in a crouched position. The high situation of the burial had spared it the disturbing action of the water filtering through the cave. It rested upon the right side and was perfectly preserved, with the legs flexed [sic], the left arm [sic] folded upon the chest, and the hand at the shoulder.

Apparently, Quagliati left this skeleton in situ. The surviving collections in the Taranto Museum contain many whole pots, which may well have originated in burial contexts. If so, it is almost certain that such burials dated to later than the main Scaloria Bassa period deposition in trench 10 (cf. Chapter 2.3 for a discussion of site chronology); the pottery vessels he recovered are in the later Scaloria Alta and Serra d'Alto styles (cf. Chapter 5.7, this volume).

Trench 2 Articulated Burial

In trench 2, an articulated burial was excavated, lying on its right side (Chapter 4.1, Figure 4.1.5a, this volume) (Winn and Shimabuku 1980:11; and Appendix 2 [online]). Photographs survive of this skeleton in situ at several slightly different moments in its excavation. This skeleton is in full articulation. Examination in the laboratory revealed no cut-marks or burning, and all fragmentation seems to have taken place well after burial. No artifacts can be securely associated with it. It is clearly an undisturbed single primary inhumation. Interestingly, the same finds bags also contained some

fragments of bone from other individuals, including an isolated pelvic fragment from a male aged 30 to 40 years; this suggests either that the burial was dug into sediments containing earlier human bone depositions, or that some scattered bone was gathered up and deposited with the burial. Although flexed inhumations without grave goods are found in both Early and Middle Neolithic villages on the Tavoliere, it is noteworthy that this burial has the latest radiocarbon date of all the dated bone samples; although it still overlaps substantially with dates for other bone samples, it may perhaps suggest a shift in the later sixth millennium BCE from the mixed disarticulated bone typical of trench 10 to single burials.

Trench 1 Intentionally Placed Cranium

In trench 1, an adult cranium was found in a natural trench or concavity in bedrock; a flint blade was laid across its frontal bone. It may have been associated with beads as well (Winn and Shimabuku 1980:9, and Appendix 2 [online]), although none are visible in the excavation photo (Chapter 4.1, Figure 4.1.4a, this volume). It lacked a mandible (Gilbert 1980:31; and Appendix 2 [online]), suggesting that a cranium rather than an articulated skull was deposited, and it was probably intentionally placed base-down in the position in which it was found.

Trench 6 Child's Skeleton

In trench 6, level 6, the skeleton of a child was excavated. The skeleton is almost complete, including metacarpals, metatarsals, phalanges, vertebrae, and ribs in good condition; this suggests that a complete body was deposited in a primary, at least minimally disturbed deposition. The cranium is missing, but a mandible and cervical vertebrae are present; this is the skeleton shown being laid out by Nemeskéri (Chapter 4.1, Figure 4.1.3, this volume). Although no photograph of this skeleton in situ survives, it is described in the 1979 field notebooks for trench 6. On August 23, the excavators note, "Nancy and Sharon work tr. 6 today and begin to uncover a child's burial. All the little ribs are in place." The following day (August 24), they continue: "[A]side from the ribs and vertebrae the rest seems a jumble and we find no skull but a piece of mandible with teeth. We recover for a better look tomorrow." No further notes on this burial are made, and when notes resume on August 31 to give final measurements for the bottom of the burial , they are written in a different hand. Overall, this seems to be a primary burial, subsequently disturbed but mostly left in situ. It seems likely that the burial was disturbed to recover the cranium, if ultimately none was indeed found. Burials from which the cranium has been removed are known at Madonna di Loreto (Tunzi Sisto 1999) and Cala Colombo (Di Lucia et al. 1977). It is worth noting that this was a relatively deep context and only Early Neolithic Guadone style pottery was found in these levels. While there is no suggestion that this pottery was whole or intentionally included as grave goods, rather than simply being mixed in the sediments surrounding the skeleton, it does tend to suggest that the burial may pre-date the Middle Neolithic (Scaloria Bassa) funerary and non-funerary use of the cave.

Articulation (or Its Absence) and Process of Deposition

Assessing articulation at Scaloria Cave is slightly inferential, as this has to be assessed before bones are removed from their original position during excavation. Surviving field notes often mention finding bones in ways which imply that they were scattered, disarticulated fragments, but generally without specifying whether the bones were human or faunal; semi-articulated bone is mentioned a few times, but without details that might enable diagnosis. The principal evidence consists of excavation photographs. Supplementing this, the original configuration of bones is sometimes preserved through concretions cementing bones in the position in which they lay in the ground.

Cemented bones provide examples of chaotic masses of bone cemented together and in some cases even cemented to stones or artifacts (Figure 4.4.1). There are also at least two instances found during lab restudy of the bones of clumps of vertebrae cemented together by calcareous concretions still in anatomical position, which implies that some of the bone was semi-articulated. Interestingly, of all the articulations in the human body, the vertebral column is among the most durable, as the vertebrae are held together with tough, persistent ligaments. This may imply that bones were deposited or disturbed some time after death, when all the more labile articulations had disintegrated but sections of the spine were still held together with ligaments. This accords well with the fragmentation

Fig. 4.4.1. Bones cemented in situ. (a) Chaotic mass of bones (bag 99). (b) Human bones cemented to pottery (bag 222). (c) Pottery crushed into human os coxae, probably through trampling (bag 101). (d) Articulated group of vertebrae (bag 100) (photos: J. Robb).

evidence below. It also suggests that vertebrae were considered an exception to whatever impulse made people clean flesh off the bones of the dead (see below).

Figure 4.4.2 records human bones in trench 6. It is a working photograph (to judge from the trowel left in it) of a low-density scatter. It can be correlated with field notebook observations in a way that gives an interesting sense of how excavators interpreted the finds:

> Federico uncovered a skull cap in mid trench, level 6. Shan believes it is a disturbed burial. There are flints, sherds, pebble burnishers, a metate and mano, and some small long bones. The cranial fragment has an injury with discoloration. It is bounded on three sides by natural suture lines. The crania [sic] might be a juvenile as are the small long bones (arms?) [sic]. Shan takes a photo in situ. (Field notes, trench 6, August 20, 1979)

In the photo, identifiable bones include part of a scapula, several cranial fragments, including an adult occipital fragment with a burned area, and a radius or ulna. Lack of burning on other fragments and in the soil suggests that the occipital was burned elsewhere before it was re-deposited here; the burning seems to be incidental burning with spalling, rather than an intentional injury. There are also pottery fragments, a broken grinding stone, and several animal bones. Both bones and objects seem randomly scattered; there is little sense either of a residual burial or of an intentional bone grouping.

Most of the human bone assemblage came from trench 10, a small (1.5 × 2.5 m) trench that contained a chronologically homogeneous deposit dating to about 5500–5300 BCE and containing Scaloria Bassa pottery. Deposits were sealed by unbroken concretion, excluding recent disturbances. Human remains were encountered relatively shallowly below this concretion, and most of the human bone was encountered in a bed between 40 and 70 cm below trench datum—in other words, about 30 cm deep. No complete burials were found, just scattered bone that was interpreted during excavation as the disturbed remnants of burials. As bone was excavated, it was classified into "bone groups," nine of which were defined. Field notes (August 25, 1979) mention findings of bone "in some cases articulated"; this implies that some remains were semi-articulated, but it also implies that in most cases, bone was found disarticulated.

A close reading of the surviving photographs of the trench 10 bone scatter provides insight into how the human bone deposit was formed.[3] Figure 4.4.3 gives a clear picture of what the excavators probably considered a "bone group": a dense concentration of bones that shows vague edges (note the contrast with areas without bone in the upper left and lower right of the image). It shows a rather chaotic mass of human

[3] We are fortunate to have a reasonable archive of photographs of human bone in situ, whose legibility attests to the persistent efforts of Winn and Shimabuku's teams at recording the deposits under challenging technical conditions. However, these photographs are unlabeled and cannot be correlated with sub-areas within trench 10, except in a few cases in which specific bones or artifacts can be identified. We must assume that the photographs are typical of the whole deposition; it seems reasonable to assume that the field team recorded what they considered the most informative and important features of the trench. Some of them probably record "bone groups." This discussion presents all photographs of bone deposition in situ in which specific elements can be identified. It is based on examining the photographs at greater magnification than that at which they are published here.

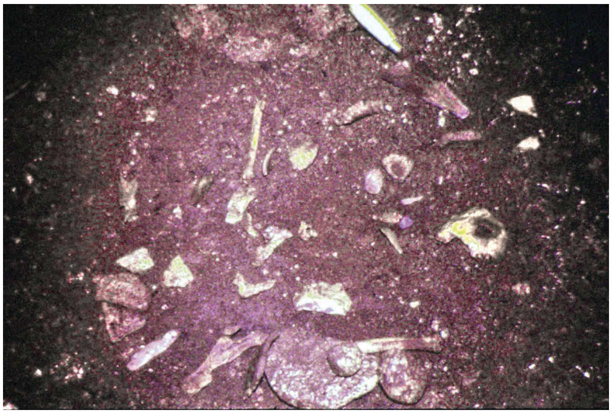

Fig. 4.4.2. Trench 6 bone scatter (note that this shows burned adult occipital in Fig. 4.4.6 in situ (photo: S. Winn).

Figure 4.4.4 shows a smaller bone group, including a juvenile ilium, adult phalanx and rib (right center), fibula (right top), clavicle (?) (left center) and various unidentified bones; a femur or humerus overlain by an occipital fragment runs across the center. As this shows, "bone groups" contained a very incomplete assortment of elements from multiple individuals, deposited without much apparent order.

Figure 4.4.5 is noteworthy in giving a sense of the relations between human bone and other objects. It seems to have been taken to record the association of elements such as a tibia (?) in the center-right, an unidentified long bone (upper center) and rib (lower right) with objects such as animal teeth, animal bones,

Fig. 4.4.3. Trench 10 bone scatter (photo: S. Winn).

Fig. 4.4.4. Trench 10 bone scatter (photo: S. Winn).

bone, animal bone, and pottery. It is noteworthy that most of the flat bones (such as the cranial fragments and scapula in the foreground) lie in the same plane, as indeed do some of the pottery fragments, suggesting bone deposited on a surface rather than a rapid, three-dimensional infilling of a pit. In the upper right quadrant, two halves of the same mandible are separated by about 10 cm, suggesting breakage and movement along this plane, but they are jumbled with a clavicle, a talus, an os coxae, ribs, and some unrecognizable bones. Groups of long bone fragments such as the femur, humerus and ulna (?) to the left show some alignment, but they are mixed with other bones at other orientations and do not give a convincing sense of having been intentionally and carefully placed. An impasto vessel with a raised foot lies inverted in the left-center of the image, but from the way it is overlying human bone, it seems to have been deposited broken rather than being a whole vessel broken in situ; it does not suggest a careful deposition of grave goods.

Fig. 4.4.5. Trench 10 bone scatter (photo: S. Winn).

and stone tools. It is unclear whether differences in color between the center and margins of the image are due to soil differences such as a pit fill or simply the concentrated lighting used in taking the photograph. Whether the association between human bones and other objects here is intentional or casual, it is clear that the human bone was disarticulated and fragmented prior to deposition and that little care was taken in placing objects in any kind of orderly way.

Figure 4.4.6 shows a small bone group; it was probably taken to document the association of a flint blade at its center with human bone. The right and left halves of a human mandible lie slightly separated in the center-right, which suggests that they may have been broken in situ, after which the fragments were moved or trampled apart. An innominate fragment with the acetabulum upward lies under and to the left of the flint blade, overlying an unidentified long bone, probably a fibula. As elsewhere, it is clear that the bones were substantially broken before their final positioning here, and their final deposition does not reflect attentive placement. It is not clear whether the association between the flint blade and the human bones is intentional or casual. There appear to be some charcoal fragments near the base of the tripod leg (right side of photograph); since the adjoining sediments and bones show no signs of burning, this suggests that the charcoal has been re-deposited from elsewhere.

Figure 4.4.7 is the only photograph that can be associated definitively with a specific "bone group," bone group 8, thanks to the presence of a unique carved bone pendant. It shows a dense scatter of bone and artifacts in detail. At the lower right of the picture is the carved animal bone pendant, with a flint blade just above it. In the upper center, upper left, and lower left are three large pottery fragments; smaller sherds are also visible. According to the field notes (August 26, 1979), these contained traces of ocher. It is unclear whether the human remains had been intentionally placed within the pot or are strewn generally over the whole area, falling within the sherds in some cases. The sloping orientation of the potsherds and the variable depths at which fragments lie suggests filling in a pit or covering an irregular surface rather than simple deposition on a flat surface. Identifiable bones include a radius (upper left), fibula (upper right), femur (right, above pendant), cranial vault fragments (upper right) and mandible (left, overlying and possibly within large pottery fragment). Other fragments not identifiable in the photograph are also present. The most notable bones present are a set of vertebrae, including three thoracic vertebrae, an axis (second cervical vertebra), and a group of four to six upper thoracic vertebrae and/or lower cervical vertebrae (center left). The vertebrae are consistent in size and could potentially belong to a single individual's vertebral column. They are not articulated, or even semi-articulated, but they do seem to be grouped. They have probably not been moved much from the time they were deposited, as they are well preserved and are not crushed or trampled; this suggests that the bone group does not reflect in situ disturbance of bones that were originally deposited articulated. The inference is that they were re-deposited as disarticulated bones but still retained some original association—as if one took a handful of vertebrae from a bag or bundle and dropped them.

This review of photographic evidence suggests some important points. Complete disarticulation is the

Fig. 4.4.6. Trench 10 bone scatter (photo: S. Winn).

Fig. 4.4.7. Trench 10 bone scatter (bone group 8); note carved bone pendant near lower right edge (photo: S. Winn).

norm. With only three exceptions discussed above (the Scaloria Alta phase burial observed by Quagliati, the trench 2 burial, and the semi-disturbed, possibly Early Neolithic child burial in trench 6), there are no documented cases of skeletons in anatomical articulation. This is reinforced from photographic evidence, and indeed it is confirmed by the finds bags themselves, which virtually always contain apparently random sets of bones rather than complete skeletons or even bones that articulate to form a region of a single skeleton. Well-documented semi-articulations are very rare and are restricted to only one or two cases of groups of vertebrae cemented in position. This suggests that the human skeletal material is not the residue of originally articulated burials that have been disturbed prior to excavation; almost all the human bone was disarticulated when it was deposited.

Bones were already fragmented when they were deposited. In a few cases, breakage happening in situ is evident, leaving adjoining fragments of the same bone visible in photographs. In many cases, however, broken fragments are deposited adjoining other bones, artifacts, or stones in a way which suggests that breakage occurred before they were deposited. Only one case of abrasion on the bones, which might have been due to trampling, was observed during the microscopic examination of the bones for cut-marks (Figure 4.4.14); interestingly, this occurs upon one of the mandibles, which may have been broken and moved slightly after deposition (see previous photos that demonstrate this commingling in Figures 4.4.3, 4.4.5, and 4.4.6). Generally, however, bone seems to have been broken before it was re-deposited, or in the process of re-deposition rather than after it was deposited. This may also suggest that much of it was relatively shallowly deposited, or indeed lying on the floor of the cave, where it would have been easily moved about.

"Bone groups" do not contain the residue of complete bodies. Even when bones may come from the same body, depositions contain very incomplete assortments of bones, missing most of the skeleton. Moreover, bone groups normally contain the remains of several people mixed together—a fact not visible in the field or from photographs but clearly established during the laboratory inventory of skeletal material. Bone groups do not seem to be clearly bounded by pit cuts or similar archaeological features. In some cases, their margins are moderately clear, defined not by sediments but by density of bones; in other cases, they seem to consist of slightly denser concentrations within a general scatter of human bone. In some cases, bone groups give the impression of having been deposited on horizontal planes; on the floor of the cave, bones share a common horizontal orientation and tend to lie in a flat plane. In one or two cases, there is a sense of more depth (in superpositions of material) that may reflect infilling of an irregular or sloping surface or piling up material being deposited; they do not seem to involve the filling in of deep pit features that would leave material deposited more three-dimensionally.

In none of the documentary evidence is there clear positioning of bones (other than for the trench 1 cranium). As a general principle, secondary depositions of bones often display intentional arrangements, whether as elaborate as the famous architectural use of bones in Neapolitan monastery ossuaries or as simple as placing crania on their base and grouping long bones aligned together. Even disturbance of burials such as in collective tombs tends to leave some patterned depositions behind (for example, with large bones swept aside and smaller bones left behind, or re-deposited bones grouped around the margins of a tomb). Nothing in the Scaloria photographs suggests any such arrangement; the overall impression is of random dumping.

The same is true for associations between artifacts and human bones. As a general rule, when objects are intentionally deposited with burials, there is almost always care given to their positioning; this is clear in most archaeological grave goods assemblages. At Scaloria Cave, this can be seen in depositions such as the flint blade associated with the placed cranium in trench 1. In contrast, the objects found in trench 10 seem to conform to the random, chaotic spatial logic typical of the bones. They are certainly not "grave goods" in any normal sense. In some cases, they may be objects already present that were mixed with the bones as the bones were deposited. It is equally likely, however, that they were deposited as part of the same process in which the human bones were deposited. Some may also be mixed in from other uses of the cave. It may be significant that, like the bones, the pottery seems generally to have been already broken when deposited.

This evidence strongly contradicts the idea that trench 10, and the Scaloria assemblage in general, represents originally intact primary burials that had been disturbed through normal archaeological processes. It also contradicts any idea of mass burial. Instead, it supports a model of secondary burial or ritual re-deposition of disarticulated bone. Moreover,

the mode of disarticulation did not involve careful grouping, placement, or individuation of skeletal material; the overall impression is that bone was dumped or scattered more or less randomly in a kind of sheet midden, sometimes grouped into denser concentrations.

Element Representation and Mode of Deposition

Element representation is one of the principal tools of the funerary taphonomist. The basic principle is simply that the skeleton consists of bones with different properties, which are affected by funerary processes in different ways. Tabulating which bones are present provides valuable clues to what processes created an assemblage (cf. Beckett 2011). In this study, as described in Chapter 4.1, we inventoried the skeletal elements present according to two methods for counting anatomical zones, that of Buikstra and Ubelaker (1994) and that of Knüsel and Outram (2004). These censuses were used to estimate the minimum number of elements (MNE) present for each bone; a minimum number of individuals was also calculated for the whole collection. Finally, for ease of comparison, these MNE figures were converted to a simple, standard representation index:

Bone representation index = (number of elements present * 100) / (number of elements present if each skeleton were complete)

For example, suppose we have a collection with an MNI of 50. If each of these 50 skeletons were complete, we would expect to find 50 left radii. If in reality we find 27 left radii, the bone representation index (BRI) for left radii equals 27/50 or 54 percent. Similarly, since a complete skeleton has 12 thoracic vertebrae, in 50 complete skeletons we would expect to find 600 thoracic vertebrae. If in reality we find 95 thoracic vertebrae, the BRI for thoracic vertebrae equals 95/600 or 15.8 percent. We would conclude that radii are better represented than thoracic vertebrae in this collection.

Bone representation curves must be read contextually; it is useful to compare them to curves from sites where funerary processes are well understood. Here, for reference, we use carefully excavated sites displaying a range of processes for which the relevant bone counts are available:

- West Tenter Street, London (Waldron 1987), is a large Roman cemetery of single primary inhumations. It usefully shows what a part representation curve might look like when complete bodies are buried and left undisturbed. Representation of different skeletal elements is more or less even, biased only by lower representation of more fragile bones such as the sternum, which may decompose in situ or be broken into small fragments and lost, and small bones such as carpals, tarsals, and phalanges that may decompose or be lost.
- Nanjemoy Creek, Maryland (Ubelaker 1974; data used below combine Ossuary I and II, tables 11–14), is a late prehistoric site where Native Americans periodically gathered up the bones of the dead and reburied them in a collective ossuary. It usefully shows the effects of secondary deposition. Bone preservation was generally quite good, and Ubelaker's report makes clear that when bones were gathered up for secondary redeposition, there was an attempt to gather small bones such as hand and foot bones. Representation of the cranium and major long bones is about equal. In contrast, there is a bias against both fragile cancellous-filled bones, including the vertebrae and ossa coxae, that may be destroyed when bones are moved, and small hand and foot bones that may be lost when bones are removed from their primary burial and re-deposited.
- Kunji Cave, Iran (Emberling et al. 2002), is a Bronze Age collective tomb in the Zagros mountains dating to the third millennium BCE. Like Nanjemoy Creek, collective burial and secondary deposition resulted in the destruction of many fragile bones and the loss of many hand and foot bones. However, it also shows the effects of practices involving specific bones. Here crania were preferentially retained in the tomb when other bones were periodically cleared from it. Consequently, crania are substantially over-represented in comparison with post-cranial remains.

As these examples show, the major forces affecting part representation curves are: (1) mechanical destruction that affects fragile bones such as the os coxae, sternum, and vertebrae more than robust ones such as the major long bones; (2) loss during movement, which affects small, easily lost bones, particularly those of the hands and feet; and (3) cultural practices affecting both the selection of bones entering the deposit (e.g., whole bodies vs. re-deposited partial bodies) and the curation or removal of selected elements.

Results for Scaloria Cave are presented in Tables 4.4.3 to 4.3.5 and Figure 4.4.8. Note that the two bone census methods used produced quite similar part representation curves. Note also that, as discussed in Chapter 4.1, these data were collected using slightly different assemblages. We refer to both in our discussion, although we use data gathered with the Buikstra and Ubelaker method in Figure 4.4.9, as it is more similar to methods through which the comparative data had been generated.

The results are informative, suggesting several inferences. All parts of the body are represented to some degree. Representation of small bones such as hands and feet is somewhat biased by the presence of the two relatively complete skeletons noted above, but even when data from trench 10 are tabulated on their own to exclude these burials, bones from all regions of the body are represented. This suggests that even if all bodies were not complete when deposited, in some cases all regions of the body were deposited.

There is a strong bias against bones that may be destroyed through mechanical breakage when they are moved, kicked, trampled, or re-deposited. Here Scaloria Cave shows strong contrasts between the high and low points of the curve, between robust bones and fragile bones. This is similar to Kunji Cave and Nanjemoy Creek and in contrast to that from West Tenter Street. Vertebrae, sacra, and sterna, in particular, are strongly under-represented. This is confirmed by more detailed data than are presented here: crania are represented by the vault rather than the more destructible facial regions, and mandibles are much more common than maxillae; scapulae are known principally from the glenoid cavity and the spine rather than from the blade, and ossa coxae are represented principally by the acetabulum and adjoining regions of the ilium rather

Table 4.4.3. MNE and element representation data for Scaloria Cave (Buikstra and Ubelaker census method)

	MNE											
	Adult left	Adult right	Adult	Juvenile left	Juvenile right	Juvenile	Total MNE	MNI adult	MNI juvenile	Elements per capita	Total elements expected	% rep.
Cranium	8	11		2	2		13	11	2	1	22	59.09
Mandible			11			1	12	11	1	1	22	54.55
Vertebra—cervical			18			14	32	3	2	7	154	20.78
Vertebra—thoracic			13			28	41	2	3	12	264	15.53
Vertebra—lumbar			7			10	17	2	2	5	110	15.45
Sacrum			1			0	1	1	0	1	22	4.55
Os coxae	1	1		7	6		15	1	7	2	44	34.09
Sternum			1			1	2	1	1	1	22	9.09
Rib	20	13		8	15		56	2	2	24	528	10.61
Clavicle	6	7		5	6		24	7	6	2	44	54.55
Scapula	3	5		4	4		16	5	4	2	44	36.36
Humerus	9	9		3	2		23	9	3	2	44	52.27
Radius	7	8		3	2		20	8	3	2	44	45.45
Ulna	8	6		2	2		18	8	2	2	44	40.91
Carpals	2	2		0	0		4	1	0	16	352	1.14
Metacarpals	9	11		2	3		25	3	1	10	220	11.36
Femur	9	9		6	11		35	9	11	2	44	79.55
Patella	3	6		0	1		10	6	1	2	44	22.73
Tibia	4	7		4	3		18	7	4	2	44	40.91
Fibula	4	1		1	3		9	4	3	2	44	20.45
Talus	9	6		1	0		16	9	1	2	44	36.36
Calcaneus	5	3		1	3		12	5	3	2	44	27.27
Tarsals	12	6					18	3	0	10	220	8.18
Metatarsals	21	10		7	3		41	4	2	10	220	18.64
Phalanges			21			1	22	2	1	28	616	3.57
Overall MNI								11	11			

Table 4.4.4. MNE and element representation data for Scaloria Cave (Knüsel and Outram census method)

	MNE											
	Adult left	Adult right	Adult	Juvenile left	Juvenile right	Juvenile	Total MNE	MNI adult	MNI juvenile	Elements per capita	Total elements expected	%rep
Cranium			15			3	18	15	3	1	31	58.06
Mandible			7			2	9	7	2	1	31	29.03
Vertebra—cervical			21			19	40	3	2	7	217	18.43
Vertebra—thoracic			42			34	76	2	3	12	372	20.43
Vertebra—lumbar			13			33	46	2	2	5	155	29.68
Sacrum			3			6	9	3	6	1	31	29.03
Os coxae	9	5		12	12		38	9	12	2	62	61.29
Sternum			3			4	7	3	4	1	31	22.58
Rib	21	12		0	10		43	2	2	24	744	5.78
Clavicle	11	8		6	5		30	11	6	2	62	48.39
Scapula	7	11		4	5		27	11	5	2	62	43.55
Humerus	14	14		6	2		36	14	6	2	62	58.06
Radius	13	12		4	3		32	13	4	2	62	51.61
Ulna	13	10		3	3		29	13	3	2	62	46.77
Carpals	8	6		0	0		14	1	0	16	496	2.82
Metacarpals	13	16		4	5		38	3	1	10	310	12.26
Femur	7	19		9	9		44	19	9	2	62	70.97
Patella	3	6		0	0		9	6	0	2	62	14.52
Tibia	11	18		3	6		38	18	6	2	62	61.29
Fibula	9	17		2	3		31	17	3	2	62	50.00
Talus	9	7		0	1		17	9	1	2	62	27.42
Calcaneus	5	6		1	3		15	6	3	2	62	24.19
Tarsals	13	11		2	0		26	3	2	10	310	8.39
Metatarsals	15	14		11	7		47	4	2	10	310	15.16
Phalanges			60			4	64	2	1	28	868	7.37
Overall MNI								19	12			

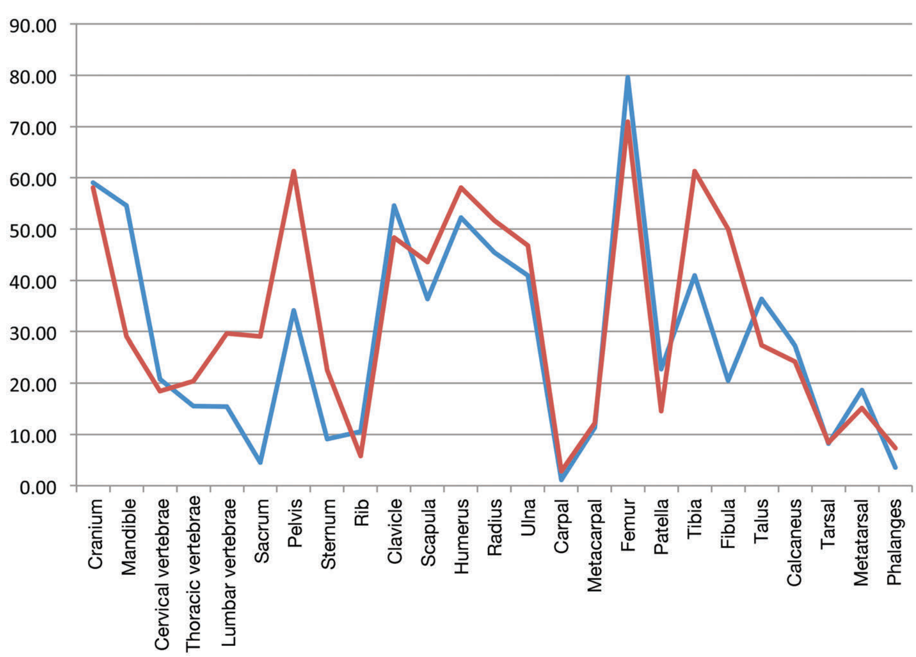

Fig. 4.4.8. Element representation curve for Scaloria Cave, calculated according to two methods (blue line: 1990 census following Ubelaker and Buikstra method; red line: 2010 census following Knüsel and Outram method).

Table 4.4.5. Element representation at Scaloria Cave and comparative sites

Part	Scaloria (K+O method)	Scaloria (B+U method)	Kunji Cave	Nanjemoy Creek II	West Tenter Street, London
Cranium	58.06	59.09	97.00	92.17	80.50
Mandible	29.03	54.55	73.00	82.13	65.00
Cervical vertebrae	18.43	20.78	24.71	19.26	52.00
Thoracic vertebrae	20.43	15.53	21.00	14.94	58.00
Lumbar vertebrae	29.68	15.45	23.00	7.96	58.00
Sacrum	29.03	4.55	30.00	47.02	59.00
Os coxae	61.29	34.09	30.00	81.03	66.50
Sternum	22.58	9.09	12.00	32.60	24.00
Clavicle	48.39	54.55	24.00	65.20	45.50
Scapula	43.55	36.36	67.00	74.45	53.00
Humerus	58.06	52.27	38.50	86.52	57.00
Radius	51.61	45.45	37.50	69.91	54.50
Ulna	46.77	40.91	37.50	79.47	61.50
Carpals	2.82	1.14	4.50	21.69	17.00
Metacarpals	12.26	11.36	19.50	35.96	50.00
Femur	70.97	79.55	53.00	91.07	59.00
Patella	14.52	22.73	21.00	41.07	26.50
Tibia	61.29	40.91	31.50	84.64	48.50
Fibula	50.00	20.45	39.00	54.70	32.50
Talus	27.42	36.36	30.00	51.72	47.50
Calcaneus	24.19	27.27	21.00	57.68	47.00
Tarsals	8.39	8.18	12.50	38.84	30.00
Metatarsals	15.16	18.64	20.50	40.75	41.50
Phalanges	7.37	3.57	7.57	6.73	13.71

Note: This table does not include ribs because published data on them are not available for all sites considered.

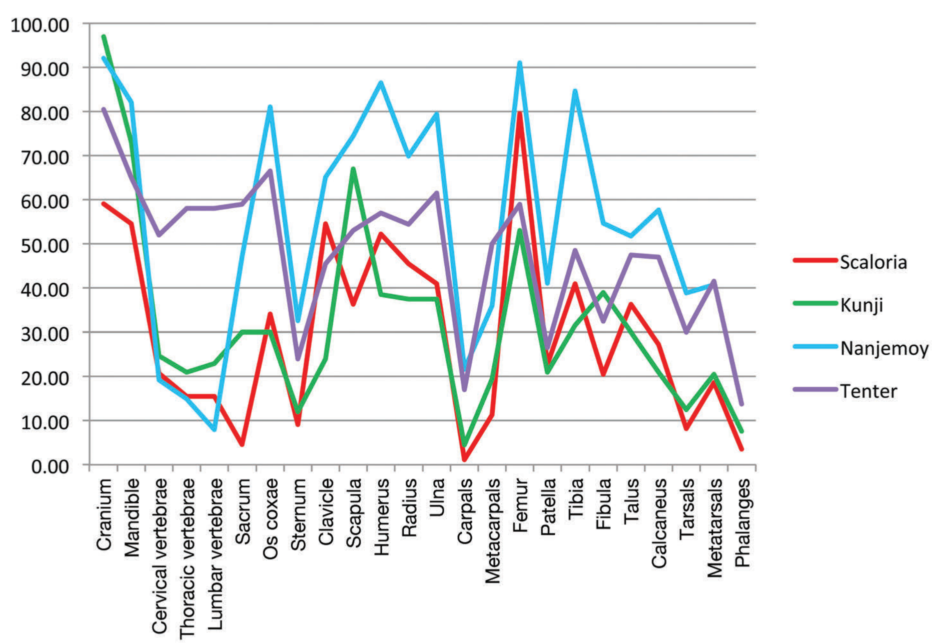

Fig. 4.4.9. Element representation curve at Scaloria (following Buikstra and Ubelaker method) in comparison with reference samples.

than by the more fragile regions of the pubis, ischium, and iliac blade.

Small elements are strongly under-represented (as at Nanjemoy Creek), with very little representation of hand and foot bones and even the patella, talus, and calcaneus. It is possible that this reflects some recovery bias by inexperienced excavators; particularly when covered with mud, carpals and tarsals may be hard to distinguish from small stones, but some experienced excavators were present and the finds bags make clear that they were attentive to quite small fragments of bone; this is probably not enough to create such a strong pattern. It is obvious from the articulation evidence reviewed above that the human skeletal material in Scaloria Cave is re-deposited, rather than in primary context, and we think many small elements may have been lost or discarded during the process of re-deposition. Ones that were not lost in this process may have been still bound together by soft tissue, as a cut-mark on a carpal bone suggests (see below).

There is no clear selection for or against particular major bones, unlike at Kunji Cave. The representation of crania and major long bones is about equal, as one would expect if complete bodies were being processed, and no element is particularly over-represented or under-represented in a way which might suggest cultural practices such as retaining bones for use elsewhere. Cranial retention is attested at nearby Neolithic sites such as Masseria Candelaro (Cassano et al. 2004), but this is not evident here. There is no over-representation of the first or second cervical vertebrae, which might suggest the deposition of fleshed heads.

Overall, the element representation at Scaloria Cave suggests the secondary deposition of bodies in a process that incurred a high level of mechanical destruction as well as bone loss. In terms of the hypotheses above, this would contradict the idea of mass burial, and it would also run counter to the idea of undisturbed or disturbed primary burials, as these would tend to have a higher representation of small bones.

Representation of Right versus Left Sides

Over-representation or under-representation of each side in the assemblage could conceivably result from two causes: intentional selection of bones from one side, and unintentional preservational bias. The latter might result, for instance, if burials had originally been deposited in primary burials in a flexed position lying on one side, so that bones from one side had a greater chance of being preserved or recovered before being re-deposited in secondary context at Scaloria.

We tabulated the frequency of bones from the right and left sides of the skeleton. The results show no clear tendency. The representation of right and left sides seems a random fluctuation. In the upper limb, for example, it is hard to imagine a process that would preserve more left clavicles, humeri, and ulnae and more right scapulae, radii, and hand bones! There does, however, seem to be greater representation of the right lower limb than of the left lower limb. It is hard to understand what would cause this, however. Italian Neolithic burials are known to have been buried more or less equally lying on their right and left sides (Robb 1994, 2007).

There is no particular bias for the right or left side in juvenile bones. Apparent patterns in cut-marked bone, burned bone, and fracture pattern should be treated as random fluctuations; none of these was statistically significant (Tables 4.4.6 and 4.4.7).

Table 4.4.6. Right versus left elements in overall assemblage

Element	% Left	% Right
Clavicle	52.9	47.1
Scapula	37.8	62.2
Humerus	52.2	47.8
Radius	46.3	53.7
Ulna	54.8	45.2
Carpals and metacarpals	48.1	51.9
Os coxae	50.0	50.0
Femur	40.7	59.3
Patella	33.3	66.7
Tibia	43.4	56.6
Fibula	42.0	58.0
Talus	52.9	47.1
Calcaneus	36.8	63.2
Tarsals and metatarsals	57.1	42.9

Table 4.4.7. Laterality of various taphonomic characteristics

	Left side %	Right side %
Juvenile bones	49.4	50.6
Cut-marked bones	53.5	46.5
Burned bones	62.9	37.1
Bones with "fresh" breakage ("perimortem" plus "dry")	41.8	58.2

Burning

Burning is evident on 4.5 percent of the overall assemblage. This low level suggests that burning was not part of a general funerary treatment such as cremation. It always takes the form of brownish to blackish scorching. No cases of grayish to white calcination were seen, and no bones displayed the typical pattern of shrinkage, twisting, and cracking that occurs when bone is exposed to intense temperatures as in cremation. The brownish to blackish color, in contrast, suggests relatively low-temperature scorching. Burning is patchy and uneven; it is rare for even a small fragment to be burned all over or burned to the same color.

All of these observations suggest that burning did not form part of a formal funerary treatment but happened incidentally as bones happened to be exposed to fire. In one or two cases, burning probably happened while bone was still moderately fresh: Figure 4.4.10 shows an occipital bone with a burned patch in its center, and there is a clear circular spall removed from the outer table, which implies the bone contained moisture when exposed. It is worth noting that the broken edges of bones are sometimes burned, implying that burning occurred after bones were fragmented (Figure 4.4.11). Moreover, burning also happened after cut-marking in a number of specimens that display both. Burning clearly took place during the Neolithic, as burned surfaces are often covered in concretion. We cannot say for certain, of course, that some or all burning did not happen outside the cave before the bones were deposited in the cave. But there is plentiful evidence for fire occurring as a result of other uses of the cave; micromorphology (cf. Rellini et al., Chapter 3.1) has revealed hearths, which may have overlapped temporally with the funerary use of the cave, and field notes often note the presence of charcoal in trenches. Moreover, there is a significant statistical relationship between burning and the presence of perimortem "dry" breaks and "mineralized" breaks that occurred some time after death (Table 4.4.8). This suggests that both were part of the ongoing process of disturbance as bones were moved around the cave. The impression is of incidental or casual burning resulting from other uses of the cave, which affected the exposed surfaces of bones that may have been lying on or close to the floor surface of the cave.

Fig. 4.4.11. Frontal bone fragment with fractured edges of burned bone (photo: J. Robb).

Table 4.4.8. Relationship between burning and breakage

	No burning	Burning	Total
Perimortem and "dry" fractures	65	14 (17.7%)	79
Mineralized fractures	311	28 (8.3%)	339
New fractures or no fractures	821	5 (0.6%)	826
Total	1197	47 (3.8%)	1244

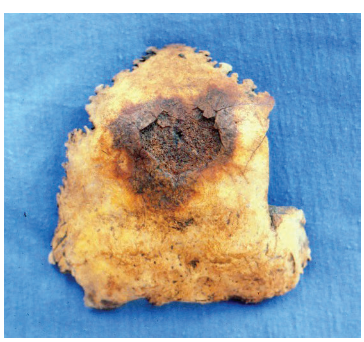

Fig. 4.4.10. Occipital bone with spalling at center of burned patch (trench 6, specimen number unknown). See also Fig. 4.4.6 (photo: J. Nemeskéri).

Rodent and Carnivore Damage, Root Etching

All specimens were macroscopically examined for rodent gnawing and carnivore damage , and suspected cases of these were examined microscopically to verify them (Haglund 1992; Haglund et al. 1989; White 1992). For carnivore gnawing, we looked for signs of punctures, grooving, and the crenelated ends of bones. For rodent gnawing, we looked for characteristic signs of paired, flat-bottomed grooves, particularly in multiple sets along the crests or ends of bones.

No carnivore damage was observed, and only one possible case of rodent gnawing was found (bag 33, an

unidentified long bone shaft fragment, subsequently much weathered). Taphonomically, both carnivore damage and rodent gnawing are generally taken to indicate that skeletal elements were exposed at some point on the surface of the ground where these animals may have had access to them. Hence, the lack of them here may suggest (at most) that bodies were not exposed in open air on the surface of the ground somewhere outside the cave before being re-deposited within it. Moreover, it implies that the cave was not frequented by rodents or other animals (unsurprisingly, as it may not have been a hospitable environment for such creatures). Similarly, as one would expect for an underground environment, virtually no root etching was observed (Figure 4.4.12).

Fig. 4.4.12. Possible rodent gnawing (unidentified long bone shaft fragment, bag 33) (photo: J. Robb).

Cut-marks and Processing of the Body

Skeletons commonly bear the marks from actions effected upon the body. The actions producing cut-marks span a wide range of purposes and gestures, and cut-marks may form typical patterns reflecting their specific intention. Cut-mark patterns known osteologically encompass the following:

- Disarticulating a body into pieces by cutting it apart at major joints (White 1992). Cuts are aimed at ligaments joining bones around articulations. These may include relatively heavy chop marks, and is commonly found on animal remains as part of the butchering process (Lyman 1994) (Figure 4.4.13).

- Removing meat or flesh from fleshed bones. This may include a range of gestures and marks: chop marks, long scraping marks extending down the diaphysis of a long bone, and "chatter" marks where a tool scrapes and jumps down a bone (White 1992). Such marks will tend to be distributed on areas where there is significant muscle mass to be removed, generally for dietary purposes.

- Harm and violence. When the body is subject to high force in order to harm it, this may leave traces on the skeleton. Such actions may be intended not only to harm or to kill, but to express hostility or destroy the body in "overkill" patterns as well (e.g., in witch executions [Darling 1998] or in warfare [Novak 2000]). Blunt-force trauma, sharp-force trauma, and projectile trauma have well-known signatures (Knüsel 2005; Novak 2000). Such injuries will typically be forceful and indiscriminate rather than precise; areas targeted vary but may include particularly the head and face (Knüsel 2013; Novak 2000).

- Defleshing. When the goal is to separate bone systematically from tissues adhering to it—as on the fossil hominin cranium from Bodo, Ethiopia (White 1986), at the Neanderthal site of Krapina (Russell 1987a), and at the Mesolithic site of Margaux, Belgium (Toussaint 2011)—intervention may involve a series of low-energy, relatively fine cuts rather than higher energy slices and chops; cuts may be distributed not where muscle mass per se is to be found, but at places where it is likely to adhere tenaciously to bones (for instance,

Fig. 4.4.13. Scaloria Cave, ovicaprine proximal femur with cut-marks at margin of head and upon neck from disarticulation (photo: J. Robb).

long bone shafts rather than ends, and with incisions rather than scraping marks).

- Targeted interventions. Bodies may be cut for a range of specific targeted interventions. In all cases, interventions typically follow a formalized modus operandi and leave a stereotyped signature of what kind of tools are used, what kind of cuts are made, and where they are located; this signature reflects the particular purpose of the intervention.

- Scalping and trophy collecting. Scalping is often done according to a specific template; in North American examples, a series of lateral cuts around the margin of the cranial vault allows the scalp to be removed as a whole, including the hair attached to it, to serve as a trophy (Olsen and Shipman 1994). Other forms of trophy collection may result both in systematically missing parts and signs of dividing the body (Verano 1986, 2001).

- Surgical interventions for therapeutic purposes. Surgical interventions typically leave quite specific patterns of incision; trepanation is a common prehistoric example.

- Mutilations. Technically similar interventions may be intended to mutilate rather than to heal; specific mutilations of the hand and thigh of the dead at the Little Big Horn battlefield were intended to prevent them from riding horses and firing rifles in an afterlife (Scott et al. 1992). Similarly, decapitation from behind (as in executions) often leaves marks on the middle cervical vertebrae and the posterior gonial angle of the mandible (Armit et al. 2011; Pitts et al. 2002).

- Autopsy, dissection, and funerary treatment. Autopsy and dissection typically result in highly patterned damage to the skeleton—for instance, in sectioning the cranium to access the brain and in cutting through ribs to access the thoracic cavity (Mafart et al. 2004). Head removal after death for ritual reasons or for trophy collecting, leaving cut-marks on the anterior aspect of the bodies of the cervical vertebrae, is an example (Armit 2012; Boylston et al. 2000; Liston and Baker 1996).

As these examples suggest, the goal of this analysis is not only to document the presence of cut-marks in the Scaloria Cave assemblage; through detailed observation of their location and patterning, we hope to gain an idea of their purpose as well (Figure 4.4.13).

Methods

All bones in the assemblage were systematically examined for cut-marks.[4] Examination was carried out twice, each time by two observers (CJK and JER). Examination was done by eye under oblique light; possible cut-marks were re-checked under low-magnification digital microscopy and doubtful cases were rejected. Microscopy often revealed further fine cut-marks not visible macroscopically. Cut-marks were identified according to canonical criteria as specified by White (1992) and others (Greenfield 1999; Olsen and Shipman 1994). Linear cut-marks were defined as incisions displaying a v-profile in cross-section. Other types such as scrape marks, anvil marks, chatter marks, and spalling were defined as per White (1992) and Knüsel and Outram (2006). Six specimens representing typical or exceptional examples were additionally verified through SEM analysis to confirm the macroscopic and low-power microscopy analysis. SEM analysis was carried out at the Department of Anatomy, University of Cambridge, by Dr. Jeremy Skepper. All cranial and mandibular cut-marks were transferred to a plastic model of these structures and photographed in order to present the distribution of these marks in the collection as a whole.

As well as coding breakage patterns (as per below) and cut-marks, we also examined bones carefully for other signs of damage, including impact scars and conchoidal fractures, and signs of abrasion and trampling. For the latter, we looked for light, parallel scratches, straight or curving, which might suggest that a bone was forcibly pressed against sharp or abrasive sediments. Only one possible example of abrasion was seen in the assemblage, and even this is not clearly distinguishable from a scrape mark made with the edge of a stone tool held sideways (Figure 4.4.14).

[4] A small number of cut-marked specimens were also found in Robb's (1990) work in specimens that were not available for re-analysis in 2010, and a few additional cut-marked bones were found in a visit to the Manfredonia Museum in 2010 mixed with ceramic and faunal remains. These were recorded but could not be re-checked or examined microscopically.

Fig. 4.4.14. Abrasion scratches upon a mandible (281) (photo: J. Robb).

Level of Cut-marking, General Technique, and Distribution in Skeleton

A total of 98 cut-marked specimens were identified, amounting to 5.5 percent of the overall assemblage (see Table 4.4.25 for details). Given how fragmented the collection is, this indicates a heavy level of skeletal processing, as an element which had been separated and processed leaving cut-marks on specific locations will have subsequently been broken into many fragments, most of them not displaying evident cut-marks.

All cut-marks identified on human bone consisted of small, fine incisions, in contrast to cut-marks observed on some faunal remains, which were larger and indicated both use of a heavier tool and more applied force. Under magnification, they showed no longitudinal striations inside the cut, implying that they had been made with a straight, regular cutting edge, presumably a stone tool. However, they often showed asymmetry, with one side cut quite cleanly and straight and the other side showing slight irregularities and splintering as well as a crescent-shaped outline; this clearly reflects the angle of incidence at which the tool was held (Figure 4.4.15).

Most cut-marks consisted of small, fine incisions 5 mm or less long and less than 1 mm deep. These almost always cut transversely across the long axis of bones. Their shallowness suggests that they were not made with great force; movement originated at the hand or wrist rather than at the elbow or shoulder. They almost always occurred in groups of cut-marks rather than singly; presumably the upper limb was held still while the wrist made repeated, quick, light cuts. Interestingly, cut-marks were very often paired. It seems likely that, as with many manual tasks (such as we often do ourselves while hammering a nail), the hand habitually made two strokes, a first, slightly more tentative one to fix the location and gesture and a second one with greater force.

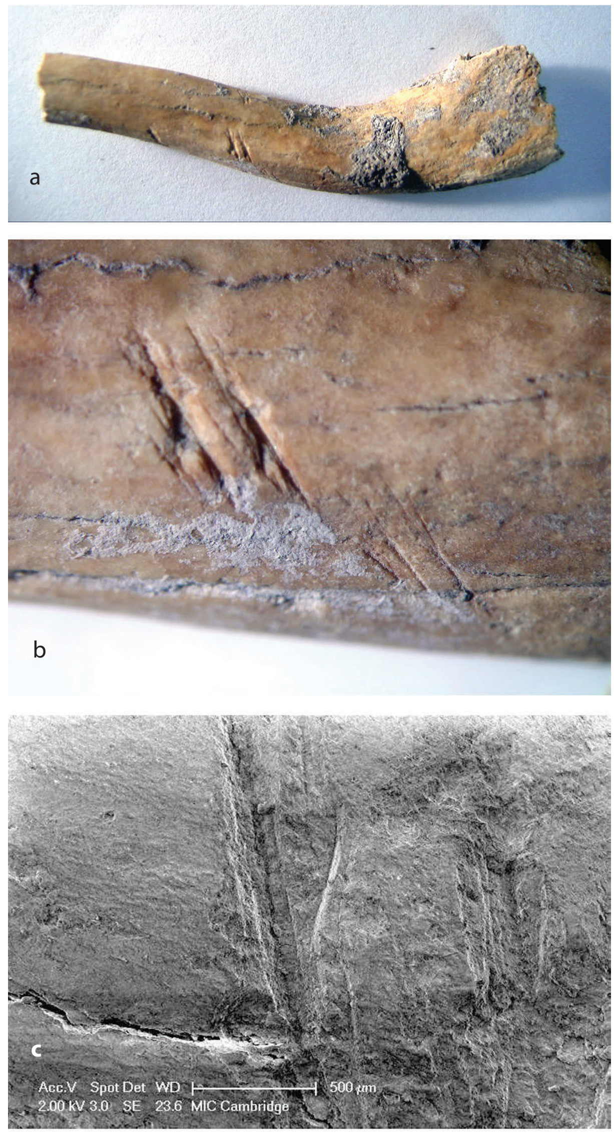

Fig. 4.4.15. Clavicle with several groups of cut-marks (95-1463). (a) Overall view: two groups of cut-marks are visible on midshaft; a third, near proximal end, lies out of sight on inferior surface. (b) The most distal group under low-magnification microscopy; cuts display asymmetry between cleaner entry side on right and slightly ragged side (to left). Several fainter cut-marks are also visible. (c) A typical cut-mark from this specimen under SEM microscopy (photos: a–b: J. Robb; c: J. Skepper).

The distribution of cut-marks in the skeleton shows that they are found in all areas of the body. In the post-crania, they are surprisingly common on the clavicles, where they are found on all faces of the shaft. They are also common on the long bones, but are known in small bones such as metacarpals and patellae as well. When tabulated statistically, cut-marks are significantly more common in the skull (cranium and mandible) and long bones than in the bones of the trunk, hands, and feet. Moreover, the few cut-marks observed located in the hands and feet appear to be at locations where incision would have helped separate the body into parts (e.g., targeting tendons or ligaments of the wrist and ankle), rather than to strip soft tissue from the bones. This may provide a clue as to their goal (see below).

In a few cases, these transverse incisions are found in locations where they may have been intended to separate major joints: around the temporo-mandibular joint, at the medial epicondyle of the humerus, and around the neck of the femur (Figure 4.4.16). However, as a general rule, the impression that cuts were intended to remove superficial tissue of all kinds is strengthened by the location of cut-marks in places such as the clavicle, where they occur on all faces of the shaft, including the superior and posterior surfaces of the midshaft where there is little in the way of muscle or ligament attachment.

Along the shafts of long bones, cut-marks may be particularly profuse; it is common to find many small groups, each of two to five incisions, along the length of a fragment. Several examples of humeri, tibiae, and fibulae had more than 20 cut-marks each, more or less regularly spaced along the shaft. In some cases, the cut-marks display a clear technique, which we have called "nick-and-strip." In this technique, the worker proceeded down the shaft of the long bone, stripping tissue away. He or she was probably bracing the bone with the knee or holding it down some other way; the non-dominant hand pulled soft tissues away from the bone, and when the tissue adhered to the bone rather than coming away, the dominant hand intervened to slice it free. The incisions thus were aimed not at slicing muscle mass away from the bone (as in filleting) but at assisting the hands to pull it away. This implies that the tissue removed may not have been deep and may have already been moderately loose, except for the tough adhesions of the periosteum (Tables 4.4.9 and 4.4.10; Figures 4.4.16 to 4.4.18).

Cut-marks of Cranium and Mandible

In the facial skeleton, cut-marks consist exclusively of small, fine incisions similar to those seen in the post-crania. Examples are known around the orbit, but they are particularly common around the mandible, which is the most commonly cut-marked bone. In a few cases, they appear to have been intended to separate the temporo-mandibular joint. However, there are few on the sides and base of the ascending ramus which might be interpreted as aimed at the insertion of the most substantial muscles of the head, the muscle mass of M. masseter, just as there are none on or below the

a b

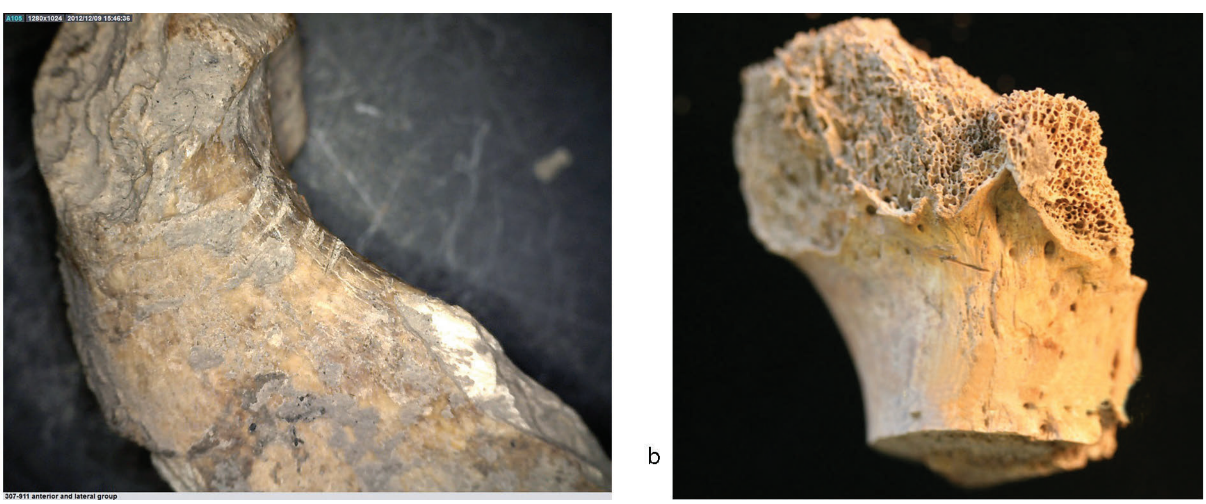

Fig. 4.4.16. Cut-marks around major joints. (a) Anterior aspect of ascending ramus of mandible (307-911). (b) Proximal femur (17-21); this specimen had four groups of cut-marks spaced around neck of femur (photos: J. Robb).

temporal lines or on the lower margin of the zygomatic processes, which might be aimed at the origin of the temporalis or masseter muscles. Instead, the most common area for cut-marks on the face is the body of the mandible; they occur in groups along the external surface and inferior aspect of the body. These seem intended principally to remove adhering tissue such as the muscles of facial expression or tissue of the throat joining the neck and mandible. One example, on the internal surface of the body next to the genial tubercles, may have been aimed at M. genioglossus or the tongue itself, and may imply that the mandible was already disarticulated when they were made. In two cases, cut-marks cut transversely across the roots of the teeth themselves within the alveoli; this is above the level of facial musculature and implies that they were aimed at removing either lip tissue or the soft gingival tissue directly covering the bone. Overall, it is clear that action on the face had little to do with either disarticulation or removing muscle mass; it was intended to remove adhering soft tissue, whether skin, periosteum, or facial muscle (Figures 4.4.19 and 4.4.20).

In the cranial vault, cut-marks took a different form: long, thin linear incisions. These are generally light, faint slicing marks a fraction of a millimeter in depth. Microscopy reveals a v-shaped profile. In two cases, broader, striated marks suggest a tool held sideways to scrape rather than to slice. Cut-marks on the cranial vault tend to occur in groups of at least two parallel cut-marks, overlapping or separated by 1 or 2 mm. Sometimes they are shorter, particularly when they occur in groups of more than two. They often cross other cut-marks, usually running more or less parallel but occasionally at right angles. This gives the impression of rapid, casual rather than precise work. Although it was difficult to estimate the length of cut-marks in such heavily fragmented material, it is clear that they generally did not run the entire length of the cranial vault, but tended to be between about 1 cm and 5 cm long. Quite often one group finished and another began not far away, working along in the same direction. The impression is of someone working along the vault to pull tissue away from the bone, pausing to make a burst of quick, repetitive slicing gestures with the hand or wrist in movement when necessary (Figure 4.4.21).

The cumulative pattern of cut-marks in the cranial vault shows clearly that they were aimed at removing the scalp tissue. Only one pair on the occipital may be directed at the nuchal musculature, much as there are none directed at the muscles of mastication on the cranial vault. Instead, they are distributed principally upon the frontal and the parietals, where they generally tend to run anterior-posteriorly, often quite close to the midline of the skull. If there was a consistent

Table 4.4.9. Distribution of cut-marks in skeleton

Bone	Cut-marked specimens	Total observed	%
Cranium	34	365	9.32
Mandible	8	30	26.67
Vertebrae	1	277	0.36
Sacrum	0	17	0.00
Os coxae	2	89	2.25
Sternum	0	9	0.00
Rib	3	180	1.67
Clavicle	8	34	23.53
Scapula	2	49	4.08
Humerus	7	53	13.21
Radius	2	46	4.35
Ulna	0	33	0.00
Carpal	1	15	6.67
Metacarpal	1	39	2.56
Phalanx-hand	0	55	0.00
Femur	8	106	7.55
Patella	1	11	9.09
Tibia	5	84	5.95
Fibula	5	55	9.09
Calcaneus	1	19	5.26
Talus	0	17	0.00
Tarsal	0	26	0.00
Metatarsal	0	51	0.00
Phalanx-foot	0	10	0.00
Total	89	1670	5.33

Table 4.4.10. Distribution of cut-marks in diverse areas of skeleton and different kinds of bone

	No cut-marks	Cut-marks	Total
Head	286	39 (12%)	325
Torso	587	16 (2.7%)	603
Arm/hand	224	11 (4.7%)	235
Leg/foot	352	19 (22.4%)	371
Skull	286	39 (12.0%)	325
Long bones	364	35 (8.8%)	399
Scapula	45	2 (2.4%)	47
Spongy bones	525	6 (1.1%)	531
Hands and feet	232	3 (1.3%)	235

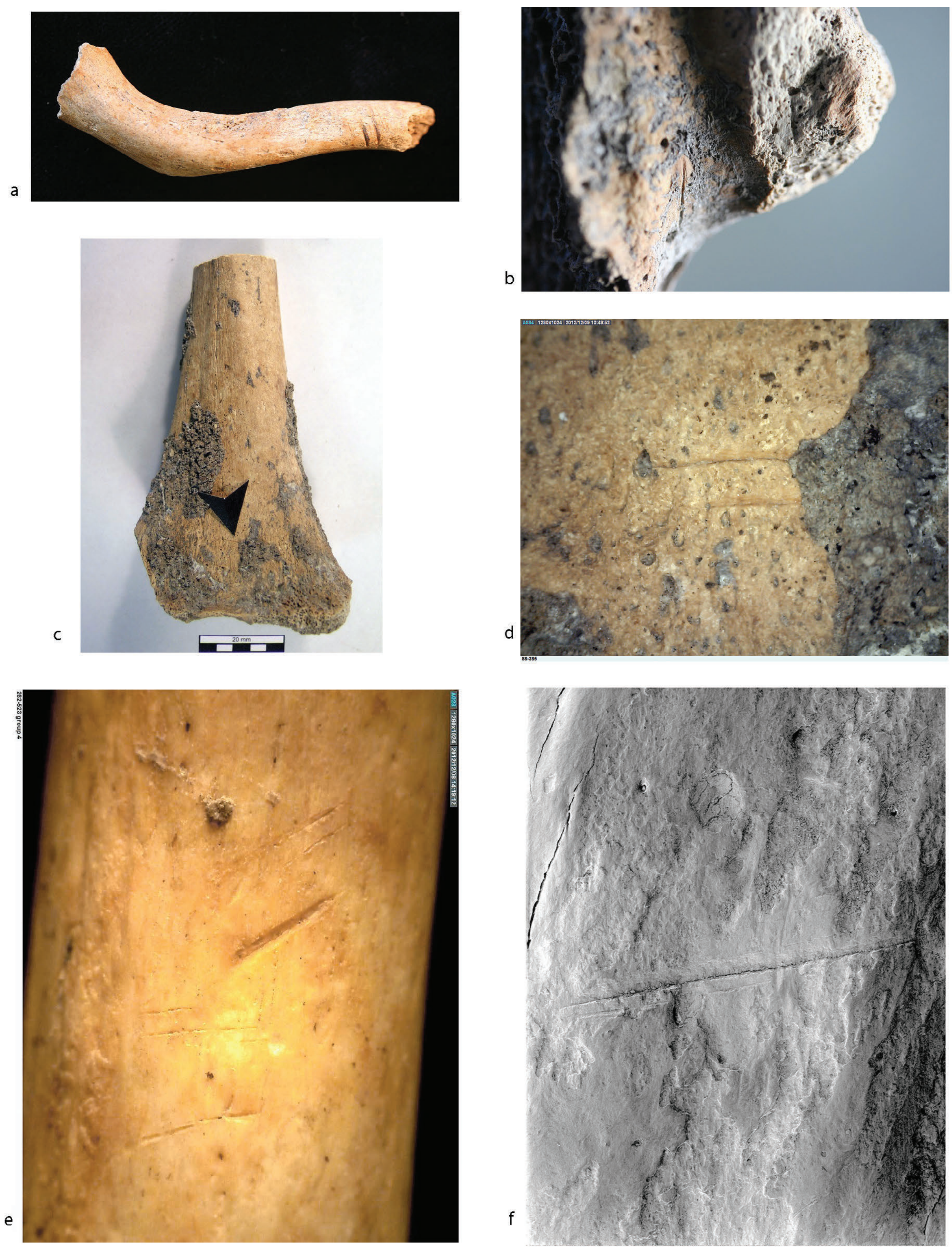

Fig. 4.4.17. Transverse incisions on post-cranial bones. (a) Relatively heavy cuts on a clavicle midshaft posteriorly (4-19). (b) Peroneal groove, calcaneus (34-626). (c) Popliteal surface, distal femur (88-385). (d) Detail, same specimen. (e) Fibula shaft (262-523): this fragment bears multiple groups of cut-marks in "nick-and-strip" pattern; note also pairs of one light and one heavy cut-mark. (f) Same specimen, SEM image of transverse incision (photos: a–e: J. Robb; f: J. Skepper).

a b c

Fig. 4.4.18. "Nick and strip" technique. (a) Humerus shaft (98-1236). (b) Same specimen, showing distribution of cut-marks along a segment of shaft; similar marks covered entire anterior margin of shaft. (c) Same specimen, detail of cut-marks (photos: J. Robb).

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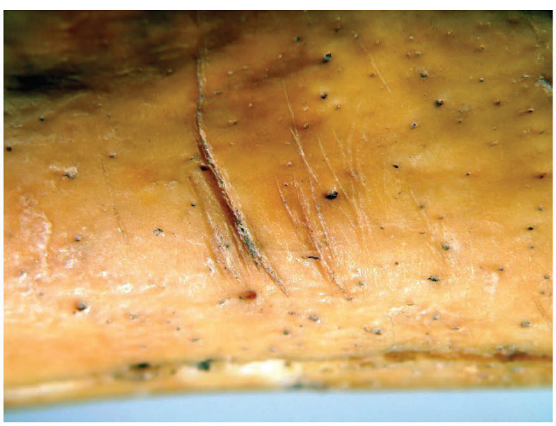
a



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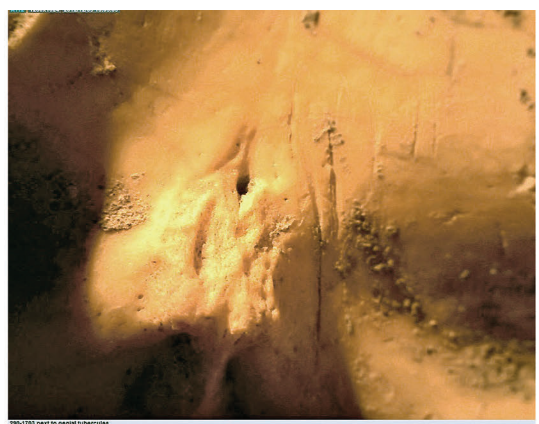

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Fig. 4.4.19. Cut-marks on facial bones. (a) Inferior aspect of mandibular body (290-1703). (b) Internal surface of anterior portion of mandible, cut-marks running vertically immediately to right of genial tubercles (290-1703). (c) Mandible with cut-mark cutting across tip of root of canine (indicated by probe); others continue to right, a third cut-mark is visible 2–3 mm above, and another runs across root of premolar to left (303-914) (photos: J. Robb).

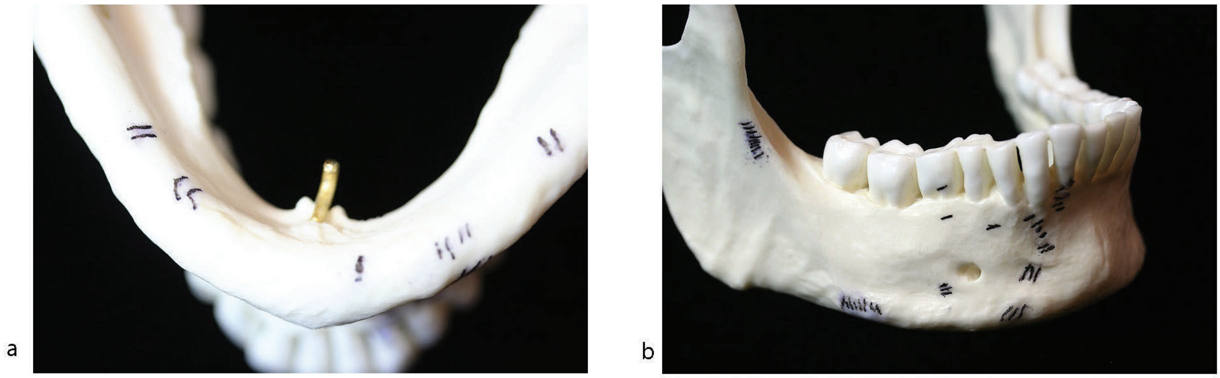


Fig. 4.4.20. Cumulative distribution of observed cut-marks on mandible. (a) Inferior view. (b) Anterior-right view.

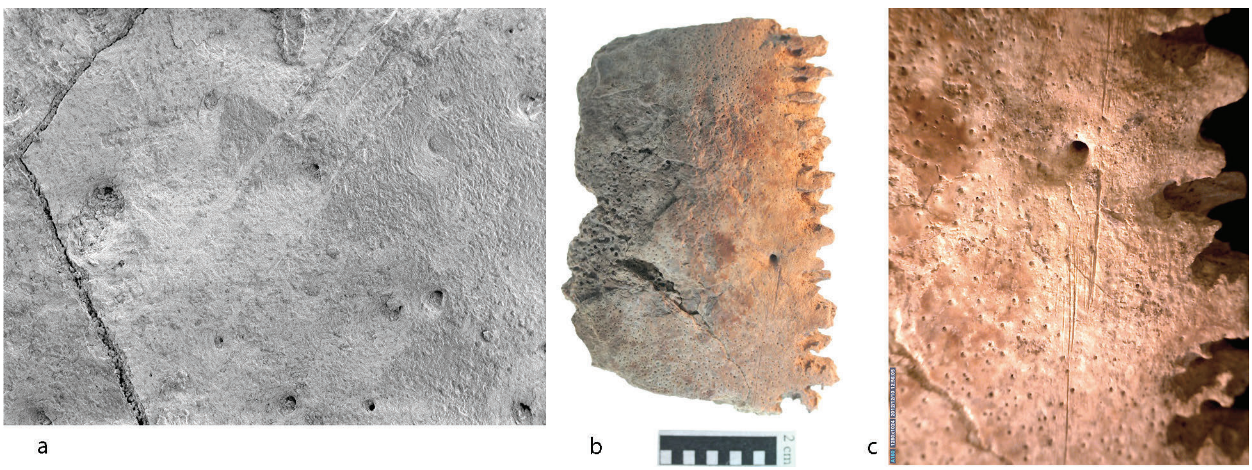


Fig. 4.4.21. Cut-marks: linear incisions across cranial vault. (a) SEM image of cut-marks on parietal (95-1503-1; see Fig. 4.1.9a in Chapter 4.1 for macroscopic photograph). (b) Parietal with several groups of cut-marks parallel to sagittal suture (53-1052). (c) Detail of same specimen (photos: a: J. Skepper; b–c: J. Robb).

method to defleshing the top of the cranium, it may have involved starting toward the center and pulling tissue away sideways, stopping to cut more when the periosteum adhered too tightly to the bone. This would have brought the scalp tissue (dermal layers, galea aponeurotica, pericranium, and hair) away in pieces. This suggests that the goal was simply to separate tissue and bone; it clearly differs from scalping techniques whose goal is to remove the scalp as a trophy or keepsake. These usually involve transverse cuts that permit the scalp to be reflected anteriorly or posteriorly (Novak and Kollman 2000; Olsen and Shipman 1994) (Figure 4.4.22).

The most striking cut-marks on the cranium were three examples of endocranial cut-marks. Two specimens displayed groups of cut-marks on the petrous region of the temporal bone. These would have resulted from using a stone tool to remove residual bits of the tentorium, the tough membrane supporting the brain, which would have a brittle texture, particularly when dried. Another displayed a pair of cut-marks on the body of the sphenoid, just posterior to the cribriform plate of the ethmoid. These endocranial cut-marks can only have been made after the cranium was already broken open and the brain itself removed. Again, there would be no nutritional purpose to removing this membrane, nor could it be part of a program either of disarticulating the skeleton or of harming the individual. Its only evident purpose would seem to be to continue the separation of bone and the tissues adhering to it (Figure 4.4.23).

Discussion: Cut-marks and Treatment of the Body at Scaloria Cave

The general picture of the process creating the cut-marked human bone at Scaloria is fairly clear, both

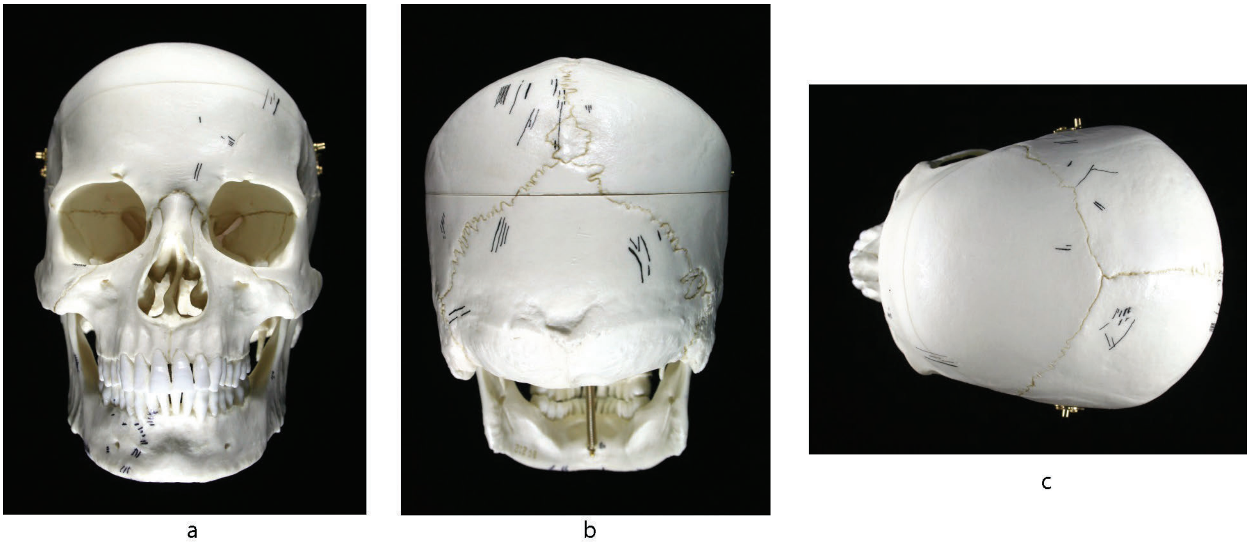


Fig. 4.4.22. Cumulative distribution of cut-marks in cranium. (a) Anterior view. (b) Posterior view. (c) Superior view.

from their placement in the skeleton and from their size and form. Among the relevant facts:

A few cut-marks may have been made in the process of separating the body at major joints such as the elbow, wrist, hip, knee, or ankle. However, most areas surrounding joints do not display cut-marks. This may perhaps suggest that, if bodies were dismembered, it happened when the individual had been dead for some time and many labile joints were already loosening so that cutting was not needed to separate segments of the body. This could have been accomplished with the hands alone.

There appears to have been little attention to cutting major muscle masses; the insertions of large muscles such as Mm. quadriceps femoris were not targeted, and there are no scraping or chatter marks along long bone shafts which might result from stripping flesh. The "nick-and-strip" marks found along long bone shafts would have been a much less effective way to remove muscle mass than common techniques such as filleting. Many cut-marks are found in places where there is very little flesh to be removed—certainly areas of low "meat utility," as faunal analysts term it.

Instead, many cut-marks seem to have resulted from defleshing, stripping tissue of all kinds—muscle, skin, tendon, and periosteum—from bones. On the skull, for example, cut-marks are mostly found on the cranial vault, presumably from removing the scalp hair and pericranium, and on the face, presumably from removing the facial muscles, skin, and periosteum. On the long bones, a common pattern is the "nick-and-strip" pattern in which the worker moved down the shaft of the bone, pulling away tissue and making quick, repeated groups of light incisions every 1 or 2 cm, presumably to free tenacious tissue.

The principal focus for defleshing seems to have been the skull (cranium and mandible) and long bones; there are fewer defleshing marks on bones of the trunk, hands, and feet. This may reflect cultural ideas about what defleshing was intended to accomplish. Defleshing had no association with age: both adult and juvenile bones show this processing equally. Cut-marks are evident on 4.6 percent of juvenile bones (18/393) and on 5.8 percent of adult bones (67/1152); statistically, the difference is not significant.

Defleshing took place within an interval beginning long enough after death that decomposition had already begun and the body did not need to be completely dismembered and stripped of large muscle masses, but when enough residual tissue remained on the skeleton to make the use of stone tools in addition to hands and other tools necessary. The low-force, finely incised cut-marks suggest that cutting was aimed at tenacious rather than thick tissue. In some cases, cut-marks were demonstrably made in places which would be inaccessible until the body was already substantially reduced to fragmented separated elements. How long was this interval? Complete skeletonization depends largely upon the environment, and can take anywhere from a minimum of several weeks to a maximum of years (Reichs 1998). In a temperate, seasonally variable environment such as Neolithic Italy, without particular steps taken to preserve bodies, we would expect decay to be substantially advanced within

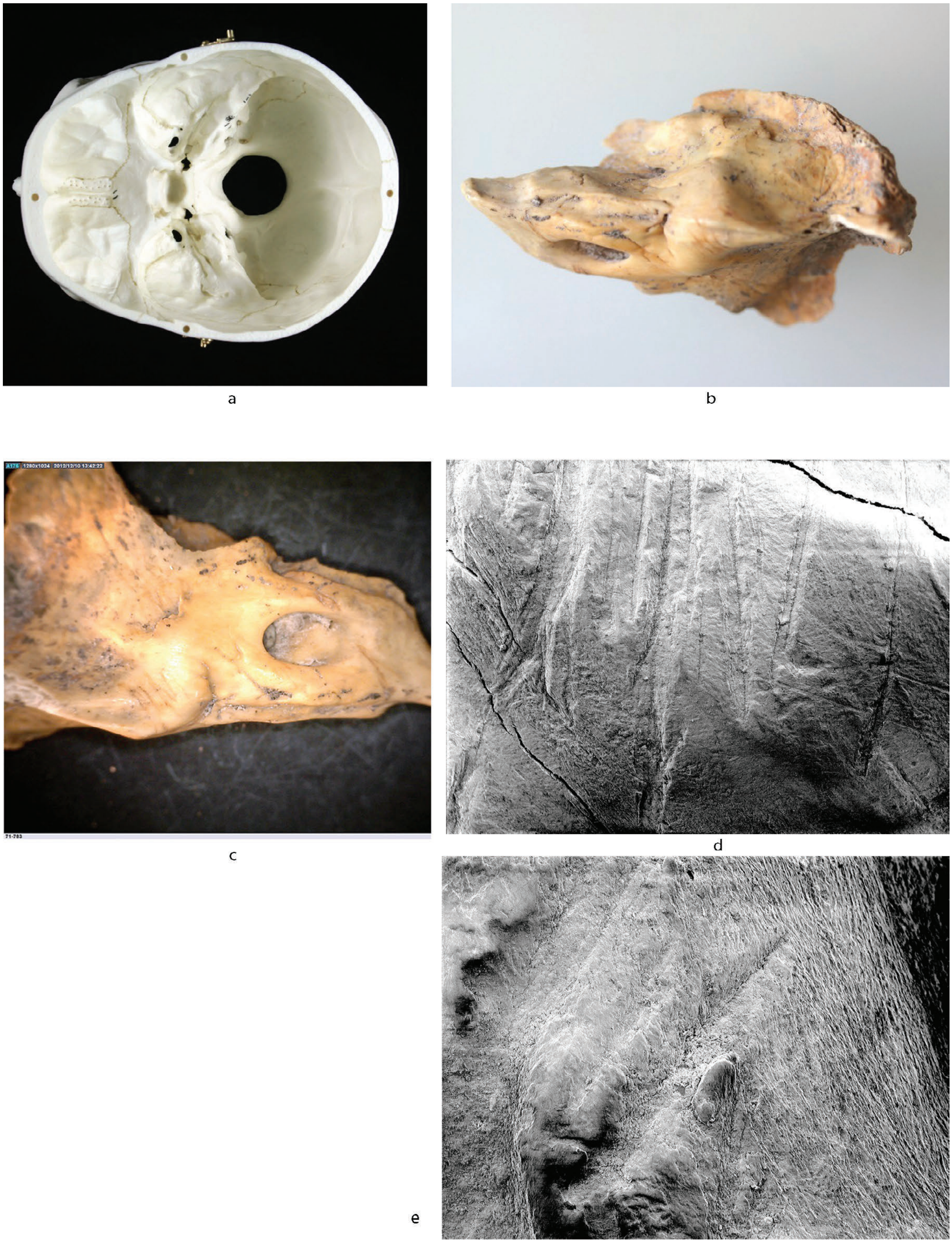


Fig. 4.4.23. Endocranial cut-marks. (a) Location (two groups on pyramidal process, right temporal bone; one group on body of sphenoid). (b) Temporal bone (71-783) with two groups of cut-marks, one on crest of petrous region and one cutting across internal acoustic meatus. (c) Detail of same specimen. (d) SEM imagery of group of cut-marks, same specimen. (e) Same specimen, SEM image of large cut-mark crossing internal acoustic meatus (photos: b–c: J. Robb; d–e: J. Skepper).

weeks and skeletonization to be mostly complete within a year at most.

Defleshing may have happened during the same period as some breakage of the bones (see below). However, it occurred before the mineralized breaks due to disturbance of bone, as these breaks often cut across cut-marks, and before burning and the accumulation of concretions. There was little relationship between burning and the presence of cut-marks: 5.4 percent (80/1476) of bones without burning showed cut-marks; 7.2 percent (5/69) of burned bone showed cut-marks. However, this is not a statistically significant relationship.

We can finally return to the general interpretations proposed at the beginning of this chapter. It is quite clear that the cut-marks at Scaloria did not principally result from disarticulating the dead, nor from removing edible muscle mass from them. This would argue against an interpretation of dietary cannibalism as at Fontbrégua. Nor do they reflect harm and violence—these are light, fine marks rather than violent blows, and in some cases they can only have been made after the individual was already dead. Moreover, there is no association with perimortem trauma or perimortem bone fracturing. Finally, the cut-marks are not unpatterned, but the patterning they display reflects the general process by which they were created rather than the specific, narrowly defined kind of intervention with particular locations, gestures, and techniques typical of surgery, ritual mutilation, scalping, trophy collecting, or autopsy. Instead, as at Krapina (Russell 1987a), Margaux (Toussaint 2011), and the Juntunen site (Russell 1987b), they seem to reflect defleshing bodies which may have been dead for some time already, cutting away residual adhering tissue and separating bones when necessary to achieve a tissue-free bone surface.

Perhaps the most curious aspect of all is that people took care and effort to remove the residual tissue thoroughly from the skull and long bones, but there is no sign they attempted to produce specific forms of soft tissues (as in stereotypical scalping), and when they were finished, they threw the cleaned bones away. It is, of course, possible that the resulting bits of soft tissue were kept for ritual use, but there is no evidence for this. It seems more likely that the goal of processing the bodies was simply to accomplish fully and finally the separation of bone and flesh, after which neither was of much further consequence. As in other rites of secondary deposition when bones are cleaned (e.g., Danforth 1982), perhaps concluding this separation marked an important transition in the funerary process.

BREAKAGE PATTERNS

Bone in living people is a composite material made of both mineral hydroxyapatite and the protein collagen; it is both rigid and elastic or plastic. When subjected to strong forces, it bends before breaking into characteristic patterns. Exactly how it breaks depends upon the forces involved and the geometry of the stressed place, but the fractures often have a curving or spiral morphology, radiating fracture lines and smooth fracture surfaces, and sharp margins. At death, the collagen in bone begins to degrade, leaving predominantly the mineral substance, which is more brittle. Bone with little or no collagen tends to fracture in typical patterns of square-edged, rectilinear fractures; examined closely, the fracture margins are often ragged or show the columnar structure of the mineral.

It is therefore possible to distinguish, in most cases, between fractures that happen when bone is "fresh" or "green"—before death, at death, or soon enough after death when the bone still contains a high level of collagen—and fractures that happen long afterward when it contains little collagen. Here, we follow the general methods of Outram (1999, 2001, 2002; Outram et al. 2005). All bone fragments were categorized according to what kind of fractures they displayed, according to the following categories:

- "Perimortem" fractures: Curving or spiral outline; radiating fracture lines in crania; examined closely, fracture margin is sharp and the fracture surface is smooth, with a ribbon-like appearance. Such fractures are common in the Scaloria Cave faunal material (Figure 4.4.24), apparently result-

Fig. 4.4.24. Perimortem fractures in faunal remains from Scaloria Cave (photo: J. Robb).

ing from butchery practices. These contain ample collagen, like that in a living animal.

- "Dry" fractures: Curving or spiral outline; examined closely, the fracture margin is undulating and the fracture surface is rough, unlike those of perimortem fractures. These occur when the bone retains some collagen but not as much as in a "fresh" bone.
- "Mineralized" fractures: Fracture with straight or rectilinear outline; the fracture margin is square and fracture surface is ragged or crenelated; edges of fracture may show soil-filled breaks or concretions. These have little or no collagen present.
- "Recent" fractures: Like mineralized fractures, but with no soil in broken margins, suggesting recent breakage. The fracture surface coloration is unlike bone exposed to soil in burial.
- No fractures (e.g., complete bone).

The loss of collagen is a continuous, ongoing process, and clearly fracture types generally form a continuum rather than absolutely discrete categories, but most specimens were categorizable without ambiguity using these standards. When multiple kinds of fractures were observed on a single specimen (e.g., one edge was broken not long after death, and another edge was broken much later, creating a mineralized break), we recorded all observed fracture types as percentages of all fractures. In this analysis, however, for each specimen, we tabulate the fracture occurring soonest after death.

Converting these categories to times after death when breakage occurred is a matter of rough estimation. In general, the categories we call "perimortem" and "dry" here together comprise bone that retain all or some collagen; the main use in distinguishing the two categories is to separate breakage which occurred at death (in cases of violent trauma or around the time of death) from breakage happening due to taphonomic processes over the succeeding months. The transition from "fresh" bone breakage to mineralized bone breakage occurs within five months after death for bodies exposed on the surface in temperate environments (Wieberg and Westcott 2008). However, in other environments, fresh bone breakage can persist longer. In any case, it is safe to assume that both "perimortem" and "dry" breakage happened within a year after death.

So when and how did the Scaloria collection become so fragmented? Some 23.4 percent of the Scaloria assemblage comprised whole elements; these were predominantly either small bones such as phalanges and metacarpals, or bones belonging to the two relatively complete and undisturbed skeletons. Another 43 percent bore only recent fractures, presumably a result of removing fragile bone from its soil matrix and drying it upon excavation. Thus, 66.4 percent of the assemblage was unaffected by earlier breakage.

"Mineralized" breakage—breaks happening more than a year after death when little or no collagen was present—was the earliest breakage recorded for 27.3 percent of the assemblage. In many cases, such breaks were covered with concretion, confirming their antiquity, and in some cases they were also burned, which suggests that they occurred during the active Neolithic use of the cave, whether one year after they were deposited or 200 years. They may have resulted from disturbance and repositioning of the bones during ongoing ritual activity over the course of years, or from other activities in the cave, or both. There is little scraping or abrasion evident on the bones, which suggests that breakage did not happen due to trampling in situ.

Only two perimortem breaks were observed in the assemblage (0.2%). There was also a complete absence of impact scars, conchoidal fractures, and evidence of smashing bones open to remove marrow (Lyman 1994; Outram 1999, 2000, 2002; White 1992). This usefully excludes the possibility that the bodies were subject to high levels of violence at or around the time of death, as one might expect in a massacre scenario. It also excludes a scenario of dietary cannibalism as at Mancos Canyon or Fontbrégua. Some 77 specimens (6.2%) displayed "dry" fractures, such as fractures happening between death and the loss of collagen. These fractures are slightly but significantly more common in long bones than in other bones, clearly because long bones both are larger and thus more likely to be disturbed, and because their tubular structure produces the diagnostic fracture form more readily. Similarly, "dry" fractures affect adult bones significantly more commonly than juvenile bones; this is probably simply because adult bones are larger and more likely to be disturbed, trodden upon, or split while being moved or manipulated. Overall, a total of 6.4 percent of the bones were first broken during the first year or so after death (Tables 4.4.11 and 4.4.12; Figures 4.4.25 and 4.4.26).

This timing is particularly suggestive when we consider the cut-mark evidence. As argued above,

Table 4.4.11. Breakage patterns in different areas of skeleton

	Skull	Scapula	Spongy bones	Long bone	Hands and feet	Total
Perimortem and "dry" breakage	11 (4.5%)	1 (1.3%)	6 (7.6%)	59 (20.9%)	2 (2.5%)	79 (6.4%)
Mineralized breakage	111 (45.9%)	14 (4.1%)	100 (29.5%)	99 (35.1%)	15 (7.0%)	339 (27.4%)
New or no breakage	120 (49.6%)	26 (3.2%)	352 (43.0%)	124 (15.2%)	196 (24.0%)	818 (66.2%)
Total	242	41	458	282	213 (17.2%)	1236

Table 4.4.12. Breakage patterns among adults and juveniles

	Adult	Juvenile	Total
Perimortem and "dry" breakage	68 (7.7%)	11 (3.0%)	79
Mineralized breakage	259 (29.4%)	80 (23.6%)	339
New or no breakage	555 (62.9%)	271 (32.8%)	826
Total	882	362	1244

Fig. 4.4.25. "Dry" break occurring within first year after death. (a) Femur shaft fragment with helical fracture (115). (b) Detail of fracture edge in same specimen, showing irregular, columnar fracture that distinguished break from perimortem breakage (photos: J. Robb).

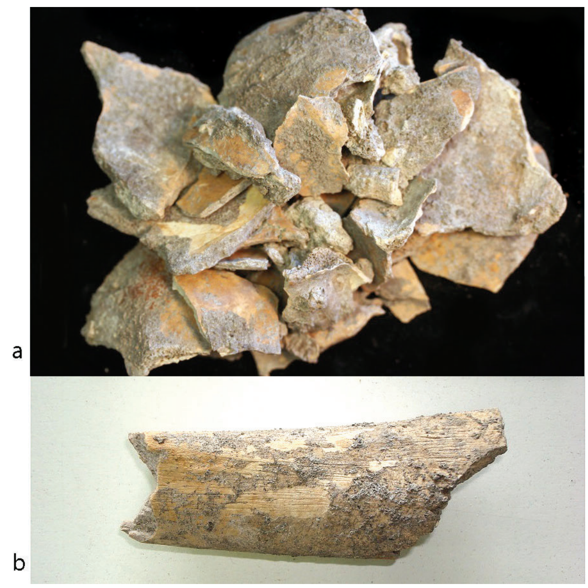


Fig. 4.4.26. (a) Typical fragments with mixture of recent breaks and "mineralized" breaks happening a year or more after death and soil exposed breakages or concreted (188). (b) "Mineralized" breaks in a femur distal shaft (photos: J. Robb).

Table 4.4.13. Cut-marks and breakage

	No cut-marks	Cut-marks	Total
Perimortem and "dry" breakage	65 (82.3%)	14 (17.7%)	79
Mineralized breakage	303 (89.4%)	36 (10.6%)	339
New or no breakage	800 (96.9%)	26 (3.1%)	826
Total	1168	76	1244

cut-marks show the removal of residual soft tissue some time after death, but close enough to death that some tissue would still be adhering to the bone strongly enough to require cutting away with stone tools. This is about the same interval in which these fractures of fresh bone would have taken place, and it may be that breakage occurred during the same ritual operations of defleshing. Statistically, in this assemblage, cut-marks are more common on bones with "dry" fractures than on bones without them, which would confirm that cut-marks and bone fracturing happened as part of the same ritual processing. This is clearest in one specimen, a juvenile clavicle, which displays both cut-marks and a distinctive peeling or splintering of bone at the distal end; this is typical of green or fresh bone being split apart—for instance, if the shoulder joints were forced apart while still held together tightly with ligaments (Figure 4.4.27; Table 4.4.13).

Fig. 4.4.27. (a) Juvenile clavicle with cut-marks at midshaft and peeling of green bone at lateral end (95-1263). (b) Detail of same specimen (photos: J. Robb).

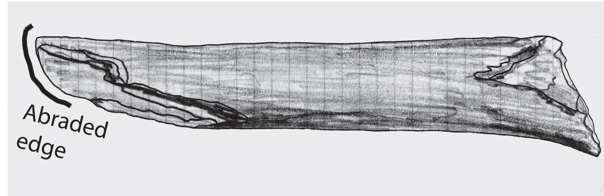


Fig. 4.28. Worked human bone: juvenile right femur (180-3425) (drawing: J. Robb).

Worked Human Bone

One of the most unusual findings of the 1978 excavation was a fragment of human bone which had been worked or used as a tool. This was a juvenile right femur, including the shaft from about the level of the lesser trochanter down to the midshaft (180-3425; inventoried in 1990 but not found in 2010 inventory). At both ends, the bone had been broken off irregularly, probably in "mineralized" fractures after loss of collagen. On the distal end of the fragment, the margin of the bone was abraded, creating a smooth, rounded edge about 1 mm wide. The modification was minimal but clearly identifiable. This abrasion clearly happened after the bone had been broken. No other modification of the bone is evident. No attempt had been made to shape the bone to a particular form for a specific purpose, and it was not intensively used; the wear observed could probably have been produced in a few minutes of working leather, clay, flesh, or some vegetable material (Figure 4.4.28).

Scaloria Cave has yielded a substantial assemblage of bone tools and worked bone (cf. Pian, Chapter 6.4, this volume). Many of them conform to common Neolithic types, notably awls made by splitting sheep or goat metapodials. At the same time, it is not uncommon on Neolithic sites to find broken bone fragments which have been used as expedient scraping tools. This would appear to be one of the latter. Why would one make such a tool using a human bone? It is possible that it was used as an expedient tool during defleshing processes, if these were done in the cave. Alternatively, it could have been used for the same kind of quotidian use as the other modified bone tools found in the cave. This may imply that someone looking for a handy piece of bone for expedient use did not recognize it as human bone rather than animal bone. This, of course, may imply simply that the people using Scaloria Cave were not trained osteologists able to distinguish faunal remains from human remains. However, if the skeletal deposits represent post-ritual disposal of "decommissioned" human bone, it may have been regarded as no longer human in any relevant sense.

Spatial Patterning within the Cave?

Taphonomic analyses often involve investigating whether different areas of a site have different forms of bone deposition. Our ability to analyze the Scaloria assemblage spatially is limited by the available provenience information, and by the fact that the cave was not excavated as a large area excavation, but in many small trenches scattered about (see Figure 2.1.23; see Chapter 2.1 for discussion). However, we can at least compare the human bone found in the various trenches.

The basic taphonomic characteristics of the assemblage were compared among trenches (Tables 4.4.14 to 4.4.17). The results show a number of differences. Trenches 3, 4, 5, 7, 8, and 9 have either no human bone or very small samples. In their low quantity of burned, broken, and cut-marked bone, trenches 2 and 6 clearly reflect the presence of complete burials. In comparison with the samples from other trenches, trench 10 displays several clear statistical tendencies:

- Slightly fewer "perimortem" and "dry" breaks, which may reflect less disturbance and bone movement.

Table 4.4.14. Taphonomic characteristics of human bone from trenches 1 through 10

Trench	Archaeological features	Identified fragments (N)	Juvenile (%)	Perimortem and dry breaks (%)	Cut-marks (%)	Burned (%)	Left side/ right side (%)
1	Placed cranium, scattered bone	137	9.5	28.0	4.4	18.2	54.5/45.5
2	Complete burial	194	4.1	1.5	2.1	1.5	57.0/43.0
3	Small sample	53	1.9	12.5	3.8	1.9	54.2/45.8
4	Small sample	2	50.0	0	0	0	100/0
5	Small sample	11	36.4	27.3	0	0	36.4/63.6
6	Almost complete child skeleton	95	83.2	2.1	6.3	0	49.3/50.7
7	No human bones	0	0	0	0	0	0
8	Small sample	13	0	30.8	2	0	38.5/61.5
9	No human bones	0	0	0	0	0	0
Sum trenches 1–9		429	7.0	9.0	4.7	6.8	54.4/45.6
10	Main bulk of human bone	823	31.5	4.9	5.8	4.4	48.7/51.3
Overall sample		1252	27.5	5.3	5.1	4.9	50.2/49.8

Note: Actual sample size varies slightly for each observation.

Table 4.4.15. Types of bone represented in each trench

			Hand/foot	Long bone	Scapula	Cranium and mandible	Spongy bone	Total
Trench	1	Count	5	57	6	41	28	137
		% in trench	3.6	41.6	4.4	29.9	20.4	100
	2	Count	65	25	1	21	82	194
		% in trench	33.5	12.9	0.5	10.8	42.3	100
	3	Count	2	15	1	21	13	52
		% in trench	3.8	28.8	1.9	40.4	25.0	100
	4	Count	1	1	0	0	0	2
		% in trench	50.0	50.0	0	.0	.0	100
	5	Count	3	6	0	1	1	11
		% in trench	27.3	54.5	0	9.1	9.1	100
	6	Count	18	25	3	4	45	95
		% in trench	18.9	26.3	3.2	4.2	47.4	100
	8	Count	1	7	0	3	2	13
		% in trench	7.7	53.8	0	23.1	15.4	100
Total all but 10		Count	80	120	8	90	130	428
		%	18.7	28.0	1.9	21.0	30.4	100
	10	Count	120	175	33	173	321	822
		% in trench	14.6	21.3	4.0	21.0	39.1	100
Total		Count	215	311	44	264	492	1326
		% within trench	16.2	23.5	3.3	19.9	37.1	100.0

- Slightly more spongy bones (e.g., the relatively fragile bones of the vertebrae, sternum, ribs, and os coxae) in comparison with long bones; this may reflect a slightly lower level of bone movement and destruction.
- More bones from the torso in comparison with long bones, particularly upper limb bones. This may perhaps reflect the deposition of remains representing the whole range of skeletal elements, rather than those subject to and able to resist movement around the cave.

Table 4.4.16. Body regions represented in each trench

			Upper limb	Head	Lower limb	Torso	Totals
Trench	1	Count	13	41	46	37	137
		% in trench	9.5	29.9	33.6	27	100
	2	Count	55	21	28	88	192
		% in trench	28.6	10.9	14.6	45.8	100
	3	Count	8	21	10	13	52
		% in trench	15.4	40.4	19.2	25	100
	4	Count	0	0	1	1	2
		% in trench	0	0	50	50	100
	5	Count	5	1	4	1	11
		% in trench	45.5	9.1	36.4	9.1	100
	6	Count	13	4	28	50	95
		% in trench	13.7	4.2	29.5	52.6	100
	8	Count	4	3	3	3	13
		% in trench	30.8	23.1	23.1	23.1	100
	Total all but 10	Count	89	90	99	148	426
		%	20.9	21.1	23.2	34.7	100
	10	Count	95	173	190	364	822
		% in trench	11.6	21.0	23.1	44.3	100
Total		Count	193	264	310	557	1324
		% in trench	14.6	19.9	23.4	42.1	100

Table 4.4.17. Origin of bone according to strontium isotope analysis by trench

	"Local"	"Non-local"	Total
Trench 1			
Trench 2		1	1
Trench 3	1	1	2
Trench 4		1	1
Trench 5			
Trench 6	4		4
Trench 7			
Trench 8	2		2
Trench 9			
Total trenches 1–9	7 (70%)	3 (30%)	10
Trench 10	18 (57%)	14 (43%)	32
Total	25	17	42

- A distinctly greater proportion of juvenile re - mains, possibly for similar reasons.
- Slightly lower percentages of burned bone, and slightly higher numbers of cut-marked bone.

These differences are relatively minor, particularly given that some of the trenches have quite small samples which may be biased by a few specimens; they underline the basic homogeneity of the collection. A tentative model to account for these differences would be that trench 10 represents bones deposited in the Neolithic in the ritual of disorderly, commingled deposition described in this chapter, more or less in the same area where they were originally deposited. The bone from the rest of the trenches represents a mixture of bone washing out of this area or moved out of this area and re-deposited farther inside the cave (and thus showing higher fractionation against torso and fragile elements and greater effects of breakage and burning) combined with some primary single burials such as the ones encountered in trenches 2 and 6. It thus seems likely that trench 10 is closer to the original area of re-deposition of secondary burials, while other trenches may include material moved outward from trench 10 as well as material resulting from other processes. Why this should result in slightly higher representation of bones from the right side of the skeleton in trench 10 and of the left side of the skeleton in other areas is not clear.

One of the most interesting differences between the areas of the cave is where "non-local" bones were deposited. As discussed in Chapter 4.3, strontium isotope variation gives a basis for distinguishing bones of "local" and "non-local" origin. At first glance, there seems to be a weak correlation between cut-marks and

Table 4.4.18. Cut-marks, origin of bones, and provenience

	Cut-marks?	"Local"	"Non-local"	Total
Trenches 1–9	No	6	2 (33%)	8
	Yes	6	1 (17%)	7
Trench 10	No	15	12 (44%)	27
	Yes	3	2 (40%)	5
Total	No	21	14	35
	Yes	9	3	12

"local" origin: 33 percent of cut-marked bones are "non-local," while 43 percent non–cut-marked bones are "non-local." To put this the other way around, 10/32 (31%) of "local" samples bear cut-marks, while 5/22 (22%) of "non-local" samples bear cut-marks (Table 4.4.18). However, this apparent correlation actually derives from spatial differences between the trenches. Trench 10 has proportionally more "non-local" samples (Table 4.4.17). But trench 10 also has fewer samples without cut-marks (Table 4.4.20). This is purely the result of bias in how samples were chosen for Sr analysis; we first analyzed a series of femora, most of which came from trench 10 and few of which were cut-marked, and then supplemented these with a series of mandibles, mostly from trenches 1 to 3 and many of which were cut-marked, along with some intentionally selected cut-marked samples, mostly from trenches 1 to 9. In fact, when we tabulate all bone specimens rather than those selected for Sr analysis, trench 10 has noticeably more cut-marked specimens (Table 4.4.14). The conclusive demonstration is that, when we examine trenches 1 to 9 and trench 10 separately, the apparent correlation between cut-marks and "local" origin vanishes entirely (Table 4.4.18). The conclusion seems to be that trench 10 includes both more "non-local" bone and more cut-marked bones than the rest of the cave, but that "local" and "non-local" people were equally likely to be defleshed.

"Bone Groups" in Trench 10

As trench 10 was excavated, human skeletal material was assigned to "bone groups." As we have seen above, these bone groups appear as denser areas within a patchy, sheet-like scatter of bone. But they give us the only available spatial information to subdivide this important deposition. Figure 4.4.29 gives a rough sketch showing the relative location of these groups.

The bone groups within trench 10 are heterogeneous rather than uniform in terms of their taphonomic characteristics and contents. Nevertheless, they show no clear patterning; there are no clear correlations among taphonomic features such as burning, breakage, and cut-marks, and types of bone represented, or between such features and location within trench 10 (Tables 4.4.19 to 4.4.22). Instead, as far as the

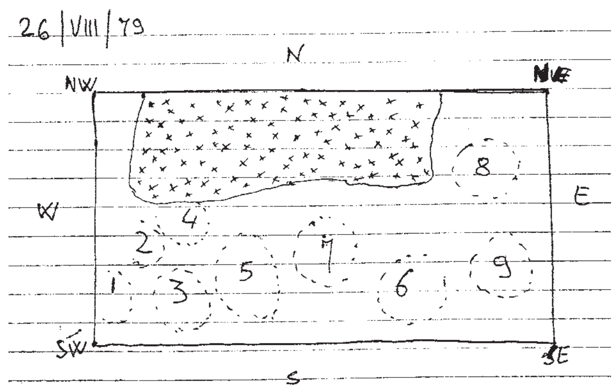


Fig. 4.29. Trench 10 "bone groups" (source: sketch map from 1979 excavation notebooks; trench is 2.5 × 1.5 m).

Table 4.4.19. Taphonomic characteristics of bone groups in trench 10

Bone group	Identified fragments (N)	Juvenile (%)	Fresh breaks (%)	Cut-marks (%)	Burned (%)	Left side/right side
1	79	43.0	8.9	6.3	7.6	53.2/46.8
2	66	39.4	4.5	1.5	4.5	52.8/47.2
3	25	20.0	0	12.0	8.0	44.4/55.6
4	120	43.3	3.3	2.4	0	51.6/48.4
5	170	32.4	2.9	7.1	5.9	48.3/51.7
6	71	29.6	7.0	1.4	4.2	42.9/57.1
7	113	25.7	3.6	8.0	1.8	44.0/56.0
8	42	9.4	4.8	4.8	4.8	27.6/72.4
9	100	27.0	5.1	6.0	7.0	56.5/43.5
All trench 10 bones	823	31.5	4.9	5.8	4.4	48.7/51.3
Overall sample	1545	25.4	6.4	5.5	4.5	48.7/51.3

Table 4.4.20. Types of bone represented in each bone group in trench 10

		Hand/foot	Long bone	Scapula	Cranium and Mandible	Spongy	Total
1	Count	7	18	4	19	31	79
	% in burial group	8.9	22.8	5.1	24.1	39.2	100
2	Count	7	11	0	13	35	66
	% in burial group	10.6	16.7	.0	19.7	53	100
3	Count	3	3	0	11	8	25
	% in burial group	12.0	12.0	.0	44.0	32	100
4	Count	17	24	2	7	70	120
	% in burial group	14.2	20.0	1.7	5.8	58.3	100
5	Count	28	29	13	48	52	170
	% in burial group	16.5	17.1	7.6	28.2	30.6	100
6	Count	8	18	3	12	30	71
	% in burial group	11.3	25.4	4.2	16.9	42.3	100
7	Count	25	25	2	18	42	112
	% in burial group	22.3	22.3	1.8	16.1	37.5	100
8	Count	5	10	5	15	7	42
	% in burial group	11.9	23.8	11.9	35.7	16.7	100
9	Count	16	23	4	20	37	100
	% in burial group	16.0	23.0	4.0	20.0	37	100
Total	Count	235	399	47	325	531	1537
	% in burial group	15.3	26.0	3.1	21.1	34.5	100

Table 4.4.21. Body regions represented in each bone group in trench 10

Bone group		Upper limb	Head	Lower limb	Torso	Total
1	Count	6	19	20	34	79
	% in burial group	7.6	24.1	25.3	43.0	100
2	Count	3	13	15	35	66
	% in burial group	4.5	19.7	22.7	53.0	100
3	Count	0	11	6	8	25
	% in burial group	0	44.0	24.0	32.0	100
4	Count	18	7	24	71	120
	% in burial group	15.0	5.8	20.0	59.2	100
5	Count	20	48	35	67	170
	% in burial group	11.8	28.2	20.6	39.4	100
6	Count	8	12	17	34	71
	% in burial group	11.3	16.9	23.9	47.9	100
7	Count	19	18	29	46	112
	% in burial group	17.0	16.1	25.9	41.1	100
8	Count	5	15	8	14	42
	% in burial group	11.9	35.7	19.0	33.3	100
9	Count	9	20	26	45	100
	% in burial group	9.0	20.0	26.0	45.0	100
Total	Count	235	325	371	603	1534
	% in burial group	15.3%	21.2	24.2	39.3	100.0

Table 4.4.22. Origin of bone for each "burial group" in trench 10

Burial group	"Local"	"Non-local"	Total
Group 1	2	1	3
Group 2	6	1	7
Group 3	1	1	2
Group 4	0	2	2
Group 5	2	1	3
Group 6	1	1	2
Group 7	1	0	1
Group 8	1	2	3
Group 9	1	4	5
Total	15	13	28

data allow us to determine, they seem to be apparently random collections of bone. The main difference in their contents seems to be the amount of spongy bones from the torso which they contain. Confirming this impression, when the taphonomic data are sorted according to the number of fragments identified within each bone group, the larger the sample size, the more they approximate the overall characteristics of the collection. This suggests that deviations from the general tendency may principally result from the vagaries of small samples. There are no systematic differences which might suggest that the bone groups result from the separate deposition of bones with different taphonomic histories prior to deposition. Similarly, strontium isotope analysis does not suggest that "local" and "non-local" bones were separated into different bone groups; rather, both types seem more or less randomly distributed among all bone groups.[5]

[5] For practical reasons, re-fitting studies looking for conjoins between bone from different bone groups were not undertaken, although they might prove informative on how the bone groups were formed.

Conclusions: Summary and Interpretation of Taphonomic Process

After this long exploration of the Scaloria Cave burial data, we can return to the question of how to interpret the human skeletal assemblage. Table 4.4.23 summarizes the statistical analyses underpinning the discussion above. Many of the models proposed for the cave can be evaluated readily (Table 4.4.24). For example, there is little support for any model of mass burial such as at Talheim or following an epidemic, or of dietary cannibalism as proposed for Fontbrégua.

Was Gimbutas right in her views quoted above? Yes and no. She correctly rejected mass burial and cannibalism views, and she perceptively saw that the assemblage was structured by ritual processing rather than simply consisting of disturbed "normal" burials. However, her description of the ritual process involved is wrong in most details. The deposition does not consist of a mass burial of bodies piled on top of each other at one moment in time. The estimate of 137 individuals present is not based on any reliable evidence; it probably simply represents the number of bags of human bones entered in the finds catalogue. While the burial assemblage is young in age, this is true of virtually all Neolithic Italian assemblages; it does not reflect ritual selection at Scaloria. There is no bias in favor of

Table 4.4.23. Summary of correlations among taphonomic variables

	Body part, kind of bone	**Side of body**	**Age (adult, juvenile)**	**Cut-mark**	**Burning**	**Breakage**
Area of cave	Trench 10 has more torso, spongy bone, scapula	Trench 10 has more slightly right bone, for no apparent reason	Trench 10 has slightly more juvenile bones	Trench 10 has slightly more cut-marks	Trenches 1–9 have slightly more burning—more disturbance	Trenches 1–9 have slightly more perimortem/dry breakage—more movement?
Body part, kind of bone		No pattern	No pattern	Cut-marks more common on long bone, skull	Burning more common on skull, for no apparent reason	Perimortem/dry breakage more common on long bone
Side of body			No pattern	No pattern	No pattern	No pattern
Age				No pattern	No pattern	Perimortem/dry breakage more common on adult bone (probably because larger)
Cut-mark					No pattern	Cut-marks more common on bones with perimortem/dry breakage
Burning						Burning more common on bones with perimortem, dry and mineralized breakage

Table 4.4.24. Evaluation of interpretations proposed for Scaloria Cave human bone assemblage

Model	Arguments supporting it	Arguments against it
"Burials"—undisturbed single primary inhumations	Trench 2: presence of complete articulated skeleton in trench 2.	
Quagliati explorations: description of complete articulated skeleton	Lack of complete, articulated skeletons everywhere else.	
"Disturbed burials"—single primary inhumations, disturbed by later activities or natural processes	Trench 6: almost complete skeleton found, with field notes describing articulated ribs and vertebrae, jumbled post-crania, missing cranium (possibly removed intentionally later).	
Trench 10 and general: element representation suggests presence of some complete bodies	Very few semi-articulated bones, particularly trench 10; element representation suggests at least some bodies were deposited secondarily, with loss of small elements. Most breakage happened elsewhere. Some breakage happened within first year after death (e.g., presumably not due to normal ongoing long-term disturbances).	
Secondary deposition	High level of disarticulation, chaotic disposition of material in situ; some bone was separated and/or broken before deposition during processing of bodies, and most bodies are highly incomplete; element representation curves show loss of small bones.	A simple model of sequential deposition, each burial displacing previous ones, or of a periodic "feast of the dead"–style re-interment, does not explain evidence for defleshing.
Mass burial following a malarial epidemic	—	No "mass burial" signature of many bodies deposited simultaneously in close contact; evidence for extensive postmortem processing of bodies (especially cut-marks); no particular evidence for disease.
Mass burial following warfare	—	No "mass burial" signature of many bodies deposited simultaneously in close contact; evidence for extensive postmortem processing of bodies (especially cut-marks); no evidence for extensive perimortem violent trauma or bone fractures.
Cannibalism	—	No evidence of perimortem violent trauma or bone fractures; cut-marks do not show butchering pattern or focus upon meat-rich areas.
Ritual processing	Trench 1: placement of disarticulated cranium with flint blade, possibly other objects. Trench 6: possible removal of cranium some time after burial. Trench 10 and general: intentional processing of bodies to remove tissue from bones; breakage and manipulation of bone within first year after death.	

women (in fact, there are no definite examples of women aged 20–22 years in the assemblage), and there is no reason to suppose any young women present died in childbirth. Moreover, while many bones display cut-marks, there are no cases of cut-marks at the base of the skull or on the vertebrae which would have resulted from removing the skull. Indeed, while there are two possible examples of special treatment of the skull (see below), element representation shows that the skull was not preferentially removed from most of the burials. These inaccuracies probably reflect Gimbutas's limited time on site during the excavation, which was

directed in the field by Shan Winn, as well as the limited, anecdotal and dated information on burial process supplied to her by Nemeskéri.

Our analysis shows that the dead at Scaloria received several distinct funerary treatments in the cave. This variety in itself is not at all unusual. There is a great variety of funerary treatments in the Neolithic of Puglia (Robb 2007:chapter 2). Even within a single site, virtually any site at which much bone has been excavated displays more than one funerary treatment (e.g., Masseria Candelaro: Cassano et al. 2004; Cala Colombo: Di Lucia et al. 1977; Grotta Pacelli: Striccoli 1988; Ripa Tetta: Robb et al. 1991; Passo di Corvo: Tiné 1983). For example, at Masseria Candelaro, the nearest village site at which extensive excavations have been carried out, several styles of burials have been found, as well as a deposit of skulls and isolated bone found in many contexts.

At Scaloria, some variation in funerary practices may be due to chronological differences.

- Single burial (disturbed, possibly for cranial retrieval), trench 6: probably Early–Middle Neolithic based on Guadone pottery
- Ritual processing of human bone/secondary deposition: collective deposition with defleshing ritual, trench 10 and general: Middle Neolithic (between 5500 and 5200 BCE) based on radiocarbon dates and Scaloria Bassa pottery
- Single burial (undisturbed): Middle–Late Neolithic (based on radiocarbon dates for trench 2 burial, between 5300 and 5100 BCE; based on high stratigraphic position and general presence of Scaloria Alta and Serra d'Alto pottery, Quagliati explorations)
- Ritual processing of human bone: placement of isolated cranium (trench 1), date unknown

The ritual processing at Scaloria is currently unique in the European Neolithic, although other examples could appear if similar taphonomic explorations were carried out on other assemblages. It is thus worth describing the Middle Neolithic burial processing in as much "ethnographic" detail as possible.

The principal area concerned is trench 10, where about two-thirds of the overall assemblage was found. Bones were deposited here from male and female adults, probably in about equal proportions, and from juveniles who comprise between a third and a half of the assemblage. The burial population thus probably approximates a cross-section of the group; only infants seem to have been excluded. Strontium isotope evidence shows that people with both "local" and "non-local" isotopic signatures were deposited here.

When people died, it is possible that some bodies were temporarily buried or exposed in the cave. However, if they were, they were subsequently disturbed extensively, and soon after burial. Whether bodies were originally deposited or exposed within the cave, somewhere else outside the cave, or a mixture of both, the assemblage recovered archaeologically must really be considered to be in secondary depositions. We can say little about the history of bodies before they were deposited at Scaloria Cave. Bones display no damage from root etching; nor do they generally display carnivore or rodent damage. This implies that they were not exposed on the surface or previously buried in shallow, vegetated environments. However, they could have been exposed in protected environments such as houses or the cave itself, or they could have been buried in temporary graves for a short period of time.

Some time after death, bones were processed. When did this occur? For at least some, if not all bodies, it was probably within no more than 6 months or so after death, so that the bones would still retain collagen and some soft tissue still adhered to them, but with joints becoming dissociated and soft tissue already separating from the bones. We do not know whether bodies were processed inside the cave or somewhere else; while there is no particular concentration of stone tools in the trench 10 area, enough were found there to provide an adequate supply if bodies were defleshed here (see Figure 6.2.3a).

Processing involved separating any remaining articulations; some bones were broken at this stage. Some areas of the body, principally the spinal column and hands and feet, may not have been processed much further; others, principally the clavicles, long bones, face and cranial vault, were the focus of the cleaning that followed. At this point, the bones were systematically cleaned to remove any skin, hair, muscle, tendon, and ligament still adhering to them. Cleaning was probably done mainly with the hands and tools of wood or bone; stone tools were used only to sever tenaciously adhering tissue through bursts of quick, fine incisions. Cleaning bones involved two specific techniques: on the cranium, strips or sheets of tissue were pulled from the vault, possibly starting laterally from the midline, and on the long bones, a "nick-and-strip" technique was used to proceed down the shaft of

long bones. Occasionally, the inside of the cranium was cleaned of remaining membranes as well.

After bones were cleaned of tissue, they were deposited rather chaotically, mixed with broken pottery, animal bones, stone tools, and other objects. They were deposited either on the floor of the cave or in a shallowly buried deposit. Subsequently, they continued to be subjected to breakage and movement, presumably as a result of ongoing funerary and other activities in the cave. It is in this stage that they suffered further "mineralized" breakage, burning, and concretion, and were transported farther from their original place of deposition, resulting in various minor differences between the trench 10 assemblage and bones from other areas.

We can therefore imagine a rite of gathering the bodies of the recently dead, bringing them to Scaloria Cave, processing them, and depositing them. At this point, we begin to encounter unanswered questions about the meaning, context, and further implications of the rite.

Who was involved? Both "local" and "non-local" people were deposited at Scaloria. "Local" people are slightly more frequent in the depositions in trenches 1 through 9; the main bone deposit in trench 10 contains slightly more "non-local" people in its mix. Scaloria is currently a unique site in the region; if these rites were practiced around each village, we would expect to find similar sites for disposing of the dead near other villages. The unique cult practiced in the Lower Cave may have helped to make the site particularly appropriate for collecting the dead from several communities. Moreover, strontium evidence shows greater variability at Scaloria Cave than at comparative village sites, suggesting that the Scaloria assemblage represents more than simply a village catchment (see Chapter 4.3). This suggests that trench 10 represents a particular episode within Scaloria's history when people from multiple communities were brought together, defleshed, and deposited in rites of secondary deposition.

How often did this ritual happen? This is unknown. At one end of the spectrum, one scenario is that defleshing and deposition happened periodically for up to a century or two, with many repeated ritual episodes taking place. It may have been a periodic festival somewhat along the lines of the "feast of the dead" of Eastern Woodlands Native Americans. If so, we would have to suppose that the number originally deposited was far higher than the MNI of 22 or 31, which is certainly not impossible. At the other end of the spectrum, it seems possible that the deposition in the trench 10 area represents a single episode—perhaps a religious revival or an exceptional response to some exceptional circumstance. This seems relatively unlikely to us, simply because it would imply at least a couple of dozen people dying in relatively small village communities within a half-year interval. But it is theoretically possible if there were some exceptional cause of mortality or if the catchment encompassed enough villages; even two to three villages the size of Masseria Candelaro or Passo di Corvo could potentially have supplied enough dead. This issue is yet to be explored, but perhaps population modeling and modeling of the ratio between different kinds of breakage could help clarify it.

Why did this particular rite take place here? Is it merely coincidence that this kind of disposal took place here, or was there an association with the unique "cult of the waters" site in the Lower Cave? This question goes beyond any question of taphonomic analysis, and we defer our ideas on it to another occasion. However, it is worth noting that the answer depends partly on understanding how unique this ritual processing was. Did Neolithic inhabitants of the Tavoliere process their dead similarly at other sites? It is impossible to say without similar studies of skeletal assemblages from other sites; although scattered, fragmented, and disarticulated human remains are known from almost every village site excavated on the Tavoliere, even at sites where there is clear evidence for placing and manipulating human remains and opening up burials, nobody has ever carried out the detailed, specialized examination needed to reveal such treatment. This is an obvious focus for future research.

A final question is, What was the actual aim of the defleshing rites? This relates directly to the question of what kind of site Scaloria Cave actually is. As noted above, the goal there was not to collect and retain specific pieces of bone for ritual use or as trophies, nor, apparently, to collect and retain specific pieces of soft tissue. If so, we would have expected to find alterations of the body more like those associated with relic collecting or division of the body (see Brown 1981, 1985; Mafart et al. 2004). Instead, the goal seems simply to have been to finish the separation of bone and soft tissue. This inspires two final thoughts. First, separating flesh and bone fully was considered important as marking a key point in the transformation of the dead, perhaps an end to commemoration rites and the beginning of understanding them as ancestral presences, spirits, or memories rather than present beings. It may have been part of managing an emotional regime of mourning.

Appendix

Table 4.4.25. List of cut-marked specimens

Element		Side	Bag	Number	Age	Details
Calcaneus		R	34	626	A	Cut-mark located on inferior surface of sustentaculum tali in groove for tendon of M. hallucis flexor longus.
Clavicle		L	4	19	J	Two clear, deep cut-marks on superior surface of clavicle midshaft. Transverse cut across shaft. There are also 5 pairs of lighter scratches around them.
Clavicle		L	95	1463	J	Multiple cut-marks on inferior surface. From lateral end: pair on posterior surface, single mark on posterior surface, pair on lower anterior surface, pair on center bottom, single mark on posterior lower surface, pair on posterior lower surface. Distinct "v" profile, encrustation in cut-marks. Cut-marks seem to be oriented toward medial end; some are oriented directly on attachment for conoid ligament.
Clavicle		L	99	13473	A	Three short cut-marks inferior to the attachment for M. pectoralis major. Scorched after cut-marks.
Clavicle		L	110	1087	J	(a) Group of 4 deep notches on anterior edge of clavicle—distal end just at curve, transversely to shaft, just medially to deltoid attachment. Concretion covering some of them. (b) Two isolated cut-marks on anterior side of inferior surface of midshaft.
Clavicle		L	168	3373	A	Added from 1990 notes. Series of at least 5 transverse cut-marks across inferior side of midshaft.
Clavicle		R	91	1623	J	Inferior side of midshaft. One deeply marked transverse cut; a second less deeply etched parallel to it and slightly overlapping. Note also spalling on lateral end—bone peeling away in layers: perimortem breakage.
Clavicle		R	95	1462	A	Central and lateral shaft of right clavicle. At least 21 cut-marks running transversely from acromial end to junction of lateral shaft and midshaft, on posterior side of shaft. Multiple short cut-marks, possibly aimed at acromio-clavicular ligament or superficial skin. Cut-marks precede crushing and concretion.
Clavicle		R	166	3367.9	A	Added from 1990 inventory. One cut-mark on superior/anterior side, transverse to shaft, ca. 2 cm in from lateral end; the other on superior side, transversely, between anterior and posterior borders.
Cranium	Frontal		86	1066	A	Two cut-marks running almost precisely along center of cranium, perhaps a few centimeters posterior to superciliary arches. Fine marks partly covered by concretions; 4 others on l side of fragment, running transversely.
Cranium	Frontal		98	1250	A	Frontal, including glabella and just above (right and left both). Cut-marks are zone 2 (left side), 8 mm from metopic suture, running superiorly-inferiorly across superciliary arch; ca. 19 mm long; 2 parallel ones.
Cranium	Frontal	R	96	743	A	Four cut-marks running antero-posteriorly across frontal toward supraorbital ridges. Long, separate incisions.
Cranium	Frontal	R	114	1165	J	Juvenile frontal with part of coronal suture. Right side: 2 faint cut-marks running antero-posteriorly.
Cranium	Occipital		112	1300	A	Fragment of unsided occipital, partially scorched. Three cut-marks, linear, long; 1 extends across entire fragment.
Cranium	Occipital	L	93	981	A	Small fragment left occipital with small piece parietal and lambdoidal suture. Four long cut-marks in 2 pairs, going from right (superior) to left (inferior), parallel and spaced apart ca. 1.5 mm.
Cranium	Occipital	L	112	1289	A	Occipital. Cut-marks located right of midline; series of ca. 7 incised marks extending antero-posteriorly, parallel but crossing each other (fast repeated gesture).
Cranium	Occipital	L	124	292	A	Occipital, left. One continuous deep cut-mark with concretions in it, medio-laterally across the occipital from asterion.

Table 4.4.25, continued. List of cut-marked specimens

Element		Side	Bag	Number	Age	Details
Cranium	Occipital	R	110	1091	A	Occipital. One fine mark about middle of lambdoidal suture, ca. 5 mm behind suture, oriented anterior-posterior. Others possible but very faint.
Cranium	Parietal				A	Parietal fragment, partially burned; side unidentified; 3 long cut-marks; casual find mixed with pottery in Manfredonia museum; labeled "T10 grave 5/1."
Cranium	Parietal		67	453	A	Unsided parietal, 2 pairs of linear incisions extending entirely across fragment, each pair ca. 3 mm apart.
Cranium	Parietal		114	1165.1	A	Unsideable. Long narrow fragment with 2 pairs of fine cut-marks running ca. 7 mm in from sagittal suture and parallel to sagittal suture. Partly covered by concretion.
Cranium	Parietal		188	191	A	Unsided parietal; 2 clear long cut-marks, 1 shorter but 1 long and thin, and several shorter, wider ones made at oblique angle to bone surface. Orientation of fragment uncertain, but clearly cut-marks made in different directions and at different angles of incidence.
Cranium	Parietal		188	190	A	Fragment of parietal, scorched, not associated with skeleton; unsided; 1 cut-mark running almost entirely across it; cut-mark happened before burning.
Cranium	Parietal		194	207	A	Unsided vault fragment, probably parietal; 3 short, broad cut-marks; 2 linear ones in a "v"; then 1 long cut-mark and 1 shorter running perpendicularly and cutting across the second group. Bone scorched after cutting.
Cranium	Parietal	L	18	9	A	Long, linear cut-marks, parallel pairs, parallel to and ca. 4 mm from sagittal suture.
Cranium	Parietal	L	53	1054	A	Parietal fragment B, different individual. Two very faint cut-marks, running anterior-posterior next to sagittal suture; crossing. Others may be present but very faint.
Cranium	Parietal	L	53	1052	A	Parietal fragment A: 2 cut-marks extending along sagittal suture; anterior 1 cuts across suture in places. Not quite joining—2 separate gestures to continue 1 line of cutting.
Cranium	Parietal	L	71	777	J	Five cut-marks on parietal slightly posterior to the coronal suture, running mostly medio-laterally but slightly diagonally.
Cranium	Parietal	L	71	781	A	Left parietal. Nine fine, long cut-marks: 2 near sagittal suture, the other 7 bunched in a repeated, overlapping set of gestures on lateral side of fragment.
Cranium	Parietal	L	77	464	A	Small fragment of left parietal. Four short cut-marks clustered together with another 1 running diagonally to them. Orientation of cut-marks is mostly medio-lateral but slightly diagonal. They are wide, and suggest scraping rather than slicing.
Cranium	Parietal	L	112	1298	A	Two parallel cut-marks extending diagonally postero-laterally to antero-medially, ca. 3 mm apart. Another pair of cut-marks cut across these at a different angle.
Cranium	Parietal	L	112	1290	J	Parietal, at junction of lambdoidal and sagittal sutures. Two major cut-marks and a shorter 3rd cut-mark, running between them; all parallel to sagittal suture.
Cranium	Parietal	R	30	809	A	Right parietal. Three long, clear cut-marks, running diagonally across parietal ca. 1.5 cm above temporal suture and below the temporal lines (which are not visible on this fragment). Perhaps aimed at fascia of M. temporalis? Striations inside each cut-mark clearly visible—perhaps scraping transversely?
Cranium	Parietal	R	86	1067	J	Right parietal, juvenile. Two longer ones running anteriorly-posteriorly toward broken end of fragment.
Cranium	Parietal	R	91	1665	A	Right parietal. Multiple cut-marks, at least 3, running antero-posteriorly, above temporal lines. One straight, some curving, widely separated.

Continued on next page

Table 4.4.25, continued. List of cut-marked specimens

Element		Side	Bag	Number	Age	Details
Cranium	Parietal	R	95	1503.1	A	Two small cut-marks running medio-laterally across lateral edge of small fragment of right parietal at lambda. Note also perimortem concentric fractures—impact on green bone. No information on relative timing of fracture and cut-marks.
Cranium	Parietal	R	114	1165.2	J	Right parietal, 2 fine cut-marks running mostly anterior-posteriorly but also slightly diagonally—disappearing under concretion.
Cranium	Parietal	R	190	204	A	Parietal, probably right side, 2 long fine marks, generally parallel, ca. 6 mm apart. Orientation diagonally across cranium from antero-medial to postero-lateral.
Cranium	Sphenoid	L	91	1663	J	Body of left sphenoid—2 cut-marks running across suture into ethmoid (missing), endocranial.
Cranium	Temporal	R	71	783	A	Right petrous; series of cut-marks along pyramid crest internal to skull; 6 located laterally on crest of petrous pyramid, 2 located near internal acoustic meatus, one of which crosses its opening to other side. Probably aimed at removing (semi-dried?) membranes after the cranium was broken open.
Cranium	Temporal	R	99	1597	A	Multiple cut-marks (at least 5) running across petrous pyramid crest on temporal bone, along superior border of the sigmoid sinus, making clear nicks in crest.
Cranium	Unid				A	Vault fragment, burned all over; side, part unidentified; casual find mixed with pottery in Manfredonia museum; 2 long close cut-marks (or 1 double mark made with notched edge?).
Cranium	Unid				A	Vault fragment; 2 long cut-marks; side and part unidentified; casual find mixed with pottery in Manfredonia museum; labeled "T10 grave 1."
Cranium	Unid				A	Vault fragment, burned all over; side, part unidentified; 2 long cut-marks cross entire surface; casual find mixed with pottery in Manfredonia museum; labeled "T10 grave 5/1."
Cranium	Unid		40	1272	J	Three cut-marks crossing corner of small fragment, ectocranial surface, with encrustation. Probably juvenile based on thinness of fragment.
Cranium	Unid		191	205	A	Small fragment of cranial vault, side and element unknown; 1 linear cut-mark runs across it for ca. 1 cm.
Cranium	Unid		265	532.1	Y	Unsided vault fragment, possibly frontal. Six very closely grouped short ones running off edge of fragment.
Cranium	Zygomatic	R	96	745	A	Right zygoma. Two small parallel cut-marks on margin of right orbit, going anterior-posteriorly. Another 7 cut-marks lateral to these, again on inferior orbital margin, closely parallel. Another cluster of marks near medial end of fragment, below orbital margin, running diagonally; this includes a deep one and about 5 shallower ones.
Femur			98	1267	A	Unsided midshaft fragment, anterior side; 4–5 cut-marks, not particularly grouped, some made with tool hitting bone at an angle
Femur		L	17	21	A	Four groups of cut-marks. (a) Postero-medial femur about where neck joins shaft, at about level of lesser trochanter, 2 light scratches. (b) Medial surface, on neck: 1 small cut-mark. (c) Anterior surface of neck below and medial to greater trochanter; single, well-marked cut. (d) Lateral surface, just below greater trochanter; 2 light scratches. Thus, there are cut-marks all around this femoral fragment. Implication: it was attached to os coxae and this was part of a determined effort to detach it. Sample 10.
Femur		L	34	638	A	Left femur, neck region between trochanters. Two small cut-marks located on medial side of neck ca. 2 cm below level of lesser trochanter. Four fine, faint transverse nicks. Several possible others but too faint to really identify.

Table 4.4.25, continued. List of cut-marked specimens

Element	Side	Bag	Number	Age	Details
Femur	R	87	1115	J	Chemical sample 29. Lower end of shaft has an extensive dry fracture and spalling. One clear transverse cut-mark on middle of anterior shaft. Cut-mark probably precedes fracture, on grounds that if you had fractured bone to state it is in now, there probably would be no point in cutting it.
Femur	R	88	387.5	J	Five groups on upper shaft between lesser trochanter and midshaft—small transverse nicks in groups of 5–10 incisions each; location on medial, anterior, and lateral shaft.
Femur	R	88	385	J	Sample 23. Two faint, transverse marks ca. 3 mm apart on center of popliteal surface, ca. 15 mm above end of diaphysis. Partly covered by concretion. Aimed at tendons for hamstrings, M. gastrocnemius?
Femur	R	99	1599	A	Noted in inventory but not in re-check.
Femur	R	102	406	A	Pair of transverse incisions ca. 2 mm long, faint; on posterior surface across linea aspera; under microscope ca. 8 more appear over area of ca. 1 cm. Many fine, rapid incisions moving up or down the shaft.
Femur	R	289	1701	A	Midshaft fragment, posterior side; 5–6 transverse incisions across linea aspera, heavily eroded.
Fibula	L	114	1212.5	A	Left fibula shaft fragment from lower shaft. Two groups: first, 2 clear small nicks running transversely on the posterior border (pair); second, 2 pairs (4 total). Groups 7 mm apart.
Fibula	L	274	542	A	About 10 cut-marks distributed sporadically along the crest of dorsal border in at least 3 small groups of 2–6, spaced ca. 9–15 mm apart. Clear "nick-and-strip" technique.
Fibula	L	279	1164	A	Series of transverse cut-marks across anterior edge of fibula, ca. 5 cm above distal articular surface, including at least 5 distinct cut-marks, single not double, with "v" profile.
Fibula	R	262	523	A	Upper shaft, right fibula. Four groups of cut-marks on dorsal surface, ca. 20 mm apart, all fine transverse. Clear example of pairing of marks and nick-and-strip technique.
Fibula	R	279	13474	A	Fibula shaft, proximal end. On dorsal side, group of 6 transverse cut-marks.
Humerus		91	1682.1	A	Unsided humerus shaft, just below proximal end. One slanting diagonal; at least 2 short transverse and probably 3–4.
Humerus	L	71	770	A	Series of cut-marks along medial side below deltoid tuberosity—1 group of 5, 1 group of 7, in attachment of M. brachioradialis; transverse nicks, very clear example of them appearing in pairs.
Humerus	L	112	1284	J	Five groups—3 around various surfaces of midshaft, transversely and 2 higher up.
Humerus	L	179	3371	A	Added from 1990 notes. Two pairs of cut-marks, 1 on anterior surface of distal humerus ca. 5–10 mm above trochlea, the other on top margin of lateral epicondyle.
Humerus	L	181	40135	A	Added from 1990 notes. Three transverse cut-marks across humerus midshaft.
Humerus	R	29	593	A	Group 1: 3 on anterior pillar, 1 pair and a third; group 2: 5 faint ones around flexor pronator complex. Medial collateral ligament, on medial epicondyle.
Humerus	R	98	1236	A	Distal right adult humerus. There are probably 50 cut-marks running transversely along anterior pillar of shaft, often in pairs ("nick-and-strip"). There is also a second group of at least 12 along medial side of trochlea, medial to articular surface; directed at synovial capsule and support ligaments.
Mandible	L	86	1077	A	Left coronoid process—5 transverse marks along crest just above/behind alveolus for M3.

Continued on next page

Table 4.4.25, continued. List of cut-marked specimens

Element	Side	Bag	Number	Age	Details
Mandible	L	271	537	J	Adolescent; 4 cut-marks of varying lengths crossing inferior margin of corpus, obliquely buccal-lingual, probably starting on lingual side. Number 45 in Gilbert's sticker numbering.
Mandible	R	104	1059	J	Noted in inventory but not in re-checking.
Mandible	R	287	1711.1	A	Two groups of cut-marks, 1 ca. 5 mm medial to mental foramen, 2 clear ones and 2 small faint ones; a second group ca. 1 cm below this, also running diagonally, with 3–4 lines. Both groups are light scratches, oriented diagonally from latero-inferior to medio-superior.
Mandible	R	290	1703	A	(a) Cut-marks inside mandible, just to right side of genial tubercles—two longer ones oriented vertically. There are 2 smaller, lighter cut-marks located above and to right (laterally). Sediment concreted in them. Aimed at removing tongue musculature. (b) On the inferior aspect of corpus, beneath M1 at margin of corpus, there is 1 deeply incised mark running slightly oblique across the body of the corpus; 1 distally is shorter and 1 medially is longer; a series of ca. 8 running at intervals along the base of corpus all the way to chin.
Mandible	R	303	914	A	Antemortem tooth loss of M1, possible expanded mental foramen—abscess. (a) One patch of fine incisions on lower left ramus, multiple, ca. 10. (b) On ascending ramus, series along anterior edge (at least 10). (c) Multiple cuts inferior to canine root, beneath the second right incisor, within infradental fossa to sever small mouth/chin muscles. Cuts across tip of tooth root exposing it; there is also a cut-mark cutting across surface of tooth itself. Sr sample B.
Mandible	R	306	909	A	(a) Cut-marks just above roots of canine on canine pillar, extending down to base of fragment; ca. 5 total. (b) One below p3, c; below M1 there are small clusters of scratches, 2 shallower ones lower down on the body of the mandible, all running horizontally. Young adult with carious lesion M3, hypoplasia. Note cut-mark on M1.
Mandible	R	307	911	A	Four groups: (a) 2 faint ones running vertically on back side of condyle; (b) anterior and below condyle there are 5–6 transverse incisions; (c) posterior and below condyle there are 5–6 transverse incisions; (d) on medial side of ascending ramus there are 2 visible cut-marks. Almost encircling condyle, removal of mandible from cranium. Sr sample F.
Metacarpal	L	95	1470	A	Left metacarpal 4 shaft. On proximal end of shaft, dorsal surface, 2 pairs of 2.
Patella	L			A	Left patella; 3 cut-marks across middle of anterior surface, horizontally; labeled "T10 grave 1," found in Manfredonia museum mixed with pottery.
Os coxae	L	75	612	J	Juvenile left ilium with a single clear cut-mark ca. 4 mm anterior to sacro-iliac joint, on inside surface of the ilium, running transversely. Slight concretion inside cut-mark. Aimed at sacro-iliac ligament.
Os coxae	R	124	239	J	Juvenile right pubic ramus. Located on top of ramus, ca. 1 cm from pubic symphysis. Pair of cut-marks, transverse. Aimed at inguinal ligament?
Radius		58		A	Added from 1990 notes (specimen 202). Transverse cut-mark near distal end of radius shaft.
Radius	L	32	1440	A	Proximal end left radius. On neck just beneath fusing proximal epiphysis (adolescent). Transverse, beneath annular ligament. One cut-mark.
Radius	R	214	293	A	Posterior surface of midshaft—several long (2–3 cm) cut-marks that (unusually) run longitudinally along the shaft rather than being short transverse ones. Hints of others on anterior surface.
Rib	L	112	1337.5	A	Left rib blade, small and thin. From central section of blade. Two pairs of faint cut-marks running diagonally from superior-lateral to inferior-medial, with another faint mark crossing them.

Table 4.4.25, continued. List of cut-marked specimens

Element	Side	Bag	Number	Age	Details
Rib	R	33	895.1	A	At least 8 or 9 cut-marks extending across entire anterior surface of the rib, slightly diagonally (from the lateral side of body superiorly to the center of body inferiorly).
Rib	R	77	476.1	A	Two faint cut-marks diagonally on anterior side of rib blade central of angle.
Scaphoid	R	106	923	A	Two clear cut-marks transversely across articular surface for the radius; carpus must have been disarticulated from wrist or in process of becoming disarticulated when cut-marks were made.
Scapula	L	38	906	A	Axillary border of left scapula, about half-way down group of 3 small transverse nicks (aimed at M. teres minor attachment?).
Scapula	R	182	3	A	Group of 4 cut-marks on spine of scapula, near top of spinous process, below acromion; on posterior surface near lateral edge. Cut-marks are in supraspinous fossa, muscle belly of M. supraspinatus. Two pairs of cut-marks.
Tibia	L	98	1231	A	Tibia complete, except for distal end. Four cut-marks transverse on posterior shaft just above nutrient foramen, just lateral to soleal line. One tight group only.
Tibia	L	216	294	A	Several dozen small transverse cut-marks all down anterior crest of lower tibia shaft.
Tibia	R	175	3427	A	Added from 1990 notes. Parallel transverse cut-marks across tibia shaft.
Tibia	R	187	33	A	Transverse on posterior surface, just below and lateral to nutrient foramen; cuts across interosseous crest, 2 cut-marks, strongly marked, slanting bevel cut from above, 9 m apart (not a pair).
Tibia	R	209	317	J	Three groups of marks. Near distal end of fragment is group of 6–7, transverse, grouped in pairs; similar group superiorly; third group is above and lateral to soleus origin, 5–6 cut-marks.
Unidentified		87	1163	A	One clear cut-mark and 2 fainter ones. Unidentified fragment of shaft (probably tibia or femur).
Unidentified		98	1264.1	A	Long bone shaft fragment, probably femur or tibia, side unknown. One long cut-mark and a group of 4 shorter ones.
Vertebra, cervical		32	1455	J	Two deep parallel cut-marks and 4 lighter ones running medio-laterally across supraspinous tubercle, on l side of bifid tubercule. Superior side. Probably ca. 6. Cut-marks run under concretion.

A, adult; J, juvenile; L, left; R, right.

Moreover, once bone was defleshed and bodies were broken up, human remains do not seem to have been treated with much ceremony. In other Tavoliere sites, it was common to cut into or erode the burials of the dead, resulting in odd bits of human bone around villages and in ditches; human bone does not seem to have been regarded as a particularly important or disturbing substance. At Scaloria, defleshed and broken-up human bone was deposited chaotically in what is probably best described as a sheet midden, in unprepared and unprotected areas mixed with detritus such as broken pottery and animal bone. It is virtually the contrary of what we might intuitively expect burial to be, the solemn and careful final laying to permanent rest of a beloved object. Of course, this ostentatiously unritualistic act of deposition would clearly have had a ritualistic quality, a meaning created by its context: throwing a processed human body away as if it were something unimportant changes its status and redefines it as something other than a human body. Such re-definition is a hallmark of rites of passage. It suggests that, ultimately, the ritual act at Scaloria Cave may have been an act of decommissioning, of defining human bone as no longer human remains to be treated differently from any other rubbish. It removes any contradiction between the human bone deposition and the ongoing quotidian use of the cave for other purposes such as shelter and keeping herds. In this sense, Scaloria may offer us not a ritual assemblage but a post-ritual one.

RIASSUNTO

Questa sezione comprende l'insieme di ossa umane rinvenute nella parte alta della grotta o nel camerone superiore, applicando una varietà di metodi tafonomici che si sono sviluppati nel corso degli ultimi due decenni. La domanda centrale è: quali elementi hanno dato all'insieme queste caratteristiche particolari e che cosa questo ci dice riguardo i rituali funerari praticati in grotta Scaloria? La domanda è particolarmente importante data la varietà di interpretazioni che sono state fatte storicamente; in vari momenti la grotta è stata interpretata come un cimitero di sepolture normali disturbate (da Quagliati, Drago, e da alcuni dei ricercatori del 1978–1979), come una sepoltura di massa risultante da un'epidemia (da Tiné e Isetti), come luogo di deposizione secondaria e di manipolazione rituale di parti del corpo (da Winn, Shimabuku, e Gimbutas), e perfino, per breve tempo, da Gimbutas come luogo di cannibalismo.

Il complesso qui analizzato è composto da 3475 frammenti; circa l'80 per cento proveniva dalla trincea 10. Circa due terzi erano elementi diagnostici. Solo quattro contesti contengono reali sepolture o deposizioni intenzionalmente collocate. Questi includono:

1. *La sepoltura della Trincea 6, lo scheletro di un bambino completamente articolato, che include la mandibola e le vertebre cervicali, ma manca il cranio, che è stato apparentemente rimosso con la successiva riapertura della sepoltura in seguito. Questa probabilmente precede le principali deposizioni di ossa.*
2. *Dalla Trincea 1, un cranio di adulto intenzionalmente collocato messo con la base in una concavità naturale nella roccia con una lama di selce sopra la parte frontale. Questo appartiene al Neolitico ma non può essere datato in modo più preciso.*
3. *Dalla trincea 2 sepoltura articolata di uno scheletro femminile completo che giace sul suo lato destro, che può risalire circa alla fine delle principali deposizioni di resti umani.*
4. *Almeno una sepoltura completa, e probabilmente più di una , trovata da Quagliati e risalente forse al periodo successivo alla fase Scaloria Bassa.*

Oltre a questi quattro contesti, tutte le altre deposizioni di ossa umane in grotta risultano quasi completamente disarticolate e molto frammentate. L'analisi che segue descrive le loro caratteristiche tafonomiche.

- *Articolazione. Note e fotografie sul campo dimostrano che la quasi totalità delle ossa umane era disarticolata al momento del rinvenimento. Non c'è evidenza di semi-articolazione o di modelli residuali per suggerire che le ossa fossero state originariamente depositate come sepolture complete e successivamente disturbate da forze naturali, e quasi nessun indizio che i manufatti rinvenuti fossero intenzionalmente associati con ossa umane. Inoltre, almeno alcune delle ossa erano state frammentate prima della loro deposizione finale. Le ossa disarticolate non formano delle associazioni né sono sepolte in buche; sembrano essere state sparse sulla superficie del deposito della grotta.*
- *La selezione e la sopravvivenza di diverse parti dello scheletro è stata valutata confrontando il sistema proporzionale con campioni di riferimento da siti con una varietà di pratiche rituali. La presenza di ossa di tutte le parti del corpo suggerisce che almeno alcuni corpi completi erano stati depositati nella grotta Scaloria. L'assenza di ossa che si distruggono facilmente (sterno, sacro, vertebre e regioni facciali) conferma un elevato livello di distruzione meccanica e di rottura, probabilmente durante rideposizione. Le ossa principali possono anche essere stati ridepositate dopo un trattamento iniziale effettuatoin altro luogo. Nel complesso, l'evidenza a Grotta Scaloria suggerisce una deposizione secondaria dei corpi in un processo che ha comportato un elevato livello di distruzione meccanica così come una certa perdita di ossa.*
- *Bruciature sono evidenti su 4,5 per cento del totale , sempre con una colorazione dal bruno al nerastro derivante da un esposizione a bassa temperatura. Probabilmente è accaduto casualmente come risultato di altri usi della grotta.*
- *Mancano totalmente danni da carnivori, è stato osservato soltanto un possibile caso di masticazione da parte di un roditore.*
- *Dal punto di vista morfologico la rottura delle ossa è stata distinta tra il risultato di fratture che avvengono subito dopo la morte e tra fratture che accadono molto tempo dopo la morte. Sono state osservate poche fratture peri-mortem, escludendo ogni ipotesi di violenza. Il 6,4 percento delle fratture mostrate sono avvenute probabilmente entro un anno dopo la morte, forse quando le ossa sono state disturbate o ridepositate.*
- *Un campione di osso umano presenta un bordo arrotondato e levigato mostrando di essere stato usato come strumento di abrasione: probabilmente il risultato di un utilizzo casuale.*

La più interessante caratteristica tafonomica sono i segni di tagli. Tutte le ossa sono state sistematicamente esaminate e controllate al microscopio per individuare possibili segni di tagli. Nel complesso, sono stati identificati 98 esemplari di segni di tagli (5,5% dell'assemblaggio sono tutti piccole incisioni sottili), che spesso si presentano in coppie o a gruppi numerosi. Essi si trovano su tutto il corpo, più comunemente sulle clavicole, mandibole, sulla volta cranica e su ossa lunghe, dalla loro posizione, sembrano essere stati destinati a rimuovere il tessuto residuale superficiale, piuttosto che disarticolare e macellare corpi freschi. Sorprendentemente, sono stati trovati tre esempi di segni di taglio endocranico, i quali avrebbero potuto essere fatti solo dopo che il cranio era stato rotto, aperto e il cervello rimosso, e sembrano destinati a rimuovere le membrane residue. Il segni di taglio forniscono una forte evidenza di una sistematica scarnificazione del corpo, anche molto dopo la morte quando la decomposizione era già iniziata, ma finché alcuni tessuti rimanevano aderenti allo scheletro.

Qual era lo scopo della scarnificazione? Paradossalmente, l'osso veniva pulito con molta cura e poi scartato. Forse la completa separazione della carne dalle ossa era considerata importante per segnare un punto chiave nella trasformazione dell'idea del morto: probabilmente segnava la fine dei riti di commemorazione del defunto. Questo atto rituale a Grotta Scaloria , potrebbe essere interpretato come un atto di "demolizione" dei resti umani, ossa da trattare come qualsiasi altro resto da scartare. In questo senso, Scaloria potrebbe essere considerato non un assemblaggio rituale, bensì un assemblaggio post-rituale.

Chapter 5

Material Culture I. Pottery: Form, Decoration, and Distribution

5.1. Pottery Morphology and Typology

Antonella Traverso

Most of the pottery recovered from the various excavations, as already noted in Winn and Shimabuku (1980:13; and Appendix 2 [online]),[1] was of the *figulina* type, defined on the basis of the chronological sequence of Neolithic ceramic types in the Tavoliere (Tiné 1983). The overwhelming dominance of figulina wares in Scaloria is marked. However, many other facies of Neolithic pottery known from southeastern Italy are also represented in the pottery assemblage from the cave. Figulina is followed in significance by another early type, the *impresso* ("impressed") ware. Other types are represented but are not as significant as figulina and impresso. These include Guadone (Mallory 1984–1987), Passo di Corvo–Bande Bianche, Masseria la Quercia, and Serra d'Alto wares (Tiné 1983).

This chapter introduces the categories of wares and the method of presentation used in this analysis. The wares have been divided into three classes—rough, medium, and figulina—on the basis of several characteristics: surface treatment, sherd thickness, and decoration. In addition, the less well-represented sherd types, such as Guadone, Masseria la Quercia, and Passo di Corvo–Bande Bianche, are discussed in terms of their relationship to the eponymous Scaloria styles. Tables are included that cross-tabulate each class of ware (rough, medium, and figulina) by form (type and subtype) followed by figure number(s) when illustrated. (See Glossary, at the end of this chapter, for ware definitions and abbreviations used here.)

The ware classes include:

- *Rough ware:* Porous impasto fabric, rich in gritty inclusions of various sizes and materials; porous surfaces, some smoothed down, generally unpolished and with frequent traces of wood tool usage; surface colors vary from gray to yellow-brown; wall thickness ranges from thick to very thick.
- *Medium ware:* Medium impasto paste occasionally with small inclusions; colors vary from yellow-brown to dark; fabric is generally well fired.
- *Figulina ware:* Homogeneous structure, sometimes of buff clay; wall thickness between 2 mm and 7 mm, with a medium weight; surface is well polished and has a typical red color. On the basis of decoration patterns, one group of figulina ware has been termed "Lower Scaloria style" (Scaloria Bassa) or, more recently, "Catignano–Lower Scaloria," while a second group has been termed "Upper Scaloria style" (Scaloria Alta). The most important differences among them are decorative, but it is also worth noting the surface texture and the impasto, which is fine in Lower Scaloria, and powdery to the touch and less well preserved in Upper Scaloria.

[1] Appendices available online at www.dig.ucla.edu.

Typology of Vessel Forms and Styles

The vessel forms and types in each of these three classes—the "rough" wares (class "R"), the "medium wares (class "M"), and the "figulina" wares (class F)—are presented below. After the analytical description of each ware category, the vessel forms are divided into respective types and subtypes. (See Glossary, at the end of this chapter, for pottery forms and typology.)

1. Rough class (Figures 5.1.1, 5.1.2, 5.1.13)

The rough class is represented by thick-walled dark or buff-brown wares; this category of vessel includes some shapes that can be ascribed to a range of functions, including containing, transforming materials, pouring, and stirring (troncoconic bowls, hemispheric bowls), while other forms were probably used only for storage (pots and jars). Impression is most frequent (creating *ceramica impressa* or impressed ware), and incision is also attested frequently. All shapes are represented in a limited number of types and varieties, except for the "pot" form, which occurs in many, sometimes complex types.

Rough Bowl (RB)
Open vessel with wide form, lacking inflection points, with walls of varying thickness and form. It includes several subtypes.

Rough Hemispheric Bowl (RHB)
Convex vessel with hemispheric profile and convex bottom; the diameter is always greater than the height (Table 5.1.1). Four subtypes are defined.

Rough Troncoconic Bowl with Convex Wall (RTB 1)
A rectilinear-walled vessel with a straight profile and a diameter that is always larger than the height (Table 5.1.2). There are two subtypes.

Rough Vessel with Neck (RVN 1)
Complex vessel form composed of a cylinder neck with a restricted opening and a more or less flattened sphere for the body; normally lacking handles for suspension; used to pour and contain (Table 5.1.3). There are two subtypes.

Rough Jar (RJA 1)
Large vessel of complex, globular shape; large dimensions with elements such as handles, which are often absent in the other classes (Table 5.1.4); frequently decorated with impressions made using varied tools. There are two subtypes.

Rough Pot (RPO 1–RPO 4) (Figure 5.1.2)
Vessel of simple globular or pseudo-spherical shape, with relatively large dimensions, lacking handles or grips, used to contain (Table 5.1.5). There are several types, each with subtypes.

2. Medium Class (Figure 5.1.3)

This class includes less-developed pottery of large dimensions (bowl in the form of a cone or hemispheric bowl, cup, and neck vessel) and one form of more considerable dimensions used as a stock pot.

Medium Bowl
Medium bowls are wide, open vessels, without points of inflection; wall thickness and form vary. They can be divided into several categories.

Medium Hemispheric Bowl (MHB 1) (Figure 5.1.3: MHB 1A, 1B)
Convex vessel with hemispheric profile and convex bottom; diameter always greater than the height (Table 5.1.6). Two subtypes are defined.

Medium Troncoconic Bowl (MTB 1) (Figure 5.1.3: MTB 1A, 1B)
Vessel with straight-walled body; profile is always straight, and rim diameter is greater than the height (Table 5.1.7). There are two subtypes.

Medium Cup (MCU 1) (Figure 5.1.3:MCU 1A, 1B, 2, 3)
Open vessel with a height/diameter relationship of 1:2 and a form more closed than bowls; usually used for drinking, with handles or lugs for suspension; forms are often quite complex (Table 5.1.8).

Medium Vessel with Neck (MVN 1) (Figure 5.1.3: MVN 1A, 1B)
Closed, complex shapes with small dimensions, composed by joining several solid shapes to create a more or less biconic profile, and used to contain and pour (Table 5.1.9).

Medium Pot (MPO 1) (Figure 5.1.3:MPO 1A, 1B, 1C, 2A, 2B)
Vessel of simple, globular, or pseudo-spherical shape, with relatively large dimensions, without handles, used to contain solids or liquids (Table 5.1.10).

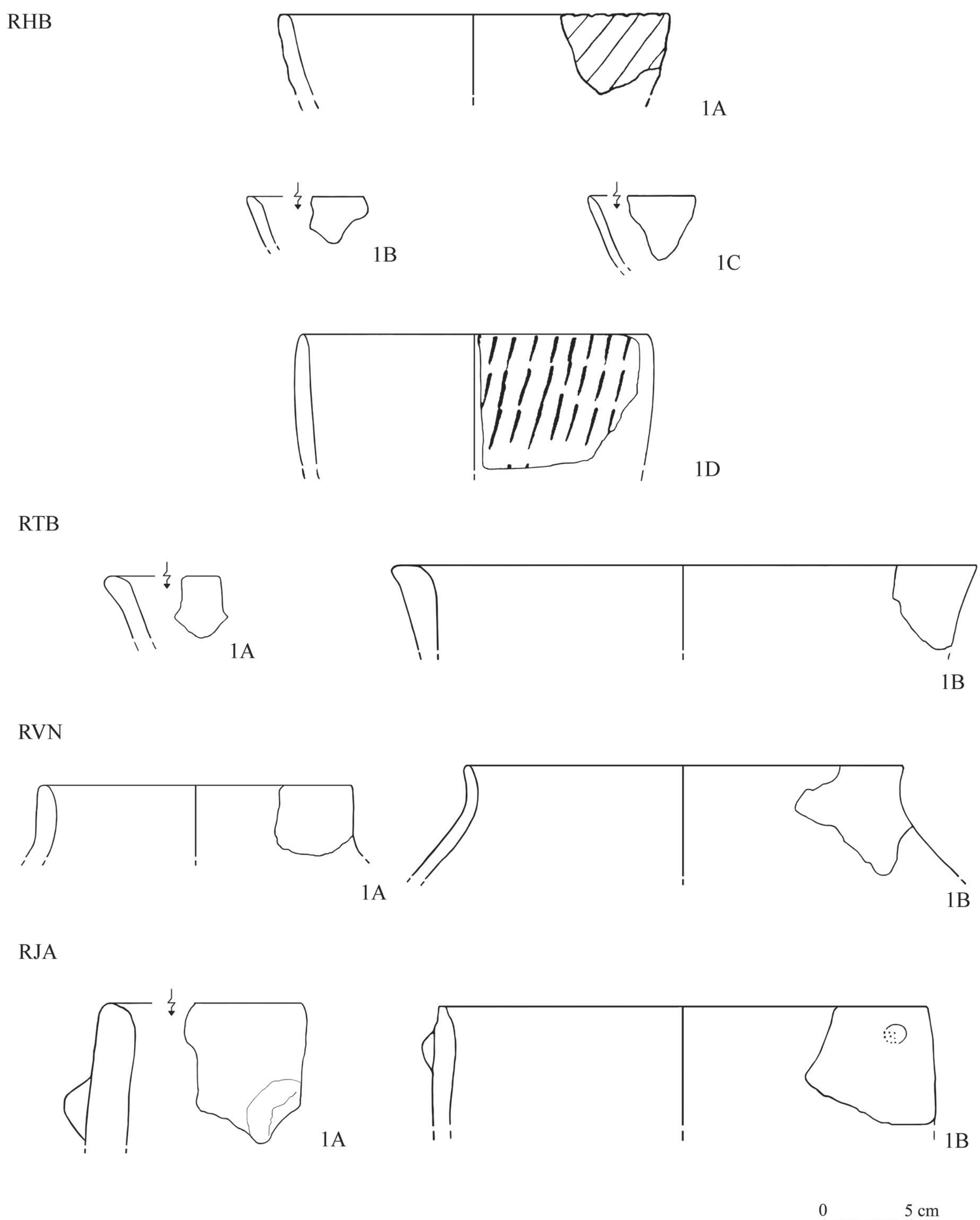


Fig. 5.1.1. Rough hemispheric bowl (RHB): see Table 5.1.1. Rough troncoconic bowl (RTB): see Table 5.1.2. Rough vessel with neck (RVN): see Table 5.1.3. Rough jar (RJA): see Table 5.1.4.

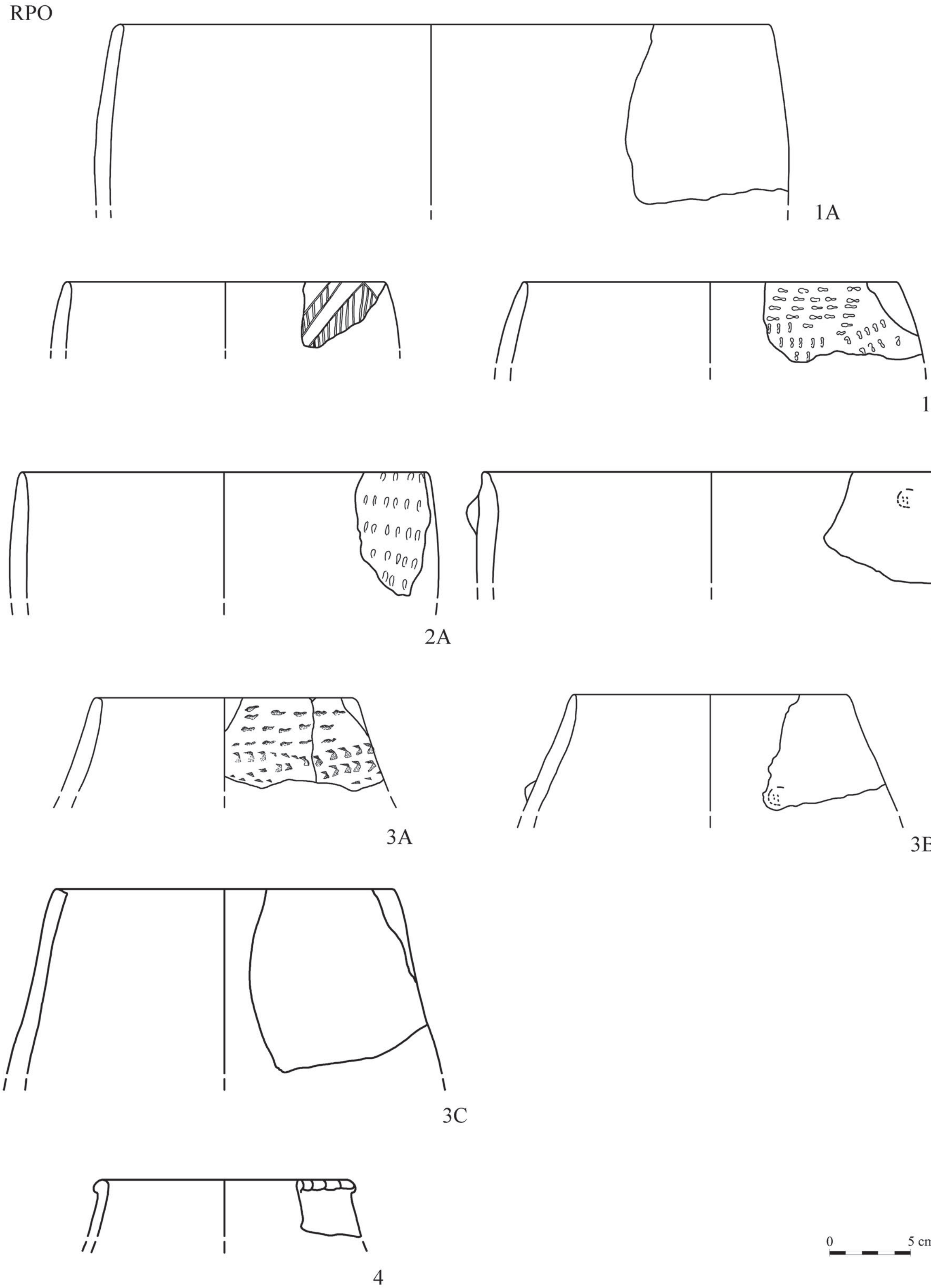


Fig. 5.1.2. Rough pot (RPO): see Table 5.1.5.

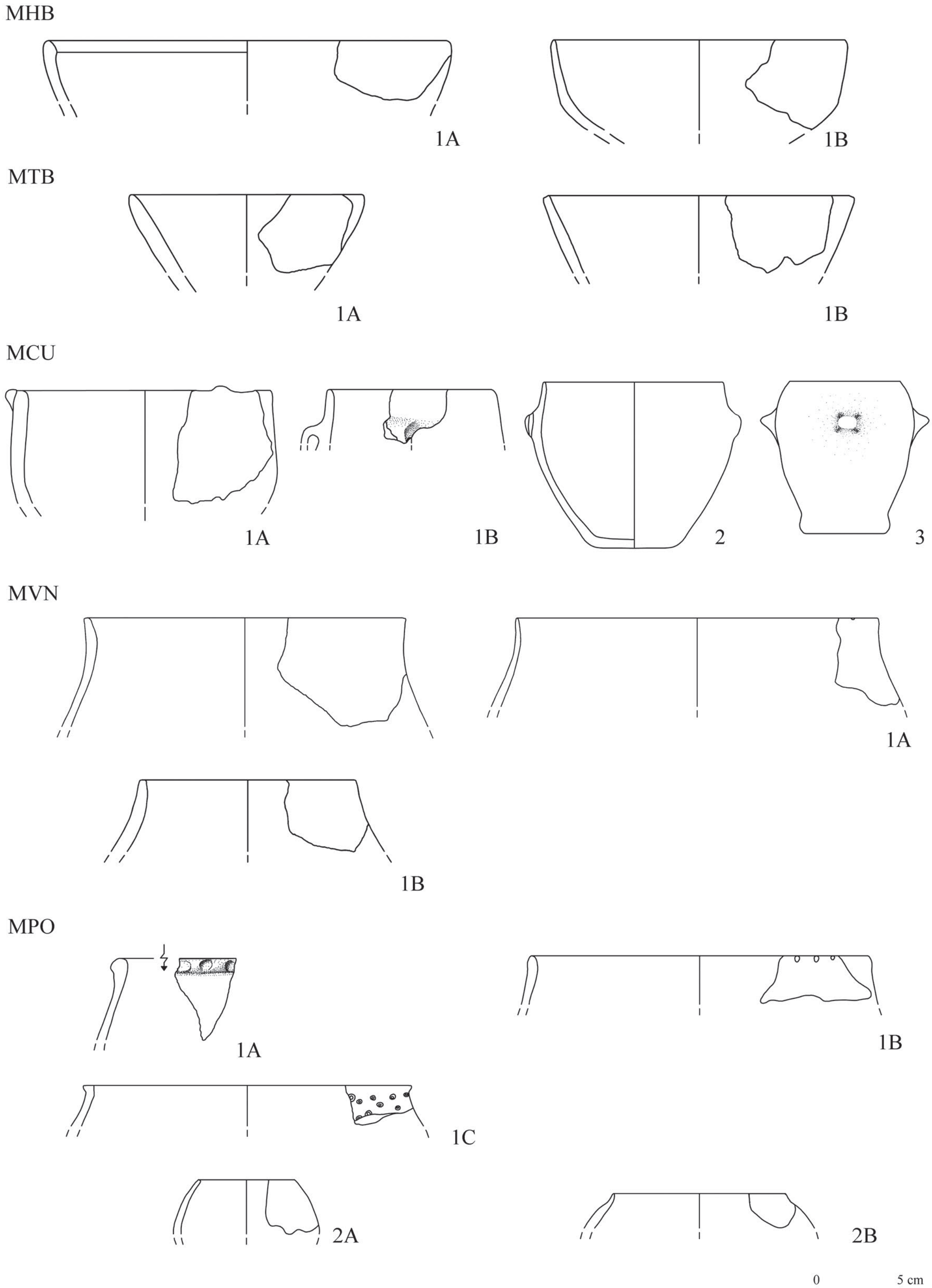


Fig. 5.1.3. Medium hemispheric bowl (MHB): see Table 5.1.6. Medium troncoconic bowl (MTB): see Table 5.1.7. Medium cup (MCU): see Table 5.1.8. Medium vessel with neck (MVN): see Table 5.1.9. Medium pot (MPO): see Table 5.1.10.

Table 5.1.1. Rough class hemispheric bowl (RHB 1) and four subtypes

Type and subtypes	Description	Illustration
RHB 1	Rim rounded, body and bottom convex	
RHB 1A	Straight lip continuous with the wall, decorated with tick marks	Fig. 5.1.1
RHB 1B	Open lip, with slight inner thickening	Fig. 5.1.1
RHB 1C	Open lip, with slight inflection beneath rim	Fig. 5.1.1
RHB 1D	Straight walls	Fig. 5.1.1

Table 5.1.2. Rough class troncoconic bowl with convex wall (RTB 1) and two subtypes

Type and subtypes	Description	Illustration
RTB 1	Lip slightly thickened but not curved, developing continuously from the straight walls	
RTB 1A	Wall strongly open	Fig. 5.1.1
RTB 1B	Wall straight	Fig. 5.1.1

Table 5.1.3. Rough class vessel with neck (RVN 1) and two subtypes

Type and subtypes	Description	Illustration
RVN 1	Rounded rim and straight lip, demarcated from vessel wall	
RVN 1A	Short, straight neck	Fig. 5.1.1
RVN 1B	Slight neck, flexed externally	Fig. 5.1.1

Table 5.1.4. Rough class jar (RJA 1) and two subtypes

Type and subtypes	Description	Illustration
RJA 1	Straight lip, in continuity with wall, lugs under rim	
RJA 1A	Rounded and straight rim	Fig. 5.1.1
RJA 1B	Tapered and flat rim	Fig. 5.1.1

Table 5.1.5. Rough class pot forms (RPO 1, RPO 2, RPO3, and RPO 4) and subtypes

Type and subtypes	Description	Illustration
RPO 1	Closed lip develops continuously from vessel wall	
RPO 1A	Undecorated	Fig. 5.1.2
RPO 1B	Decorated	Fig. 5.1.2
RPO 2	Straight lip	
RPO 2A	Rounded rim	Fig. 5.1.2
RPO 2B	Tapered rim	Fig. 5.1.2
RPO 3	Lip and wall closed, deep body	
RPO 3A	Rounded rim	Fig. 5.1.2
RPO 3B	Tapered rim	Fig. 5.1.2
RPO 3C	Rim bordered at angle to wall	Fig. 5.1.2
RPO 4	Body and lip closed, thickened rim with thin, vertical tick marks	Fig. 5.1.2

Table 5.1.6. Medium hemispheric bowl (MHB 1) and two subtypes

Type and subtypes	Description	Illustration
MHB 1	Straight lip	
MHB 1A	Rounded rim	Fig. 5.1.3
MHB 1B	Rounded rim with internal thinning	Fig. 5.1.3

Table 5.1.7. Medium troncoconic bowl (MTB 1) and two subtypes

Type and subtypes	Description	Illustration
MTB 1	Open lip, rectilinear walls	
MTB 1A	Tapered rim, opened lip	Fig. 5.1.3
MTB 1B	Rim finished on angle to wall	Fig. 5.1.3

Table 5.1.8. Medium cups (MCU 1–4) and subtypes

Type and subtypes	Description	Illustration
MCU 1	Rounded rim, straight lip, hemispheric body, flat or convex if deep	
MCU 1A	Small knob on rim	Fig. 5.1.3
MCU 1B	Small vertical handle with ribbon shape	Fig. 5.1.3
MCU 2	Thinned rim, straight lip, ovoid body, with flat, deep, little knob under rim	Fig. 5.1.3
MCU 3	Thinned rim, closed lip, ovoid deep body, flattened bottom, and small raised plastic decoration	Fig. 5.1.3
MCU 4	Straight lip, ovoid body, with flat, deep, small horizontal handle	

Table 5.1.9. Medium vessel with neck (MVN 1) and two subtypes

Type and subtypes	Description	Illustration
MVN 1	Flat rim cut obliquely, lip in continuity with closed wall, probably rounded down to flat bottom	
MVN 1A	Long neck	Fig. 5.1.3
MVN 1B	Short neck	Fig. 5.1.3

Table 5.1.10. Medium pot (MPO1 and MPO2) and subtypes

Type and subtypes	Description	Illustration
MPO 1	Rounded and decorated rim, lip in continuity with closed wall, globular body	
MPO 1A	Thickened rim with finger markings	Fig. 5.1.3
MPO 1B	Rounded rim with thin finger markings	Fig. 5.1.3
MPO 1C	Small punctures below rim	Fig. 5.1.3
MPO 2	Spherical, profile nearly dinos* shape, small dimensions	
MPO 2A	Lip in continuity with wall	Fig. 5.1.3
MPO 2B	Lip distinguished from wall, straight	Fig. 5.1.3

* Dinos shape: In the classical nomenclature, this is a well-known pottery shape from southern Italy, designating a vase like a ball with a narrow mouth.

3. Figulina Class (Figures 5.1.4–5.1.12)

This class of ware has forms made in two fabrics: Scaloria Bassa and Scaloria Alta. Several forms are particular to the Scaloria Bassa style and others to the Scaloria Alta; some are common to both. In this discussion, we link the specific forms to these fabrics.[2] In this section, we describe 10 forms, proceeding from more open forms to more closed forms. Some forms belong to typological families (e.g., the category of bowls comprises hemispheric, troncoconic, and carinated bowls). Several types have already been mentioned for other classes of ware.

Figulina Patera (FPA 1) (Figure 5.1.4:FPA 1A, 1B; FPA 2, 3)
Very open shape similar to the classical patera, with a large, convex or flat bottom (Table 5.1.11), and generally with rich decoration.

Figulina Bowl (FB)
Large, open vessel without points of inflection; walls are straight or converse. There are several subtypes (hemispheric, troncoconic, and carinated).

Figulina Hemispheric Bowl (FHB 1) (Figure 5.1.5: FHB 1, 2)
Convex vessel with hemispheric profile, the diameter always exceeds the height; convex bottom (Table 5.1.12)

Figulina Troncoconic Bowl (FTB 1) (Figure 5.1.6)
Rectilinear shape with a straight profile, diameter always larger than the height, and a flat or convex bottom (Table 5.1.13).

Figulina Carinated Bowl (FCB 1–3) (Figure 5.1.7)
Shallow body, bottom distinguished from the neck by more or less accentuated carinations (Table 5.1.14).

Figulina Cup (FCU 1, FCU 2, FCU 3) (Figure 5.1.8a–b)
Open form with a height/diameter relationship of 1:2 and therefore a somewhat more closed form than the bowl; used for drinking because equipped with handles or knobs. These are often quite complex forms (Table 5.1.15).

Figulina Ovoid Beaker (FOB 1) (Figure 5.1.8b)
Deep shape with diameter less than half of height, often covered with rich decoration (Table 5.1.16).

Figulina Vessel with Neck (FVN 1, FVN 2, FVN 3) (Figure 5.1.9)
Complex form composed from the association of two solid figures (cylinder and sphere) with a more or less biconic profile, used to contain and pour, and normally lacking handles and lugs (Table 5.1.17).

Figulina Biconic Vessel (FBV 1 and FBV 2) (Figure 5.1.10)
Complex vessel form, profiles ranging from biconic to ovoid (containers?); subdivided into several varieties and sizes (Table 5.1.18).

Figulina Pot (FPO 1, FPO 2, FPO 3, FPO 4) (Figure 5.1.11)
Vessel of simple globular or pseudo-spherical shape, relatively large dimensions, lacking handles or lugs, and used to contain (Table 5.1.19).

Figulina Amphora (FAM 1) (Figure 5.1.12)
Large vessel of complex form with two to four handles generally set between the neck and shoulder; probably used to transport and to contain (Table 5.1.20).

[2] The Scaloria Bassa and Scaloria Alta styles are characterized by both fabric and decoration.

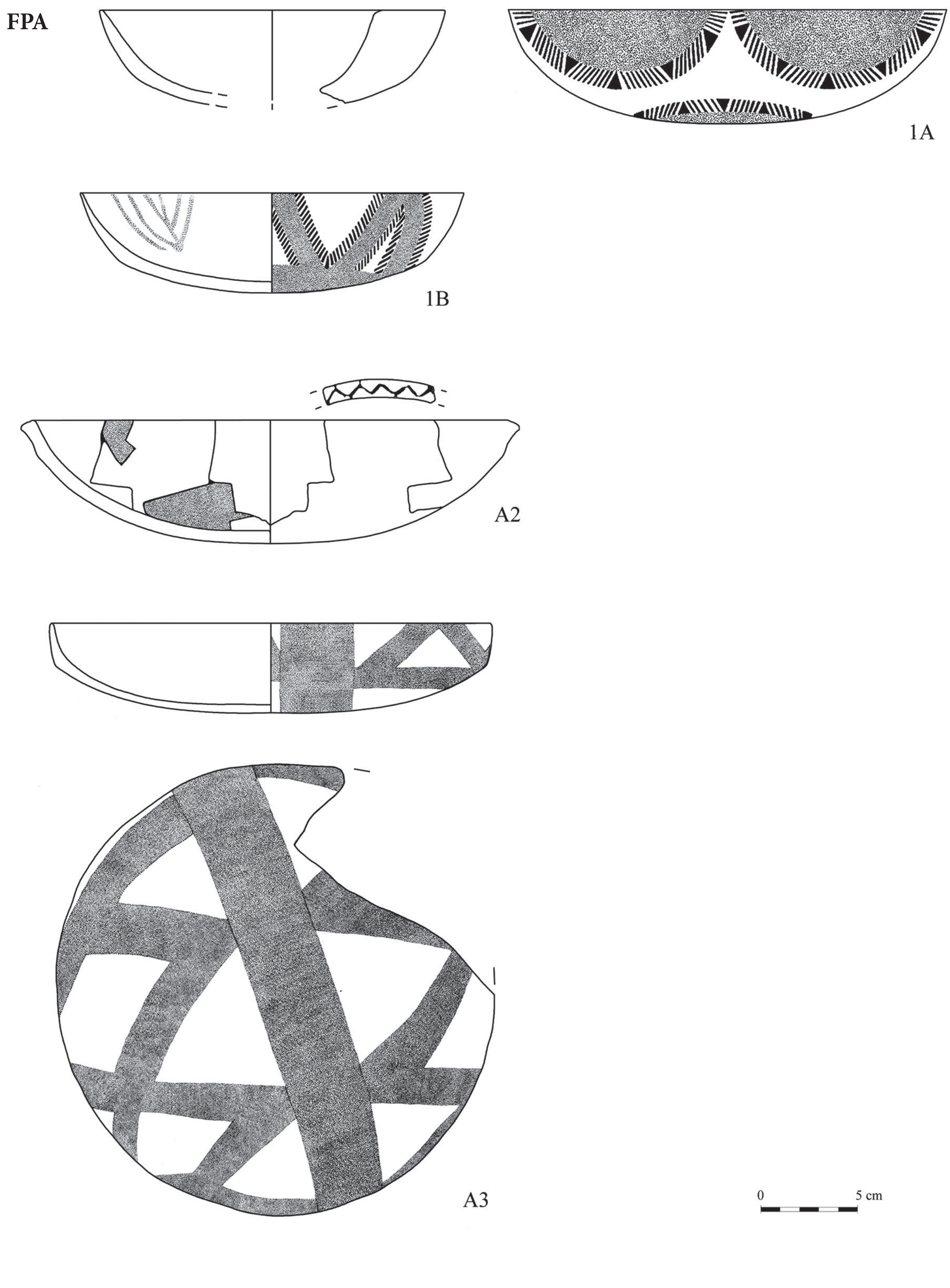


Fig. 5.1.4. Figulina patera (FPA): see Table 5.1.11A3. Tapered rim, straight lip, bottom carinated, nearly flat: for painted design, see Fig. 5.1.14:5B, and cf. Chapter 5.7, Fig. 5.7.9 # 21939.

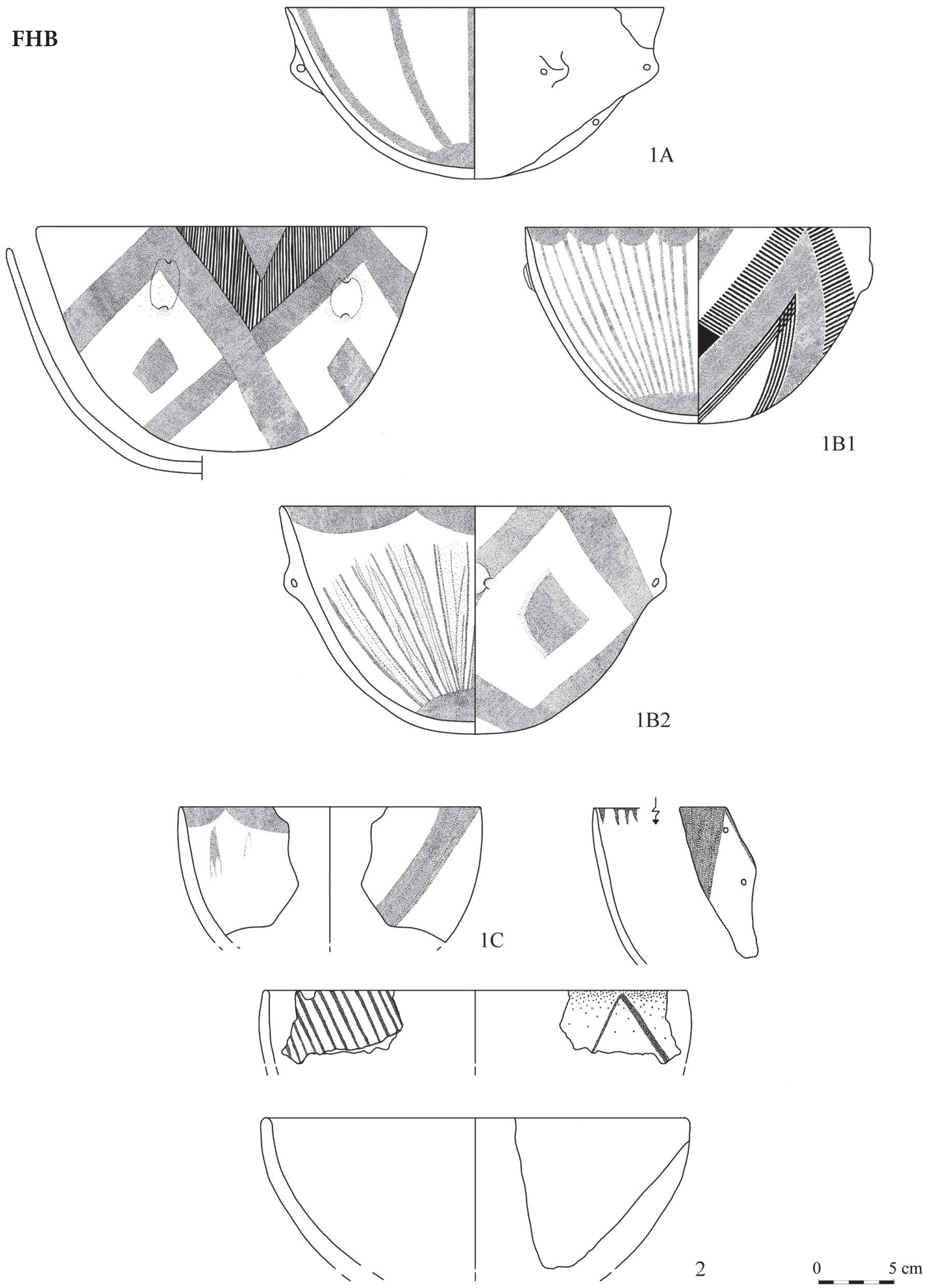


Fig. 5.1.5. Figulina hemispheric bowl (FHB): see Table 5.1.12.

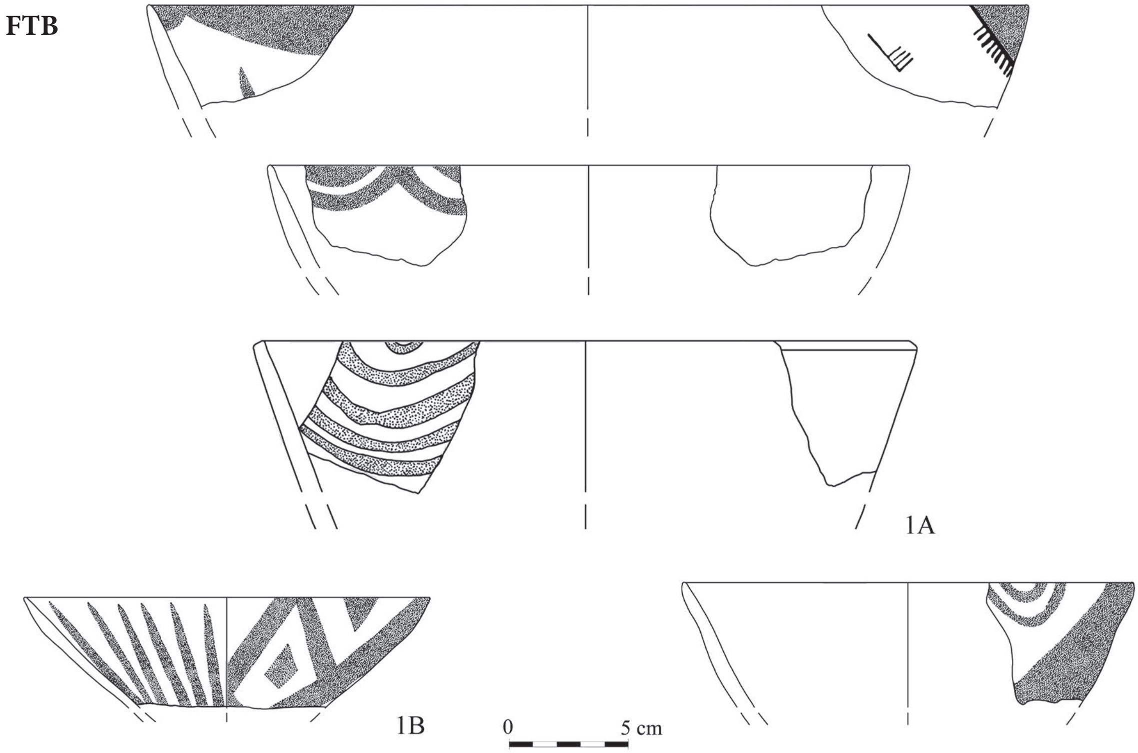


Fig. 5.1.6. Figulina troncoconic bowl (FTB): see Table 5.1.13.
(See also Fig. 5.6.6, Field catalogue 1002, 8/24/79, trench 10E L 2: painted, reconstructed.)

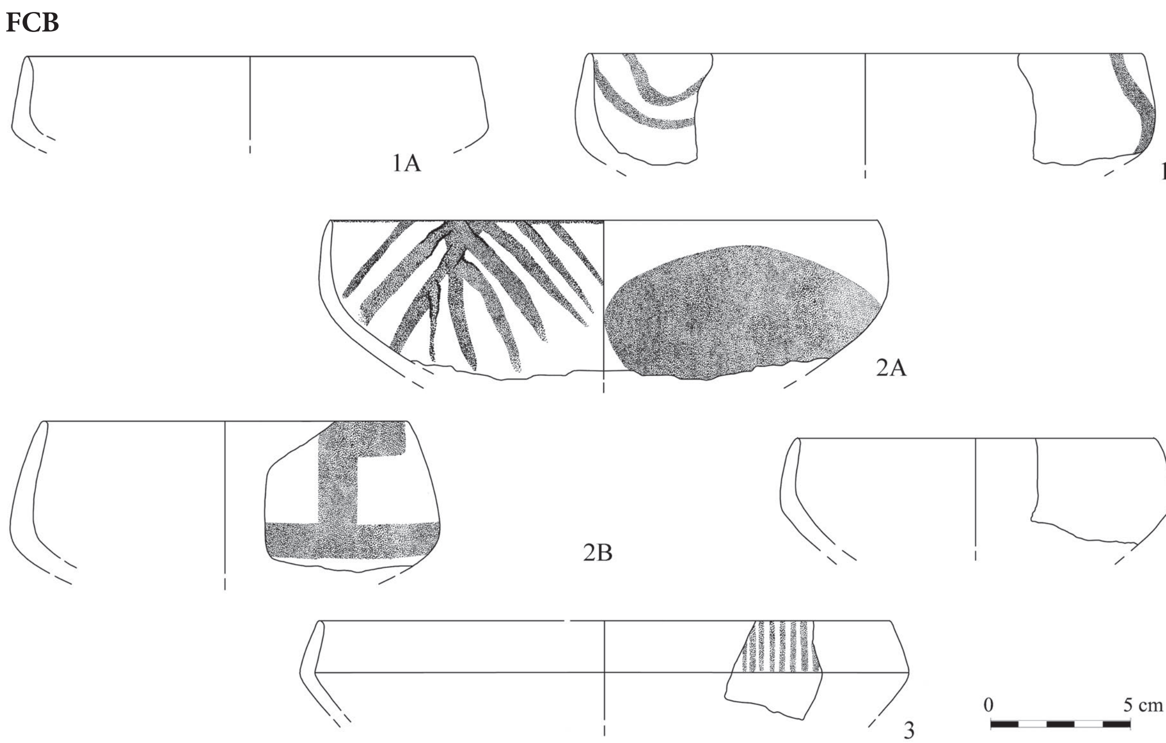


Fig. 5.1.7. Figulina carinated bowl (FCB): see Table 5.1.14. (Cf. 2A, red-painted ovals, with Fig. 5.1.14:3C and Chapter 5.7, Fig. 5.7.14 # 21828.)

FCU

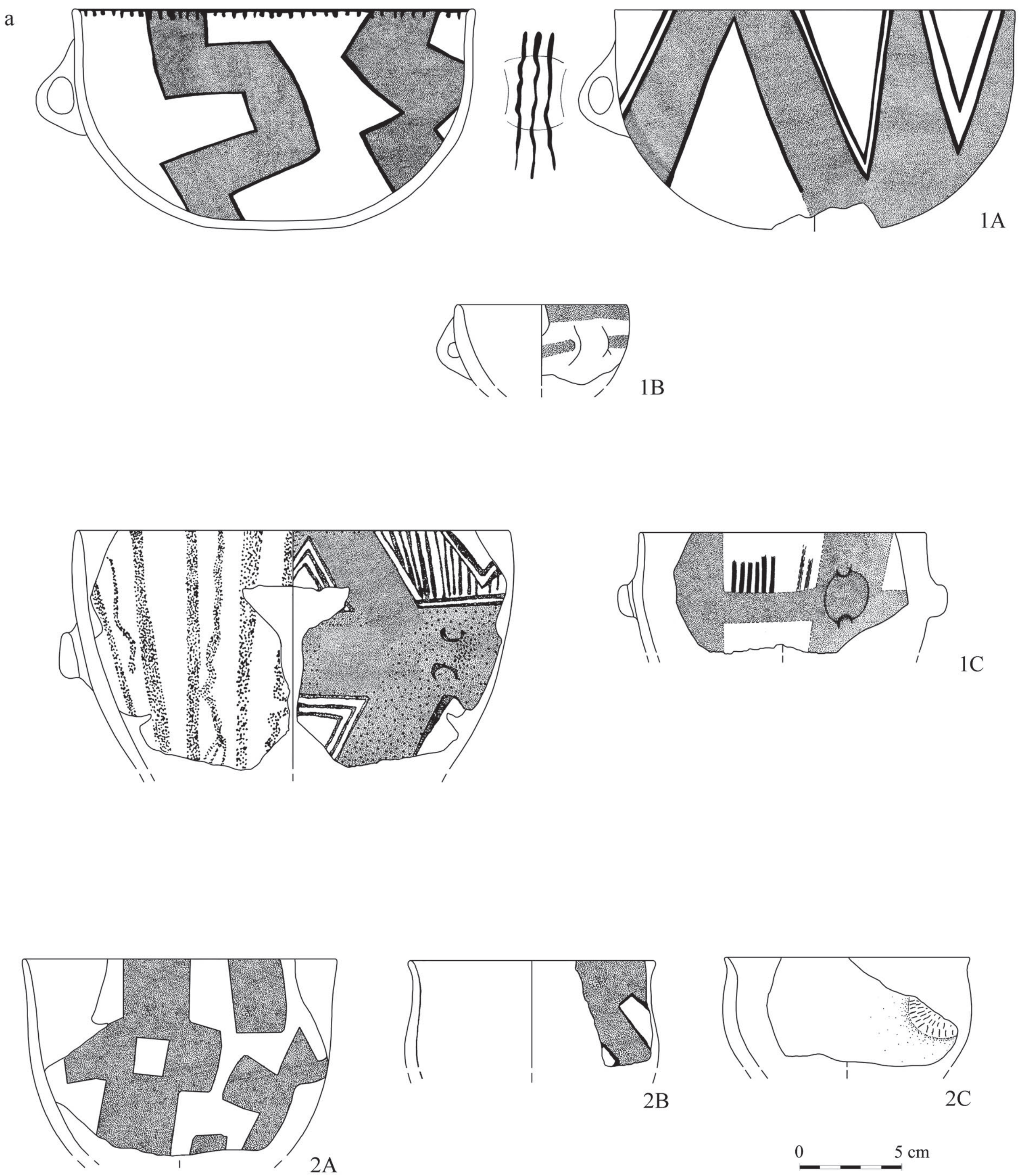


Fig. 5.1.8a. Figulina cup (FCU) (see Table 5.1.15). FCU 1A (cf. Fig. 5.1.16:8A, 8B); 1B: open lip; 1C: pierced knobs; FCU 2: tapered rim, wavy lip, short neck, globular body, no handles; 2A: restricted neck; 2B: accentuated neck; 2C: rim modeled internally. (**Fig. 5.1.8b** *on next page.*)

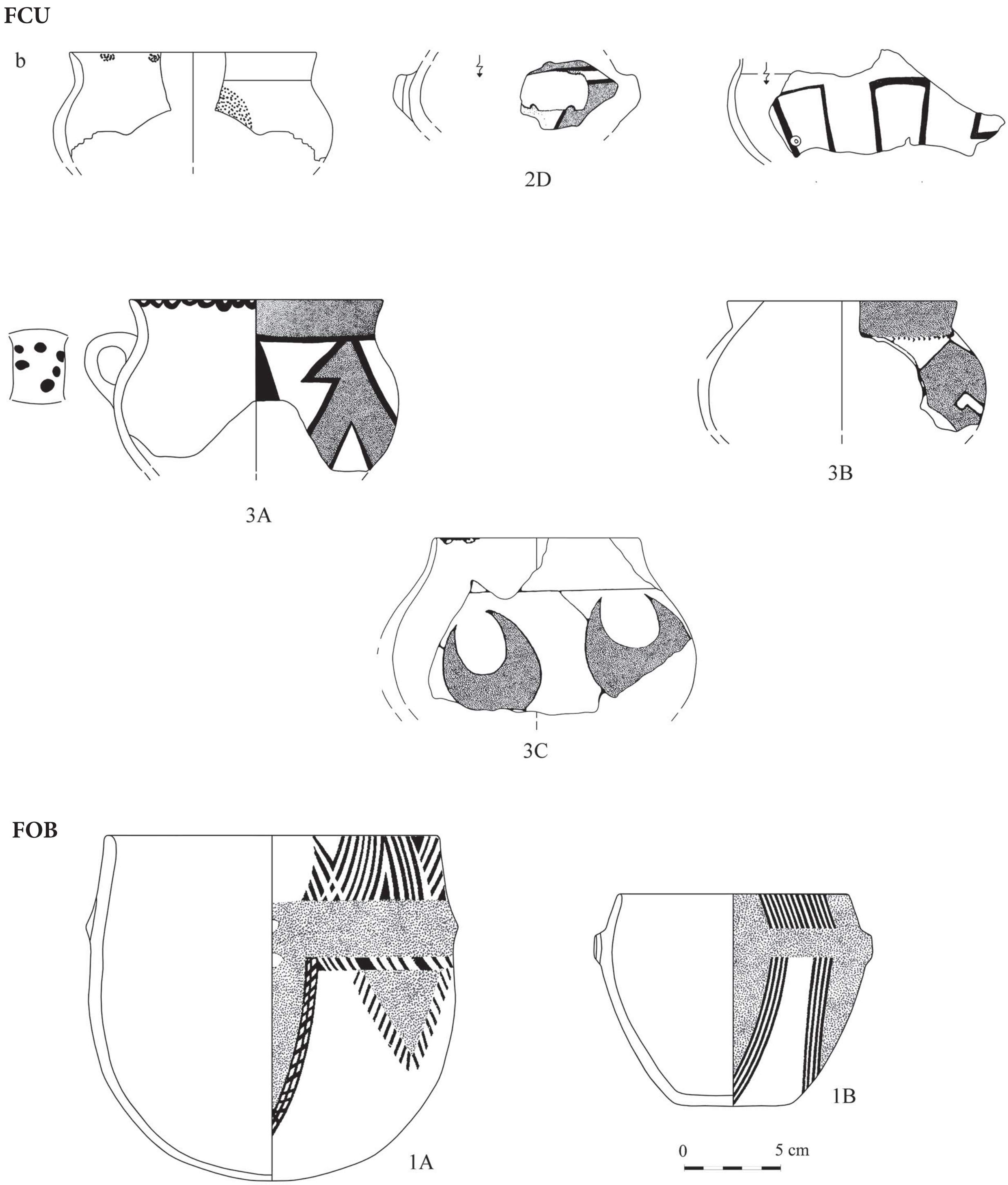


Fig. 5.1.8b. Figulina cup (FCU) (see Table 5.1.15) and ovoid beaker (FOB) (see Table 5.1.16). FCU 2D, right (cf. Fig. 5.1.16:8C); 3A (cf. Figs. 5.1.16:8B and 5.3.2, and Chapter 5.7, Fig. 5.7.4 # 23010); 3C (cf. Fig. 5.16: 8D, left). FOB: ovoid body; knobs resemble handles. 1A: convex bottom; 1B: flat bottom.

FVN

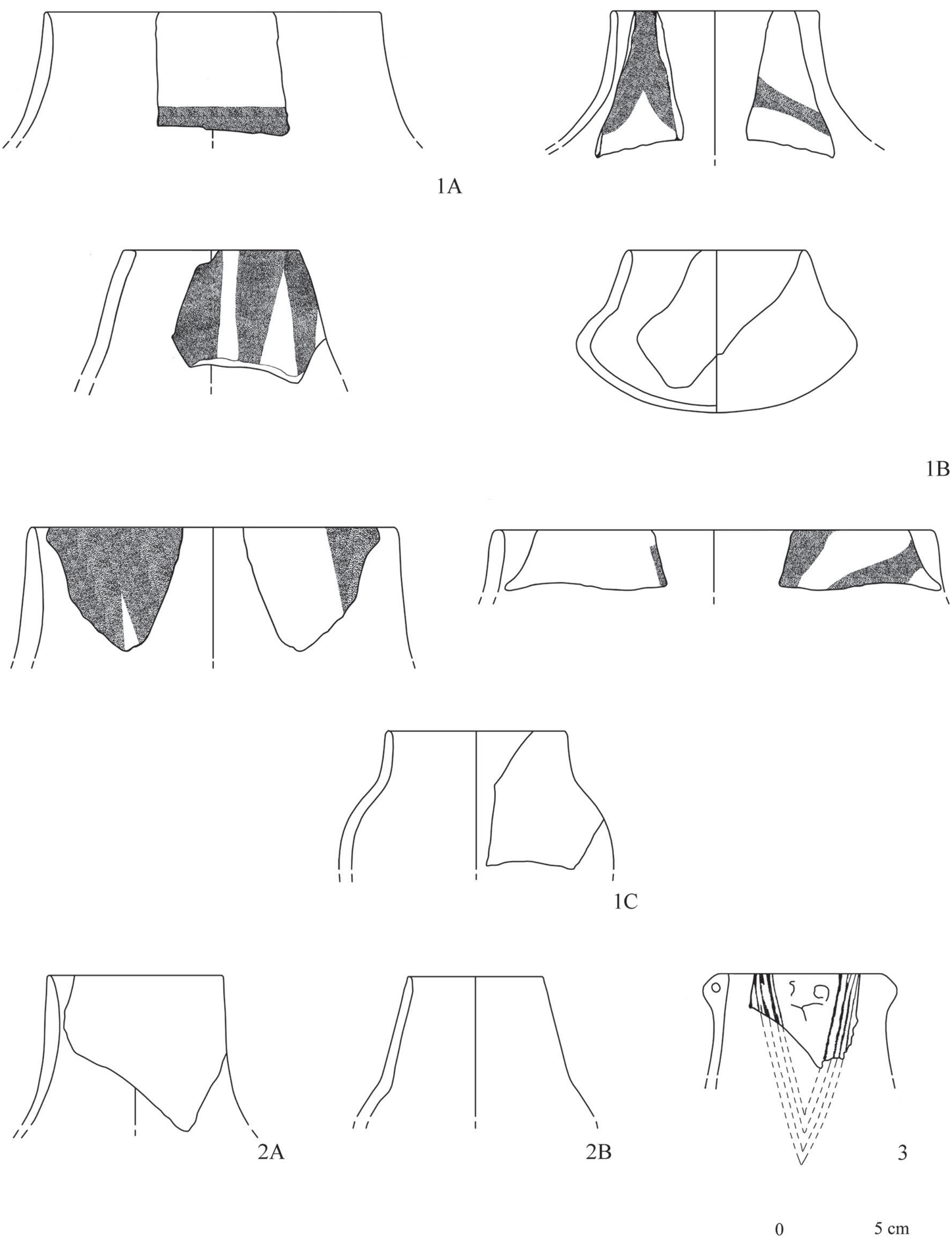


Fig. 5.1.9. Figulina vessel with neck (FVN): see Table 5.1.17.

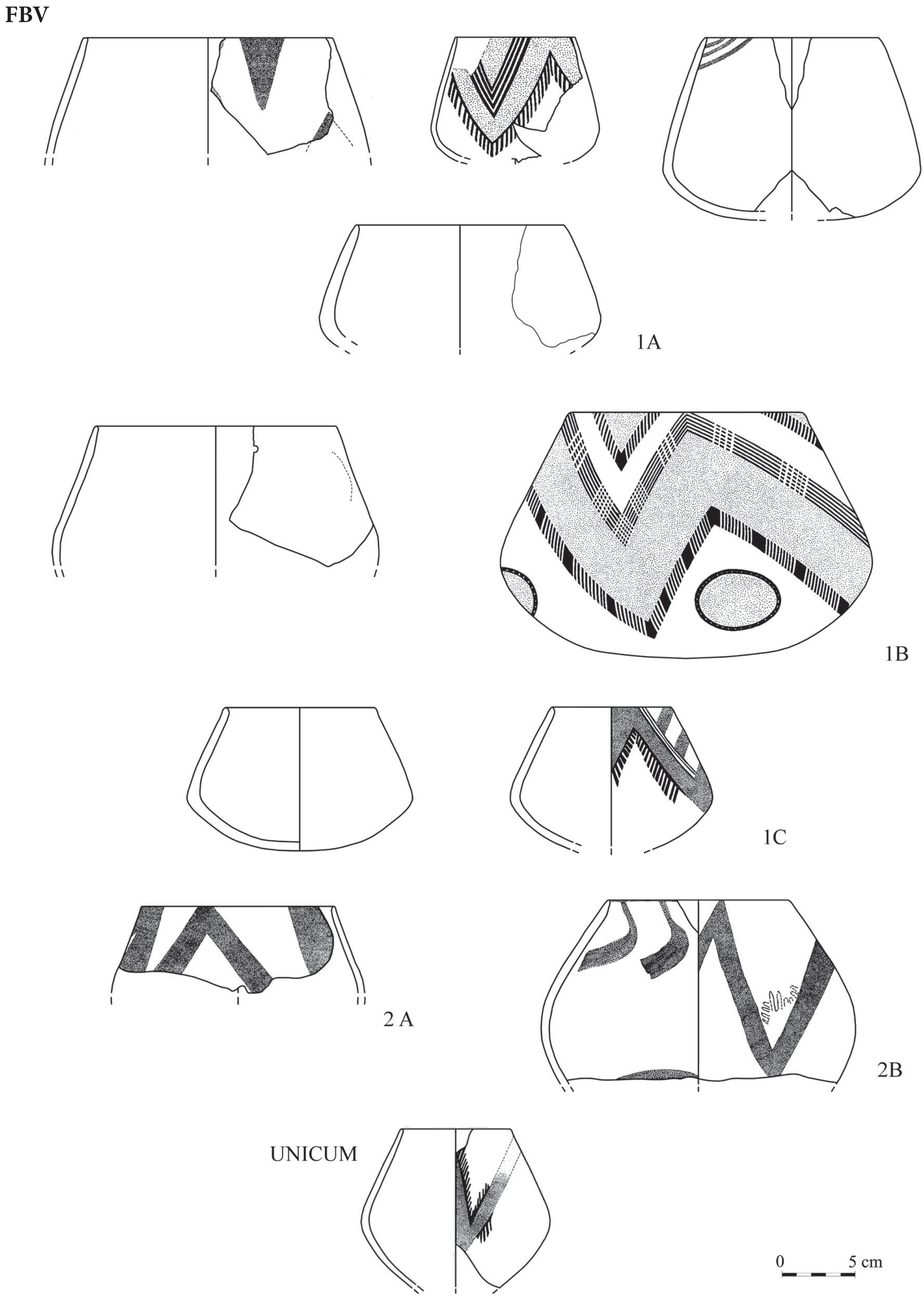


Fig. 5.1.10. Figulina biconic vessels (FBV): see Table 5.1.18. FBV 2B (cf. Fig. 5.1.14:1B); for painted fringe, see Chapter 5.7, Fig. 5.7.5 # 21941a.

FPO

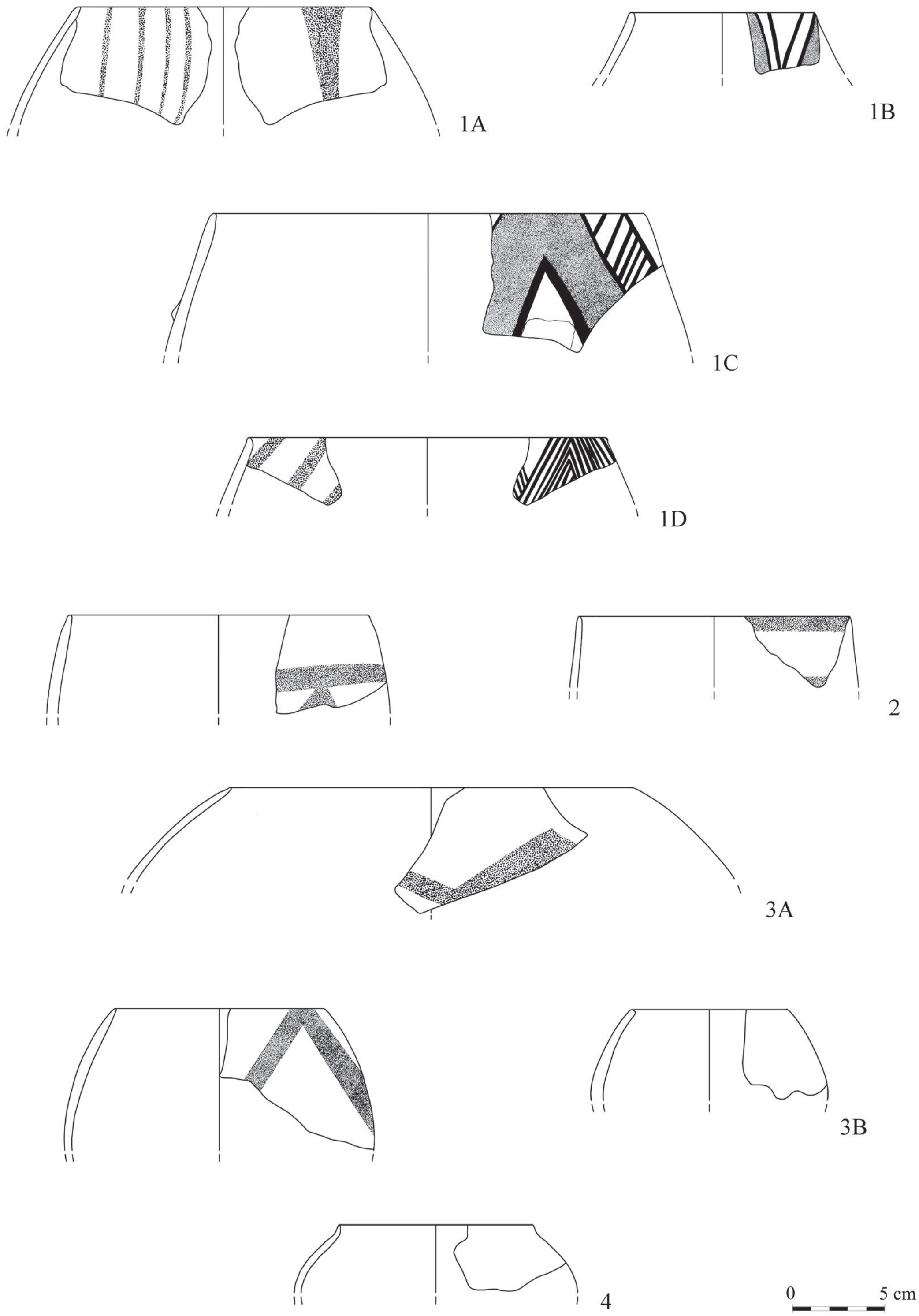


Fig. 5.1.11. Figulina pot (FPO): see Table 5.1.19.

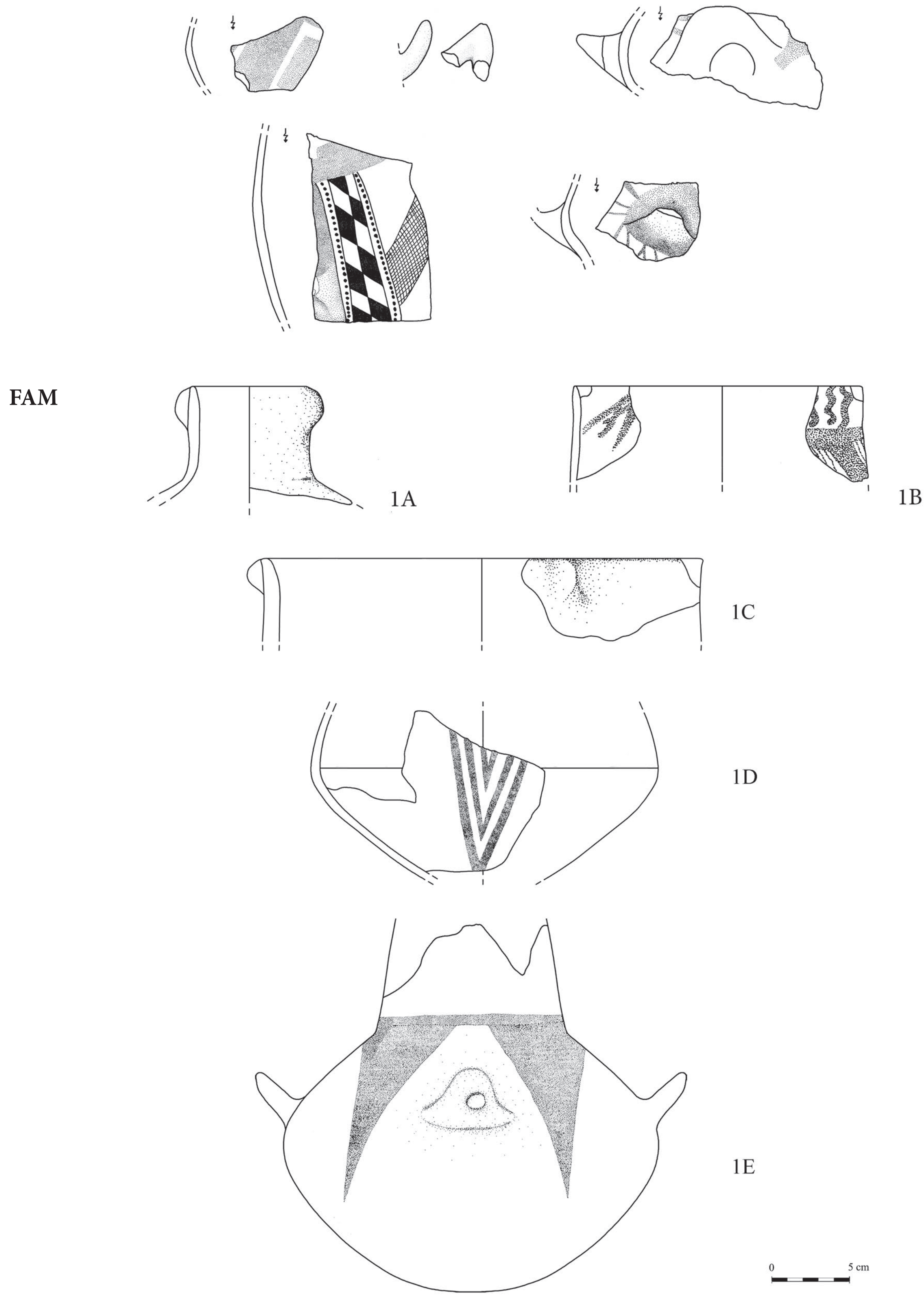


Fig. 5.1.12. Handles (top two rows) and figulina amphora (FAM 1A–1E); see table 5.1.20.

Table 5.1.11. Figulina patera (FPA 1, FPA 2, and FPA 3) and two subtypes

Type and subtypes	Description	Illustration
FPA 1	Rounded rim, lip everted	
FPA 1A	Convex bottom	Fig. 5.1.4
FPA 1B	Rim lightly modeled in correspondence with bottom	Fig. 5.1.4
FPA 2	Flat rim, lip distinguished from wall and modeled	Fig. 5.1.4
FPA 3	Tapered rim, lip straight, bottom carinated and nearly flat	Figs.5.1.4, 5.1.14:5B

Table 5.1.13. Figulina troncoconic bowl (FTB 1) and three subtypes

Type and subtypes	Description	Illustration
FTB 1	Lip in continuation with rectilinear wall, open profile	Fig. 5.1.6
FTB 1A	Body with rectilinear profile	Figs. 5.1.6, 5.1.14:2A
FTB 1B	Very open wall	Fig. 5.1.6
FTB 1C	Deep, straight-sided	Fig. 5.1.6

Table 5.1.14. Figulina carinated bowl (FCB 1, FCB 2, and FCB 3) and subtypes

Type and subtypes	Description	Illustration
FCB 1	Rounded rim, closed lip	
FCB 1A	Thickened carinations with rounded corner	Fig. 5.1.7
FCB 1B	Lower carinations with rounded corner	Fig. 5.1.7
	Thin carinations with sharp corner, deep body	
FCB 2	Closed lip, high carinations	
FCB 2A	Tapered rim, rounded carinations	Fig. 5.1.7
FCB 2B	Rounded rim, carinations with corner	Figs. 5.1.7, 5.1.14:5E
FCB 3	Rounded rim, closed lip, walls distinguished from rim	Fig. 5.1.7

Table 5.1.16. Figulina ovoid beaker (FOB1) and two subtypes

Type and subtypes	Description	Illustration
FOB 1	Ovoid body, with knobs resembling handles	
FOB 1A	Convex bottom	Fig. 5.1.8(b)
FOB 1B	Flat bottom	Fig. 5.1.8(b)

Table 5.1.12. Figulina hemispheric bowl (FHB 1 and FHB 2) and subtypes

Type and subtypes	Description	Illustration
FHB 1	Rounded rim, lip in continuity with wall, convex bottom, semicircular profile equipped with pierced handles	
FHB 1A	Body with semicircular profile, with two handles vertically oriented on same side of vessel	Fig. 5.1.5
FHB 1B	Deep body with two handles vertically oriented on same side of vessel	(not illustrated)
FHB 1B1	Vertical pierced knobs	Fig. 5.1.5
FHB 1B2	Horizontal pierced knobs	Figs. 5.1.5, 5.1.14:5C
FHB 1C	Straight lip, shaped at top	Fig. 5.1.5
FHB 2	Rounded rim, open lip, shaped like convex hat	Fig. 5.1.5

Table 5.1.15. Figulina cup (FCU 1, FCU 2, and FCU 3) and subtypes

Type and subtypes	Description	Illustration
FCU 1	Rounded rim, hemispheric body, very flat; many with deep convex base; vertical strap handle	
FCU 1A	Straight lip	Figs. 5.1.8(a), 5.1.16:8A
FCU 1B	Open lip	Fig. 5.1.8(a)
FCU 1C	Vertically pierced knobs, circular profile	Fig. 5.1.8(a)
FCU 2	Tapered rim, wavy lip, short neck, globular body, without handles	
FCU 2A	Restricted neck	Fig. 5.1.8(a)
FCU 2B	Accentuated neck	Fig. 5.1.8(a)
FCU 2C	Rim modeled internally	Fig. 5.1.8(a)
FCU 2D	Rim with internal ledge	Fig. 5.1.8(b)
FCU 3	Open lip, short, distinct neck, globular body, vertical handle	
FCU 3A	Thinned rim	Figs. 5.1.8(b), 5.1.16:8B
FCU 3B	Flat tapered rim	Fig. 5.1.8(b)
FCU 3C	Wavy lip, globular body	Fig. 5.1.8(b)

Table 5.1.17. Figulina vessel with neck (FVN 1, FVN 2, and FVN 3) and subtypes

Type and subtypes	Description	Illustration
FVN 1	Rounded rim, distinct short, wide lip, flattened globular body	
FVN 1A	Straight lip, wide or narrow neck	Fig. 5.1.9
FVN 1B	Closed lip, wide or narrow neck	Figs. 5.1.9, 5.1.14:5G
FVN 1C	Short, wide or narrow neck	Fig. 5.1.9
FVN 2	Tapered rim, high neck, pear-shaped body	
FVN 2A	Straight lip	Fig. 5.1.9
FVN 2B	Closed lip	Fig. 5.1.9
FVN 3	Narrow neck, and small pierced lugs on rim (often four handles)	Fig. 5.1.9

Table 5.1.18. Figulina biconic vessel (FBV 1, FBV 2, and Unicum) and subtypes

Type and subtypes	Description	Illustration
FBV 1	Tapered rim, lip closed and continuous with vessel wall, carinated; deep convex profile	
FBV 1A	Carinations rounded and low on body	Fig. 5.1.10, Fig. 5.1.15:4
FBV 1B	Carinations central and rounded	Fig. 5.1.10
FBV 1C	Carinations central and sharp	Fig. 5.1.10
FBV 2	Tapered rim, globular profile, central flexion point of body	
FBV 2A	Rim develops continuously from wall	Fig. 5.1.10
FBV 2B	Light, distinct rim	Fig. 5.1.10, Fig. 5.1.14:1B
Unicum	Miniature vessel in imitation of larger, biconic vessel	Fig. 5.1.10 unicum

Table 5.1.19. Figulina pot (FPO 1, FPO 2, FPO 3, and FPO 4) and subtypes

Type and subtypes	Description	Illustration
FPO 1	Rounded rim, closed lip in continuity with convex wall	Fig. 5.1.11
FPO 1A	Globular body, curvilinear shoulder	Fig. 5.1.11
FPO 1B	Extended shoulder	Fig. 5.1.11
FPO 1C	Small lugs	Fig. 5.1.11
FPO 1D	Rim cut obliquely	Fig. 5.1.11
FPO 2	Rounded rim, ovoid body, straight wall	Fig. 5.1.11
FPO 3	Lip very closed, curvilinear wall and profile nearly like dinos shape	
FPO 3A	Flattened globular body	Fig. 5.1.11
FPO 3B	Spherical body	Fig. 5.1.11
FPO 4	Rounded rim, distinct lip, curvilinear shoulder, spherical wall	Fig. 5.1.11

Table 5.1.20. Figulina amphora (FAM 1) and two subtypes

Type and subtypes	Description	Illustration
FAM 1	Globular body, small flat base, from two to four horizontal handles	Fig. 5.1.12:1
FAM 1A	Short neck	Fig. 5.1.12
FAM 1B	Larger neck	Fig. 5.1.12, Fig. 5.1.16:7B

Decorative Typology of the Pottery Classes

The three classes of ware (rough, medium, figulina) exhibit different surface decorations. These are presented below (graffito, paint), along with the various techniques in which they are executed (impressions, incisions).

Rough and Medium Classes

For these classes of paste, decoration consists of impressions created with various tools (see Natali 2004; Traverso 2000), incisions made with a blade or by a hard object dragged along the surface, and the graffito or scratches created by the pressure of a blade on the dry surface of the pottery. Among impressions, three macro categories can be distinguished: finger impressions (with fingernails or fingertips), tool impressions using a blade or a bone or wood tool (sometimes with a quadrangular tip), and impressions made by shell (a cardium or unidentified shell with a smooth edge). Occasionally cord is used. These tools create different patterns in different zones of the vessel. Table 5.1.21, a cross-tabulation, compares the different motifs that we have identified in the Scaloria collections.

Table 5.1.21 shows the occurrence of decorations that are distributed irregularly or in an ordered way across the surface of the vessel. Impressed decoration concentrates mostly on the body of the vessels, except for decoration created with the fingers, which can also involve the rim. Impressed decoration may be distributed randomly over the entire surface, or it may be distributed in some structured way. In some cases, there appears to be more order in the overall syntax when the implement was specifically chosen (e.g., cardium shells, cords, blades), whereas the decoration may seem more random when fingernails were used.

Only on the medium fabrics with tan-brown surfaces is the graffito technique found. This decoration comprises motifs such as simple oblique lines, or more complex motifs, such as ladders, scratched into the surface of the dry pottery. Fine-tipped tools like distal segments of stone blades were used to decorate when the surface was hard (Figure 5.1.13:5A, 5B).

Figulina Class

In the figulina class, the decoration is usually painted, and all the shapes in this class have more or less complex

Table 5.1.21. Tools compared with decorative syntax and location on rough or medium ware (on Fig. 5.1.13)

	Technology	Fig. 5.1.13	Type	Tool	Rim	Body	Random distribution	Regular distribution
1	Impression	1A	Finger	Fingertip—in line or covering surface	x	x	x	x
	Impression	1B		Nails—in line or covering surface	x	x	x	x
	Impression	1C		Opposing nail impressions			x	
		1D		Coffee grains		x	x	
2	Impression	2A	Tool	Simple blade or rotated tool		x	x	x
	Impression	2B		With quadrangular tip (bone or wood)		x	x	x
	Impression	2C		With circular tip (wedges)		x		x
	Impression	2D		With semicircular tip		x		x
3	Impression	3A	Cardium	Cardium covering		x		x
	Impression	3B		Rocker		x	x	x
	Impression	3C		Regular				
	Impression	3D		Used on external side		x	x	
	Impression	3E		Unidentified shell		x		x
	Impression	3F	Cord					x
4	Incision	4	Tool	Blade/tool—oblique lines		x		x
5	Graffito	5A	Blade	Simple oblique lines		x		
		5B		Ladder motif		x	x	x

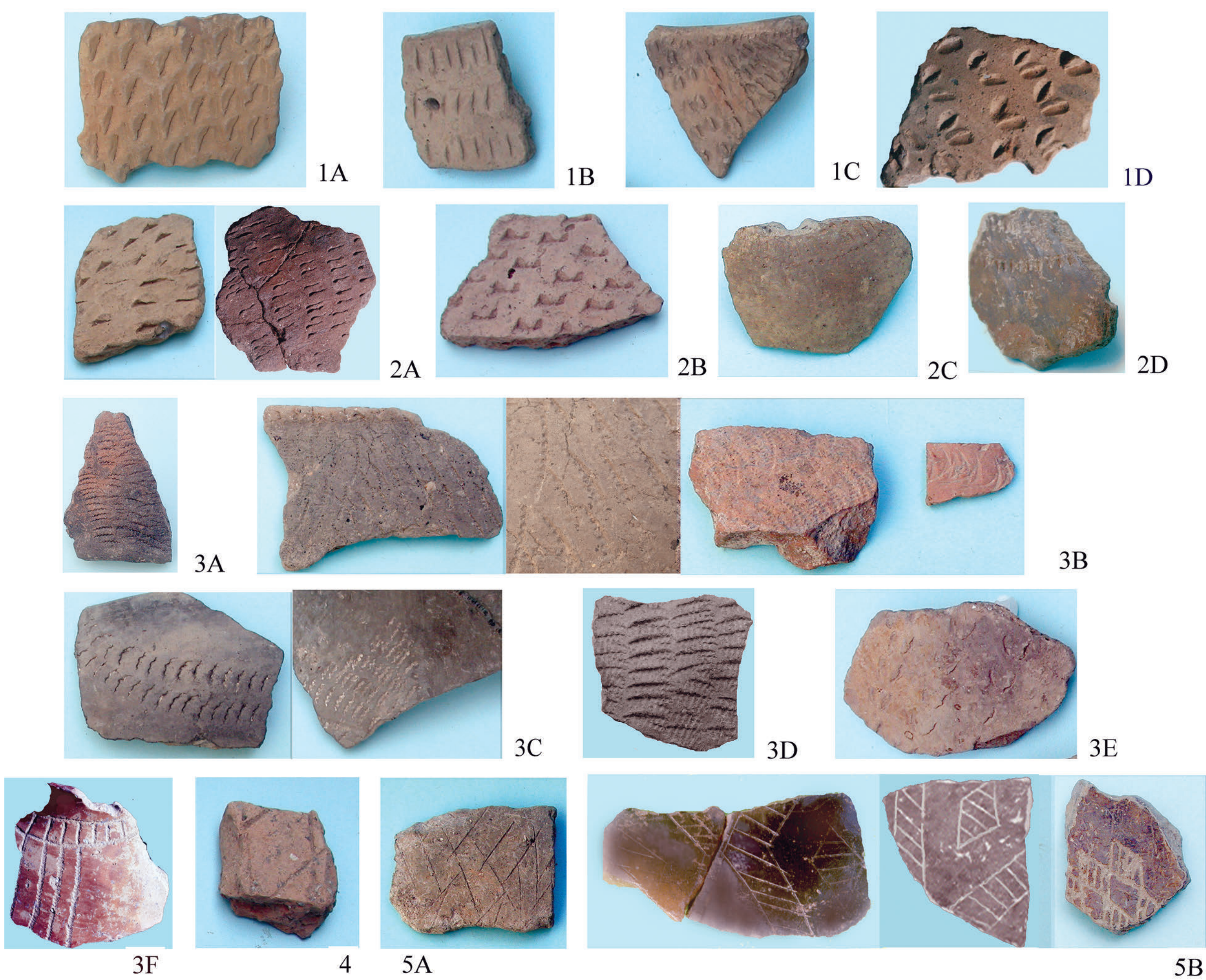


Fig. 5.1.13. Decorations on rough or medium surfaces (color): 1A–3F, impressed; 4, incision; 5A, B, graffito.

painted decorations, as illustrated in Figures 5.1.14 and 5.1.15. In this ware class, some shapes are always decorated (pateras, cups, carinated bowls). However, because this decorative technique is not consistently distributed across the entire vessel, some sherds lack painted decoration, and thus we cannot quantify the occurrence of decorated versus undecorated pottery, as was possible at other sites (Bagnone and Zamagni 2003:116).

This technique involved painting the pottery at the dry stage with brushes with soft and fine tips, in patterns of more or less complex outlines. Large color blocking or background painting is never used. Some figulina vessels do display reserve painting, which accompanies many of the decorations in the Catignano–Lower Scaloria style. In this technique, the red bands are bordered by painted lines of another color (black or brown); in the empty spaces left in the deco-

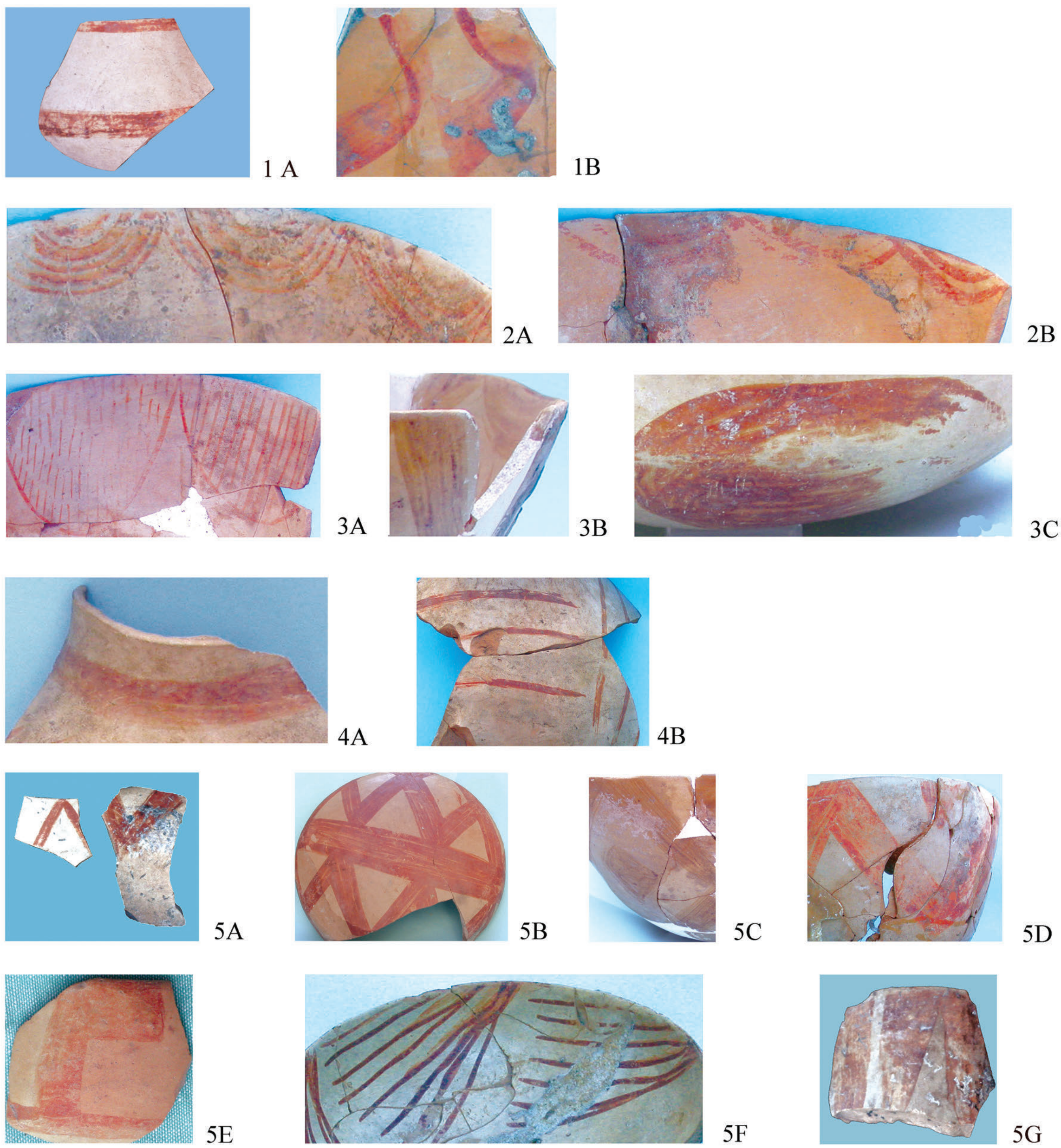


Fig. 5.1.14. Figulina, Scaloria Basso painted wares (color). 1B (cf. Fig. 5.1.10:2B); 5B (cf. Figs. Fig. 5.1.4:A3 and 5.3.6a); 5E (cf. Fig. 5.1.7:2B, left); 5F (cf. Chapter 5.7, Fig. 5.7.8a [right] # 53419b).

ration, during the firing, fat or some similar substance was used as a barrier to the color. This technical solution, keeping some zones of the surface free from paint, was defined as the Scaloria Bassa style by Tiné and Isetti (1975–1980) and, more recently, as the Catignano style by Tozzi and Zamagni (2003).

In order to describe and index the range of designs, following Shepard (1968) and Tozzi and Zamagni (2003), the decorative typology was categorized as presented in Tables 5.1.22 and 5.1.23 (and see Figures 5.1.14 and 5.1.15); these decorative types are later collated with the occurrences of the vessel forms (see Chapter 5.2, this volume). In Table 5.1.22, the simple red decoration has been combined with the "negative bordered decoration" because in some cases it was impossible to differentiate the two.


1


2


3


4


5


6

Fig. 5.1.15. Figulina biconic vessel: FBV, Scaloria Basso painted wares: (1) Red painted on white; (2) red painted on white; (3) pale reddish on pale pink painted; (4) BV red/brown paint on pale pink (cf. Figs. 5.1.10:1B, right, and 5.3.3); (5) brown paint on beige (see Fig. 5.3.3); (6) reddish brown paint on pale beige.

Table 5.1.22. Scaloria Bassa–style decoration

Color	Type	Decoration	Zone	Illustration and variety
Red	1	Curving bands	Curvilinear lines starting from horizontal line	Fig. 5.1.14:1A
			Meandering	Fig. 5.1.14:1B
	2	Empty semicircles	Concentric, side by side, with multiple lines	Fig. 5.1.14:2A
			Concentric overlapping lines	Fig. 5.1.14:2B
	3	Filled semicircles and circles	Filled with vertical hatching	Fig. 5.1.14:3A
			Filled with uniform color	Fig. 5.1.14:3B
			Simple circles 3C	
	4	Straight line (horizontal, vertical, oblique)	Under rim	Fig. 5.1.14:4A
		Vertical, oblique	On body	Fig. 5.1.14:4B
	5	Multiple straight lines (horizontal, vertical, oblique)	Simple corner	Fig. 5.1.14:5A
			Zigzag	Fig. 5.1.14:5B
			Multiple-angle crossed design	Fig. 5.1.14:5C
			Crossed-angle design with square, triangle, or circle inscribed	Fig. 5.1.14:5D
			Rectilinear angles	Fig. 5.1.14:5E
			Fringes	Fig. 5.1.14:5F
			Triangles	Fig. 5.1.14:5G
Red/black	6	Negative decoration	Bordered from "reserved" decoration	Fig. 5.1.16:9B, 9C

Table 5.1.23. "Scaloria Alta–style" decoration and trichrome pottery of "Capri style"

Color	Type	Technique	Decoration	Motif	Illustration and variety
Red, white, brown	7	Wide paintbrush	Metopal decoration	Fringes associated with painted parts	Fig. 5.1.16:7A
Red, brown		Wide paintbrush	Metopal decoration	Fringes associated with other motif	Fig. 5.1.16:7B
Red, brown, white	8	Wide paintbrush	Complex motifs	Zigzag	Fig. 5.1.16:8A
				Hooks	Fig. 5.1.16:8B
				Groups of squares	Fig. 5.1.16:8C
				Crescent moon	Fig. 5.1.16:8D
				Hourglass	
Red, brown, white	9	Wide paintbrush	Bands in angular shapes		Fig. 5.1.16:9A
		Thin paintbrush	Bands in angular shapes	Filled by thin lines	Fig. 5.1.16:9C

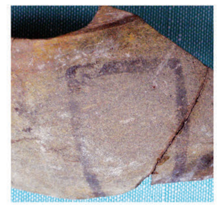
The technique of bordering bands with painted lines of another color can perhaps explain the success of the more complex polychrome designs of the late Scaloria phase, also referred to as Scaloria Alta style. This facies follows the earlier Catignano–Scaloria Bassa style; it is characterized by a complex of motifs of red or brown lines associated with the white color, where the bands form complex motifs (such as hooks, squares, and grids) on a fabric requiring a different system of firing (see Chapter 5.6, this volume) (Figure 5.1.16). The analysis by Traverso and Isetti in Chapter 5.2 (this volume) shows the association of several types of this decoration with some particular forms, such as cups with an open lip, demarcated short neck, globular body, and vertical handle (see Figure 5.1.8b: FCU 3).

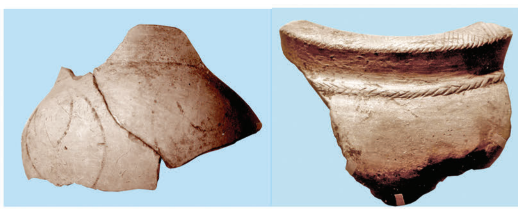

7A


7B


8A


8B


8C


8D


9A


9B


9C

Fig. 5.1.16. Figulina: Scaloria Alta painted wares (color); 7A pot fragment; 7B pot fragment (see Chapter 5.7, Fig. 5.7.4a # 41002); 8A FCU (see Fig. 5.1.8a:1A, left); 8B FCU (see Figs. 5.1.8b:3A and 5.3.2; and Chapter 5.7, Fig. 5.7.4a # 23010); 8C FCU (see Fig. 5.1.8b:2D, right); 8D (left) FCU (see Fig. 5.1.8b:3C); 8D (right) FCU plastic ring below neck; rim incised; 9A FCU (see Fig. 5.1.8a:1A, right); 9B, C seven sherds: black, brown linear paint (fringe, ladders, etc.) on red, beige backgrounds (cf. designs in Chapter 5.7, Fig. 5.7.6 # 21944, # 21953, # 21952).

Glossary: Pottery Forms and Typology

Type/shape/ class	Description	Reference in chapter
Rough	Porous impasto fabric, rich in gritty inclusions of various dimensions and materials; surface has porous surfaces smoothed down, generally unpolished and with frequent traces of wood tool usage; surface colors vary from gray to yellow-brown; wall thickness ranges from thick to very thick	
RHB 1	Rough hemispheric bowl, rounded body and bottom convex	Table 5.1.1
RTB 1	Rough troncoconic bowl with convex wall	Table 5.1.2
RVN 1	Rough vessel with neck	Table 5.1.3
RPO 1	Rough pot, closed lid develops continuously from vessel wall	Table 5.1.4
RPO 2	Rough pot, straight lip	Table 5.1.4
RPO 3	Rough pot, lip and wall closed, deep body	Table 5.1.4
RPO 4	Rough pot, body and lip closed, thickened rim with thin vertical tick marks	Table 5.1.4
RJA 1	Rough jar, straight lip, in continuity with wall, lugs under rim	Table 5.1.5
Medium	Medium impasto paste occasionally with small inclusions; colors vary from yellow-brown to dark; fabric is generally well fired	
MHB 1	Medium hemispheric bowl	Table 5.1.6
MTB 1	Medium troncoconic bowl	Table 5.1.7
MCU 1	Medium cup	Table 5.1.8
MVN 1	Medium vessel with neck	Table 5.1.9
MPO 1	Medium pot, rounded and decorated rim, lip in continuity with the closed wall, globular body	Table 5.1.10
MPO 2	Medium pot, spherical, profile nearly to dinos shape, small dimensions	Table 5.1.10
Figulina	Homogeneous structure, sometimes of buff clay; wall thickness between 2 mm and 7 mm, with a medium weight; surface is well polished and has a typical red color. On the basis of decoration patterns, one group of figulina ware has been termed "Scaloria Lower Style" (Scaloria Bassa) or more recently "Catignano-Lower Scaloria," while a second group has been termed "Upper Scaloria Style" (Scaloria Alta). The most important differences among them are based on decorative style, but also we point out the surface texture and the impasto, which are fine in the Scaloria Lower, and powdery to the touch and less well preserved in the Upper Scaloria.	
FPA 1	Figulina patera, rounded rim, lip everted	Table 5.1.11
FPA 2	Figulina patera, flat rim, lip distinguished from wall and modeled	Table 5.1.11
FPA 3	Figulina patera, tapered rim, lip straight, bottom carinated and nearly flat	Table 5.1.11
FHB 1	Figulina hemispheric bowl, rounded rim, lip in continuity with wall, convex bottom, semicircular profile, equipped with pierced handles	Table 5.1.12
FHB 2	Figulina hemispheric bowl, rounded rim, opened lip, shaped like a convex hat, restricted bottom	Table 5.1.12
FTB 1A–C	Figulina troncoconic bowl, subtypes	Table 5.1.13
FCB 1A, B, 2AB, 3	Figulina carinated bowl, subtypes	Table 5.1.14
FCU 1A–C, 2A–D, 3A–C	Figulina cup	Table 5.1.15
FOB 1A, B	Figulina ovoid beaker, subtypes	Table 5.1.16
FVN 1A–C, 2A–B, 3	Figulina vessel with neck, subtypes	Table 5.1.9
FBV 1A–C, 2A–B	Figulina biconic vessel; Unicum, subtypes	Table 5.1.10
FPO 1A–D, 2, 3A–B, 4	Figulina pot, subtypes	Table 5.1.11
FAM 1A, B	Figulian amphora, subtypes	Table 5.1.20

Riassunto

In questo capitolo di preludio all'analisi stratigrafica, sono state messe in una sequenza descrittiva tutte le forme e le sintassi decorative riconosciute per la fase del Neolitico Medio di Grotta Scaloria.

A margine sono state trattate anche le decorazioni ad impressione sulla classe ceramica grossolana, in base ad una suddivisione in tre macrocategorie di impasti, per cercare di individuare una eventuale seriazione tra la ceramica impressa e la ceramica dipinta a partire dalla sequenza cronotipologica delle ceramiche neeolitiche del Tavoliere così come riconosciute da S. Tiné per il periodo Neolitico (Tiné 1983).

Alle due categorie cronologiche fortemente rappresentate a Grotta Scaloria della ceramica dipinta a bande rosse marginate o semplici ed alla ceramica impressa, si accompagnano sporadici elementi tipo Guadone, Masseria la Quercia e Passo di Corvo-Bande Bianche (Tiné 1983), nonché elementi seriori quali isolate decorazioni e forme Serra D'Alto prevalentemente circoscritte a quelle trincee che erano dislocate presso le aree residuali della campagna 1931.

Questa suddivisione ha consentito di isolare, nei successivi capitoli sulle sequenze stratigrafiche, le morfologie e decorazioni tipiche della fase più recente di frequentazione della grotta, già definita da S. Tiné di Scaloria Alta, e di descrivere tutte le tipologie individuate nella parte bassa della grotta, pertinenti invece ad una facies omogenea, circoscrivibile anche ad uso ben specifico di questa parte del complesso ipogeico.

5.2. Pottery from the Upper Chamber 1978 Excavations

Antonella Traverso

Introduction

The materials from the 1978 excavations in the Upper Chamber were presented in a preliminary study by Winn and Shimabuku (1980; and Appendix 2 [online]), together with a report on the nature of the deposits and on the stratigraphic elements identified in trenches 1, 2, 3 and an external trench. For a general overview, see E. Isetti's contribution on the history of research (Chapter 2.1, this volume). Here we analyze the ceramics recovered in the 1978 excavations quantitatively in order to define the chronology and ceramic classes, along with the general chronological sequence of the deposit. Vessel wares and forms—rough, medium, and figulina—and decorative styles are presented in Chapter 5.1 (this volume), Figures 5.1.1–5.1.12 and Tables 5.1.21–23. (See Chapter 5.1, this volume, for abbreviations and definitions.)

Earth movements had shut off the ancient entrance to the cave; it was temporarily reopened during the 1978 campaign. The location of the three 1978 trenches (Figure 2.1.4a, this volume) in one of the more accessible areas of the "Camerone Quagliati" is central to our general interpretation. In the absence of a stratigraphic diagram and to delineate any differences in formation dynamics of the deposits, we have compared the weights of finds from the diverse levels for each trench.

Trench 1

From trench 1, near the original cave entrance, 979 diagnostic fragments were recovered from 10 levels, weighing a total of 18.116 kg. Figure 5.2.1 shows the occurrence of the various ceramic styles identified in each trench.[1] Most of the pottery is from levels 1 through 4; the lowest level with ceramics is level 8. Figure 5.2.2 shows that the average weight of the figulina and medium classes, which is greater than the weight of other wares in the first five levels, reaches its maximum value in levels 4 and 5 (the exception, in level 8, could be due to the remains of a skull burial[2] (see Isetti, Chapter 2.1, this volume). For figulina and medium wares, there is a general correspondence between the absolute quantity of the materials and their average weight, with higher values in the first four levels. In the rough class, the fragments have a lower average weight, more fragments, and a higher fragmentation index in the first four levels. They increase in size in levels 5, 7, and 8, suggesting more depositional stress in the upper than in the lower levels.

There is a general correlation between the absolute quantities of the materials and their average weight (Figures 5.2.1 and 5.2.2), with higher meaningful values in the first four levels. Only one difference can be seen, in the rough class, which has a lower average weight in the first four levels. In fact, this pottery has been documented in the first levels with a large number of fragments and a high index of fracture. This would therefore indicate greater depositional stress in the upper rather than the lower levels. A different stratigraphic situation is delineated in the lower levels, where the red-painted figulina (both Scaloria Bassa and Scaloria Alta) is absent (layers 7–8b), while in the upper levels this ware is in a worse state of preservation. This situation could be variously explained: the rough class (predominantly impressed) in the lower levels could have been in its original setting, whereas in the top levels it could be a secondary deposit with mixing of layers following funerary use of the cave. Another observation is suggested from this possible

[1] Masseria la Quercia (often abbreviated to "Masseria") was defined as Guadone (Tiné 1980); Scaloria Bassa and Figulina (F.) red painted are interchangeable ceramic styles. Figulina Masseria is chronologically earliest.

[2] When Scaloria Alta pottery is fractured, the fragments are close together. Could this be because they were linked to burials that were contemporary with Serra d'Alto?

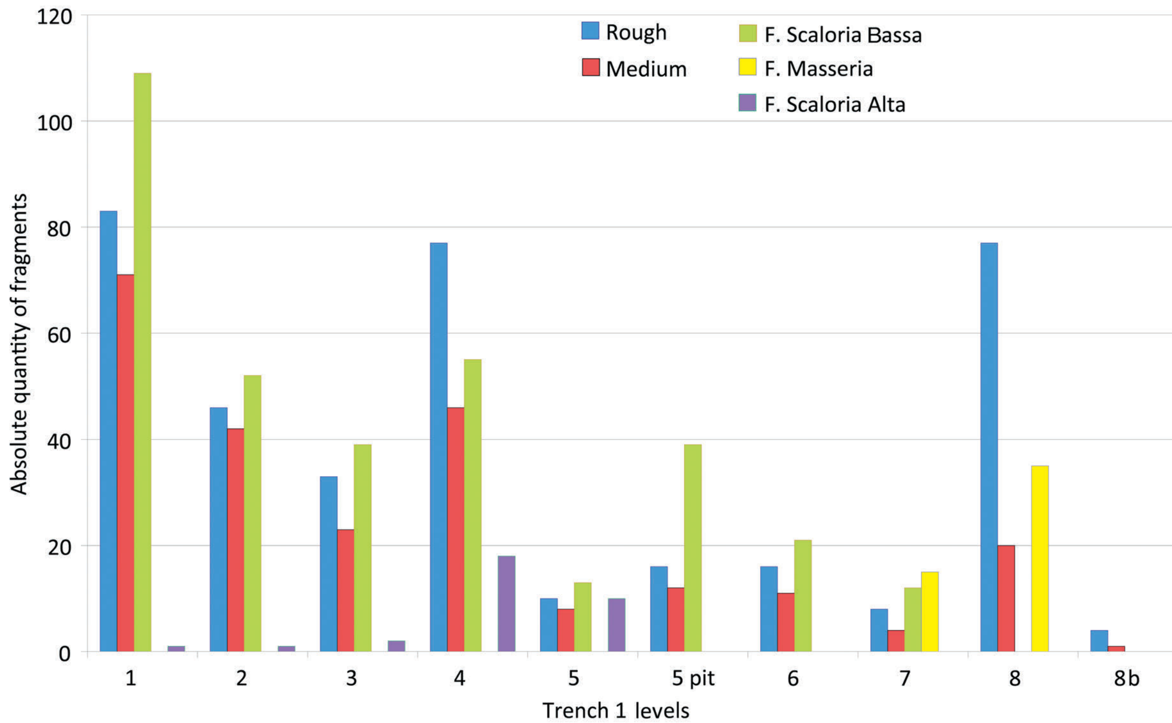


Fig. 5.2.1. Quantity of ceramic styles in each level of trench 1 (F = Figulina).

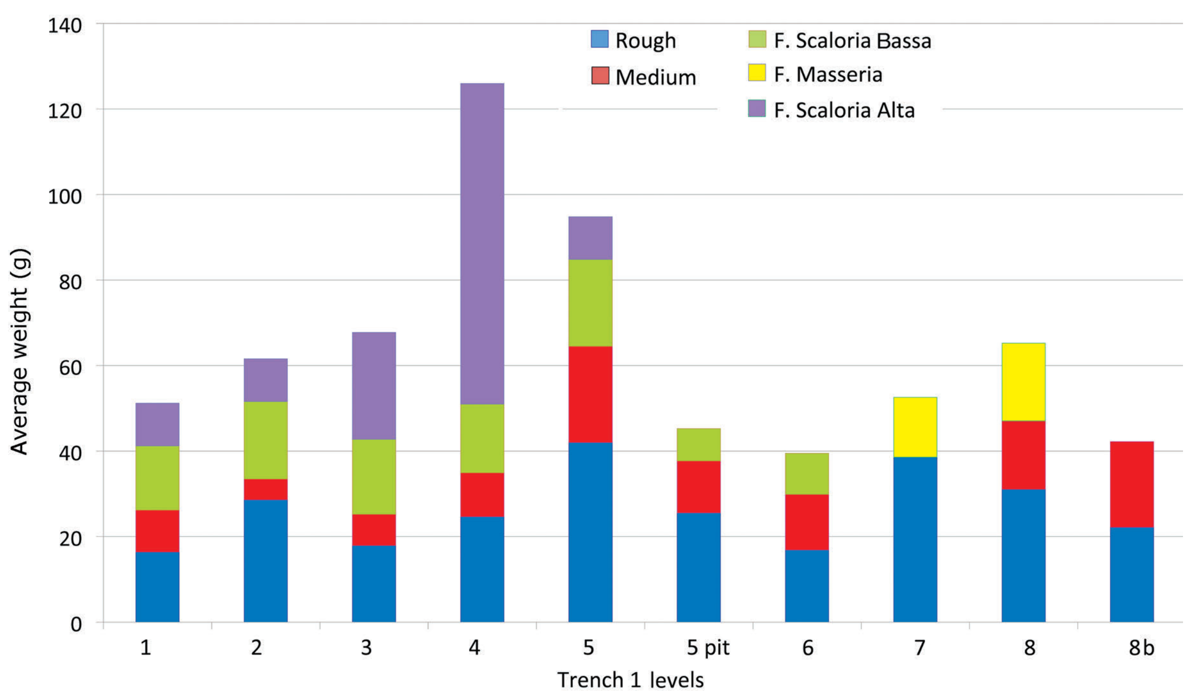


Fig. 5.2.2. Average weight of fragments in trench 1 (F = Figulina).

Table 5.2.1. Counts for levels and shapes by type, trench 1

Level/shapes	Rough	Medium	Figulina Scaloria Bassa	Figulina Masseria	Figulina Scaloria Alta
1 (totals)	2	1	6		
Cup 2A			1		
Cup 2D			1		
Cup 3A			2		
Cup 3C			1		
Jar 1C	2				
Vessel neck 1A		1	1		
2 (totals)	1	3	2		1
Amphora 1					1
Hemispheric B,1B		1			
Pot 1A	1				
Pot 3			1		
Vessel neck 1A		2	1		
3 (totals)		2			2
Carinated B3					2
Hemispheric B1A		2			
4 (totals)		1	1	1	
Carinated B1,C			1		
Hemispheric B1A		1			
Vessel neck 2A				1	
5 (totals)		1	2		1
Carinated B1A			1		
Carinated B3			1		1
Hemispheric B1A		1			
7 (totals)	1				
Jar 1C	1				
8b (totals)		1		1	
Hemispheric B1A		1		1	
Grand total	4	9	11	2	4

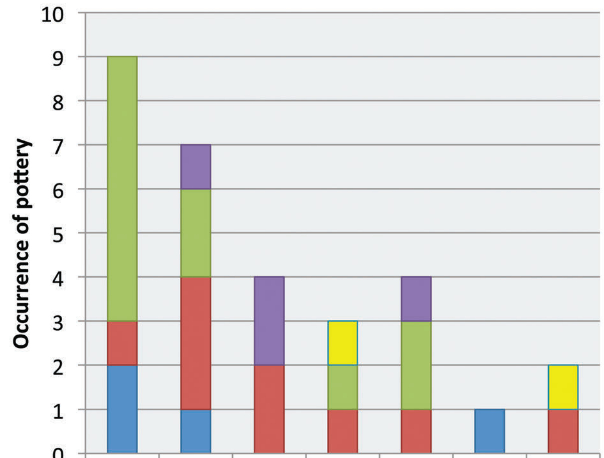
explanation: the diagnostic quantity of the figulina class from levels 7 and 8, attested by a low number of fragments compared to the total (35 fragments), is related to the Masseria la Quercia style, which chronologically precedes other painted wares. However, the non-diagnostic fragments, lacking in decoration, are more difficult to distinguish; they may have originally been decorated with "red-painted lines" or with the "Masseria la Quercia" style (see Table 5.2.1 and Figure 5.2.3).

As Winn and Shimabuku report (1980:9; and Appendix 2 [online]),[3] one compelling reason for excavating trench 1 was the observation of an undisturbed exposed human skull. Scaloria Alta pottery is present up to level 5, and this partially agrees with dating carried out on charcoal found near the skeleton (LJ-4650: 6490 ± 140 BP; LJ-4651: 6330 ± 90 BP; and see Robb, Chapter 2.3 [this volume]), although neither charcoal nor pottery was directly associated with the skull.

In terms of the typological categories outlined above, the rough pottery (RPO) includes mostly jars and pots, with a high percentage of decoration by various means such as shell impression (Figure 5.1.13:3A with cardium impression covering the surface), fingernail (Figure 5.1.13:1A), and tools with a quadrangular point (Figure 5.1.13:2B) (see Winn and Shimabuku 1980 for all citations here; Appendix 2 [online]).

In the medium class, we have the unique presence of the hemispheric bowl (MHB) in type 1, recovered from several levels (1, 2, 3, 6, and 8), both in this form (Figure 5.1.3:MHB 1B [rim with internal thinning])

[3] Appendices are available online at www.dig.ucla.edu.



Levels -->	1	2	3	4	5	7	8b
Count of F. Masseria				1			1
Count of F. Scaloria Alta		1	2		1		
Count of F. Scaloria Bassa	6	2		1	2		
Count of Medium	1	3	2	1	1		1
Count of Rough	2	1				1	
TOTAL for Trench 1	9	7	4	3	4	1	2

Fig. 5.2.3. Histogram for trench 1 showing counts of five types by level (based on Table 5.2.1) (F = Figulina).

and in the cup form (Figure 5.1.3:MCU 1A, B) with rounded rim.

The figulina class is documented in several forms and varieties: the cup (Figures 5.1.8a:FCU 2A; 5.18b: 3A and 3C); the necked vase (Figure 5.1.9:FVN 1C); and the carinated bowl (Figure 5.1.7:FCB 1A, 1B). The type in Figure 5.1.7:FCB 3, with lip and distinct body, is also common among the Scaloria Alta decorated wares. The Scaloria Alta decorations recovered from this trench include typical patterns of painted metopal decoration filled with bands delimited by rows of points.

Trench 2

This trench, documented by Winn and Shimabuku (1980:10; and Appendix 2 [online]), was selected for study because of the abundant materials visible on the surface; it subsequently "revealed rich deposits of over one meter. After 30 cm of water-borne material, important discoveries were made of undisturbed burial and cultic deposits at various levels." From the trench come 1,624 fragments of pottery, a total of 20.57 kg, distributed among 15 levels, of which two constituted the top levels of burial "structures" labeled 6, 10, and 11.

Figure 5.2.4 illustrates the occurrence of pottery remains in trench 2. Pottery is amply present in levels 8, 9, and 11, with a strong concentration of figulina pottery with simple red bands. The labels accompanying the materials, in the absence of other information from the excavation, attribute this material to burial goods (referred to as "structure"), though whether from "tomb 10," "tomb 6," or some other structure is not clear. Since only one unambiguous burial is actually documented and it did not have any pottery directly associated with it, such attributions must be regarded with substantial caution. Scaloria Alta decoration is attested only up to level 5; the exception from level 11 corresponds to cleaning the trench walls ("cleaning levels 9–10"), from which the beautiful hemispheric bowl comes (Figure 5.1.16: 9A), and this is likely due to stratigraphic mixing during excavation. Rough pottery is found at nearly all levels in association with the figulina with simple red bands, and, in the basal levels, sherds of Masseria la Quercia ware.

Figure 5.2.5 shows the average weight of sherds from trench 2. For each class, fragment size is more or less homogeneous among the different levels. Exceptionally, figulina fragments of greater dimensions come from the levels labeled "tomb 10" and "level 11,"

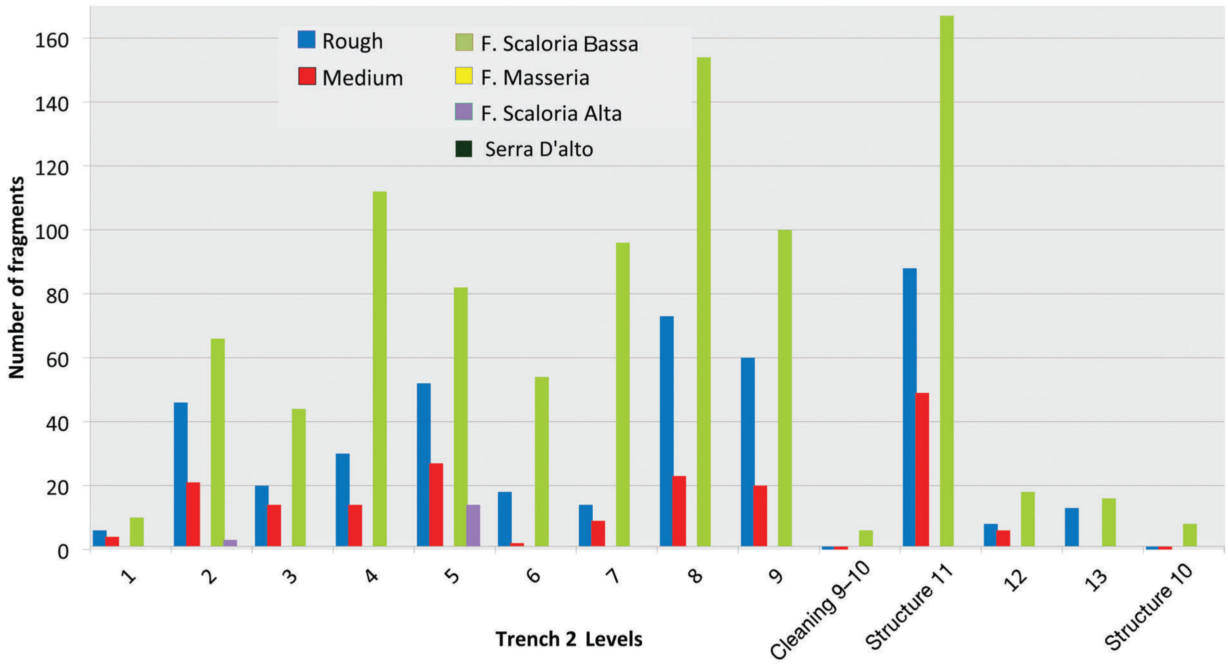


Fig. 5.2.4. Trench 2 levels by ceramic types and number of fragments (single sherd recovery: Masseria—L1, 9–10, 13; Serra d'Alto—L4).

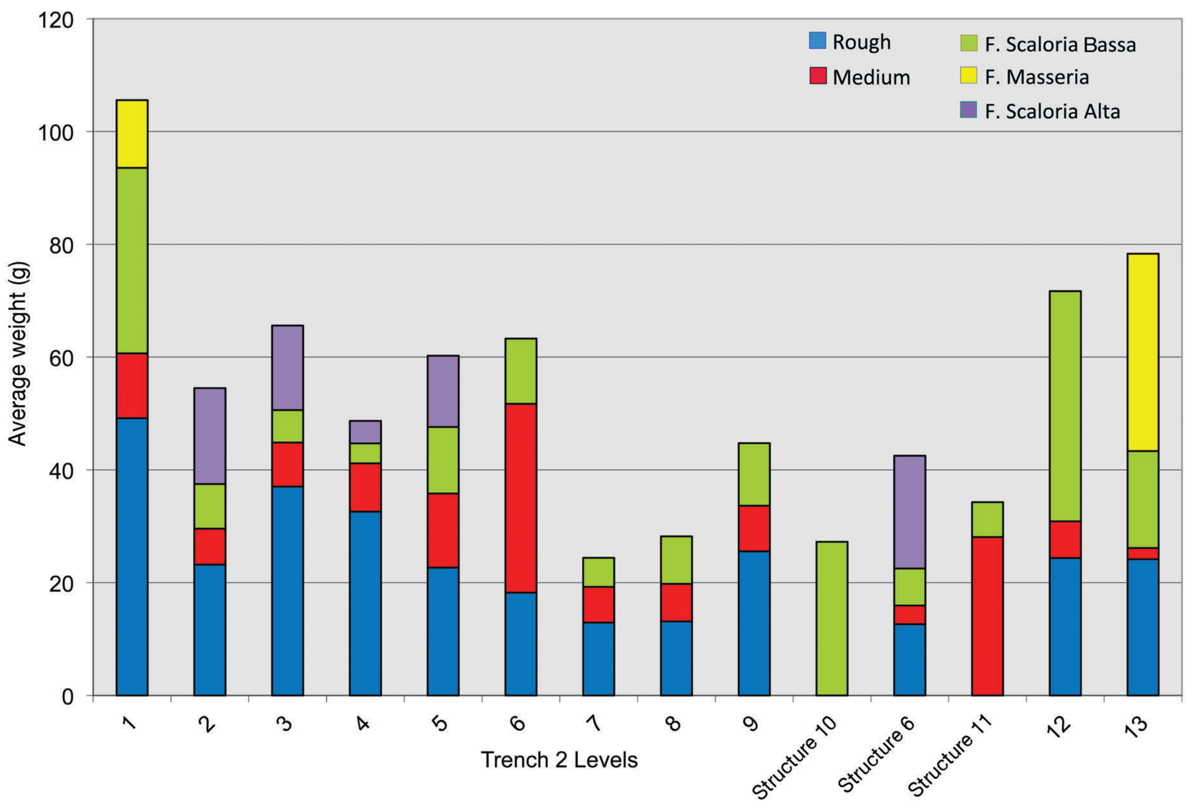


Fig. 5.2.5. Histogram for trench 2 levels showing average weight (g) of sherds by type. (The term "structure" was used interchangeably with "tomb.")

which seem to have better-preserved medium-class ware, that is, a significant number of ceramics with graffita decoration. These elements may derive from disturbed burials, of which at least one was protected by slabs (Winn and Shimabuku 1980:11; and Appendix 2 [online]); if so, this could also explain the presence as far as level 5 of Scaloria Alta pottery in a relatively good state of preservation, including its presence in "tomb 6," the opening of which was presumably in level 5. However, overall evidence for disturbed burials in this specific situation is uncertain, as noted previously.

Table 5.2.2 and Figure 5.2.6 show correlations among vessel forms and their profile and decorative styles. The rough class encompasses simple forms such as the jar (RJA) or the pot (RPO), generally impressed with fingernails (Figure 5.1.13:1A, 1B) in typology (see Chapter 5.1, Table 5.1.21, this volume). Many sherds cannot be categorized according to a specific shape but are decorated with instruments like a blade (Figure 5.1.13:2A) or a quadrangular-tip tool (Figure 5.1.13:2B), and with cardium shells (Figure 5.1.13:3A, 3C). In the medium class, the "graffita" pattern (Figure 5.1.13:5A, B) has been recovered both in the upper levels (3) and in lower levels (until 12).

More important, however, are the forms and types for the figulina class. Considering only those from level 5 down to the base of trench 2 (level 13), we can identify the cup; hemispheric, troncoconic, and carinated bowls; biconic vase; vase with neck; and amphora. Only one form, the patera (FPA 2, 3), appears in the upper levels, with simple red-band decoration or with Scaloria Alta decoration. Significantly absent here is the type with negative decoration (FPA 1A; Figure 5.1.4:1A). Trench 2 also contains some forms that are absent in the lower part of the cave, including the carinated bowl and troncoconic bowl from level 7 and the level of tomb 10. This could indicate that these levels may have been more recent than the lower chamber ritual site.

Trench 3

This trench was located to explore "the flattened area, protected by some back dirt left behind by serious robbers" (Winn and Shimabuku 1980:11; and Appendix 2 [online]). In reality, the thin intrusive deposits were characterized by "a circular pit cut into the sterile yellow soil. Excavation of this pit, about 1 meter in diameter, showed it had been dug for burial purposes" (ibid.). Three levels have been identified, in some cases articulated into sublevels (levels 3a, 3b, "3c around the skeleton," "cleaning pit"); note again that "around the skeleton" was a designation indicated during the excavation when excavators believed they had encountered burials, but the evidence for an actual burial here is ambiguous. Some 320 fragments were recovered, with a total weight of 3.031 kg, of which 54 are diagnostic fragments. We did not find any Scaloria Alta pottery, thus agreeing with the assessment of the preliminary report that trench 3 pottery may be "somewhat earlier than that found in Trenches 1 and 2" (Winn and Shimabuku 1980:2; and Appendix 2 [online]). Because of the limited number of levels, we present here the material divided by average weight of the diagnostic fragments. Figure 5.2.7 highlights this, where the diagnostic fragments of all classes have a higher average weight in general terms.

Unfortunately, the number of diagnostic sherds does not allow further observations, except to note that levels "around the skeleton" (level 3) and with "cleaning the area" produced some troncoconic and carinated bowls and a few fragments of Masseria la Quercia style, presumably evidence of some chronological stratification still in place. In general, this confirms Winn and Shimabuku's observation that this area was used mostly in the earlier part of the sequence, when troncoconic and carinated bowls are absent in the Lower Chamber.

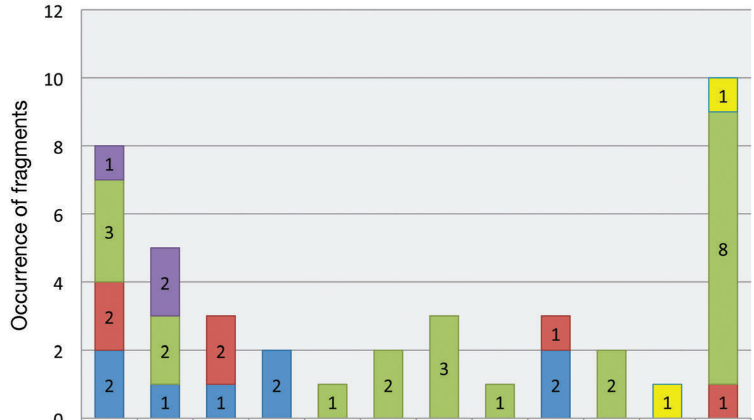
External Trench (Outside Cave)

After magnetometric readings, this sounding was undertaken to try to locate the original cave entrance. The 4 ×6-m exposure was in the proximity of a ridge of rock (still evident in the aerial photograph) (Winn and Shimabuku 1980:5–7; Appendix 2 [online], and Chapter 2.1, this volume) and was quickly reduced to 2×6 m because of an outcrop of rock under the first 10 cm of deposit. A further reduction of the surface was made due to many outcrops of large boulders that prevented deeper excavation. It was therefore only possible to explore the stratigraphy in four areas: sector 2, for 24 levels (until −2.4 m); where there was a small aperture connecting the inside of the cave at ground level; sectors 3–4 until level 11; sector 6 until level 5; and sector 7 until level 17, for a depth of −1.70 m.

Figure 5.2.8 illustrates the number of fragments of differing pottery styles recovered from the external trench, sector 2, where it was possible to identify 26 levels, reaching a final depth of 2.4 m. There were large amounts of figulina and rough pottery from levels 7,

Table 5.2.2. Counts of pottery shapes by level and type, trench 2

Level/type	Rough	Medium	Figulina Scaloria Bassa	Figulina Scaloria Alta	Figulina Masseria
1 (totals)	2	2	3	1	
Cup 3A			1		
Jar 1A	1				
Patera 2, 3		1	1		
Pot 1B	1				
Troncoconic B, 1B			1		
Vessel neck 1A	1				
Vessel neck 1C	1				
2 (totals)	1		2	2	
Carinated B, 1A			1	1	
Cup 4B				1	
Hemispheric B, 1B2			1		
Pot 1B2	1				
3 (totals)	1	2			
Jar 1B	1				
Pot 1B		2			
4 (totals)	2				
Jar 1A,B	2				
5 (totals)			1		
Vessel neck 4A			1		
6 (totals)			2		
Biconic vessel 1B1			1		
Hemispheric B, 1A,B			1		
7 (totals)			3		
Biconic vessel 1A1			1		
Carinated B2			1		
Troncoconic B1A			1		
8 (totals)			1		
Biconic vessel 1A1			1		
9 (totals)	2	1			
Hemispheric B1A	1				
Jar 1A	1				
Troncoconic vessel 1B		1			
12 (totals)			2		
Biconic vessel 1A, B			2		
13 (totals)					1
Hemispheric B1A					1
"Structure 10" (totals)		1	8		1
Amphora 1A			1		
Biconic vessel 1A1			1		
Biconic vessel 2A			1		
Carinated B1A,B			3		
Hemispheric B1A			1		1
Hemispheric B1B		1			
Troncoconic B1A			1		
Grand total	8	6	22	3	2



Levels -->	1	2	3	4	5	6	7	8	9	12	13	struct 10
Count of F. Masseria											1	1
Count of F. Scaloria Alta	1	2										
Count of F. Scaloria Bassa	3	2			1	2	3	1		2		8
Count of Medium	2		2						1			1
Count of Rough	2	1	1	2					2			
TOTAL trench 2	8	5	3	2	1	2	3	1	3	2	1	10

Fig. 5.2.6. Histogram for trench 2 showing counts of wares by level (based on Table 5.2.2).

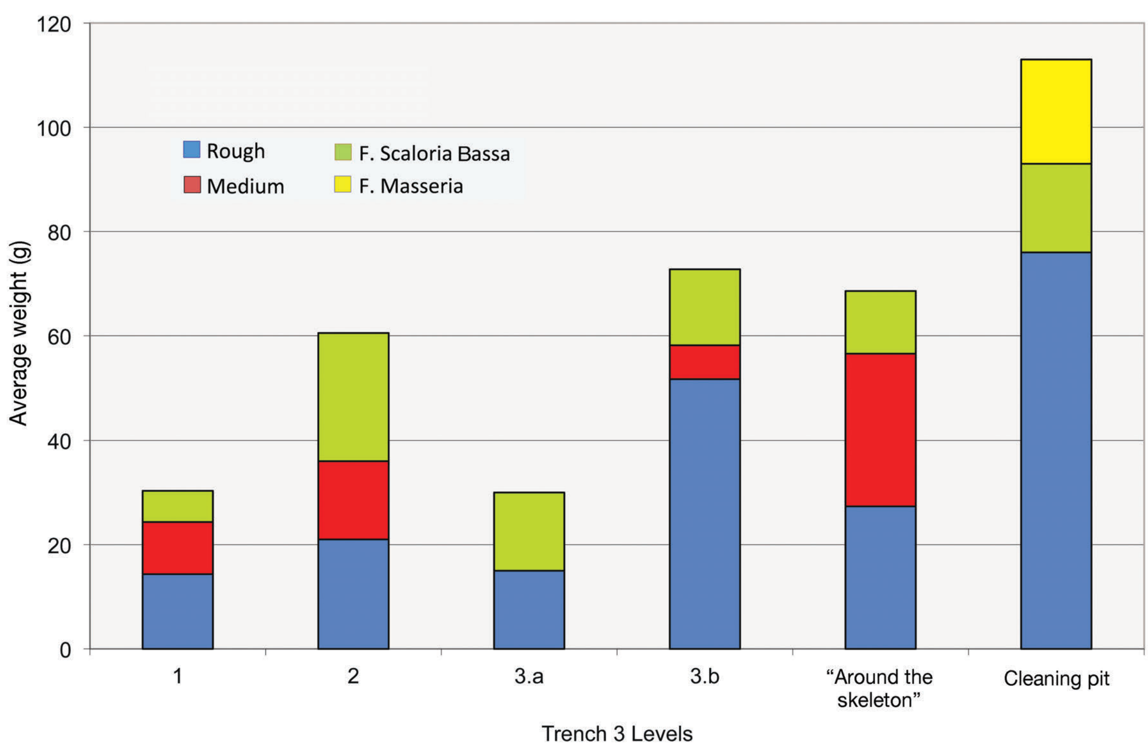


Fig. 5.2.7. Trench 3 levels by average weight of fragments (g) and pottery class.

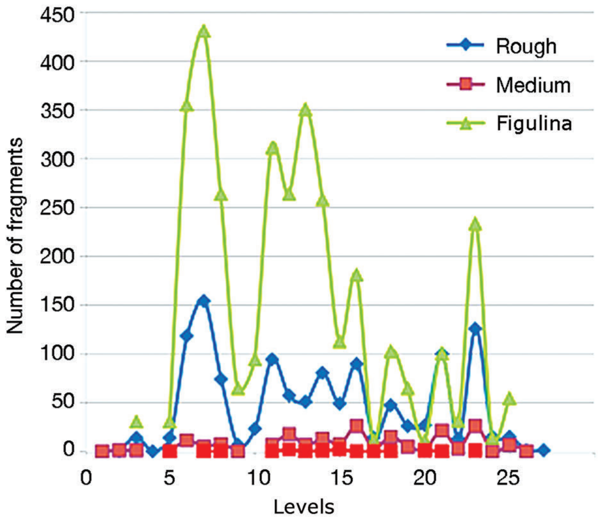


Fig. 5.2.8. Number of fragments by pottery type recovered from external trench levels, sector 2.

10–12, and 22, while the medium class had constant, low values in all levels. Level 7 contained a large quantity of fragments (593) compared with the average of 180 fragments per level; there were smaller quantities in the lowest levels (25 and 26) and more in some upper levels (particularly 6, 7, and 8).

Figure 5.2.9 presents the average fragment weight of all pottery classes recovered from the external trench sector 2. Scaloria Bassa pottery was not reported. There is a clear difference between levels 8 and 26 and the other levels, particularly for the rough class: in levels 8 and 26 the fragments are larger and better preserved. This is also true for the Scaloria Alta pottery coming from levels 12, 19, and 22, where preservation is considerably better than in other levels. The presence of Scaloria Alta style in the deeper levels of this external trench (up through level 22) may indicate a later sequence or that the deposit could be in secondary stratification due to collapse of the sequence.

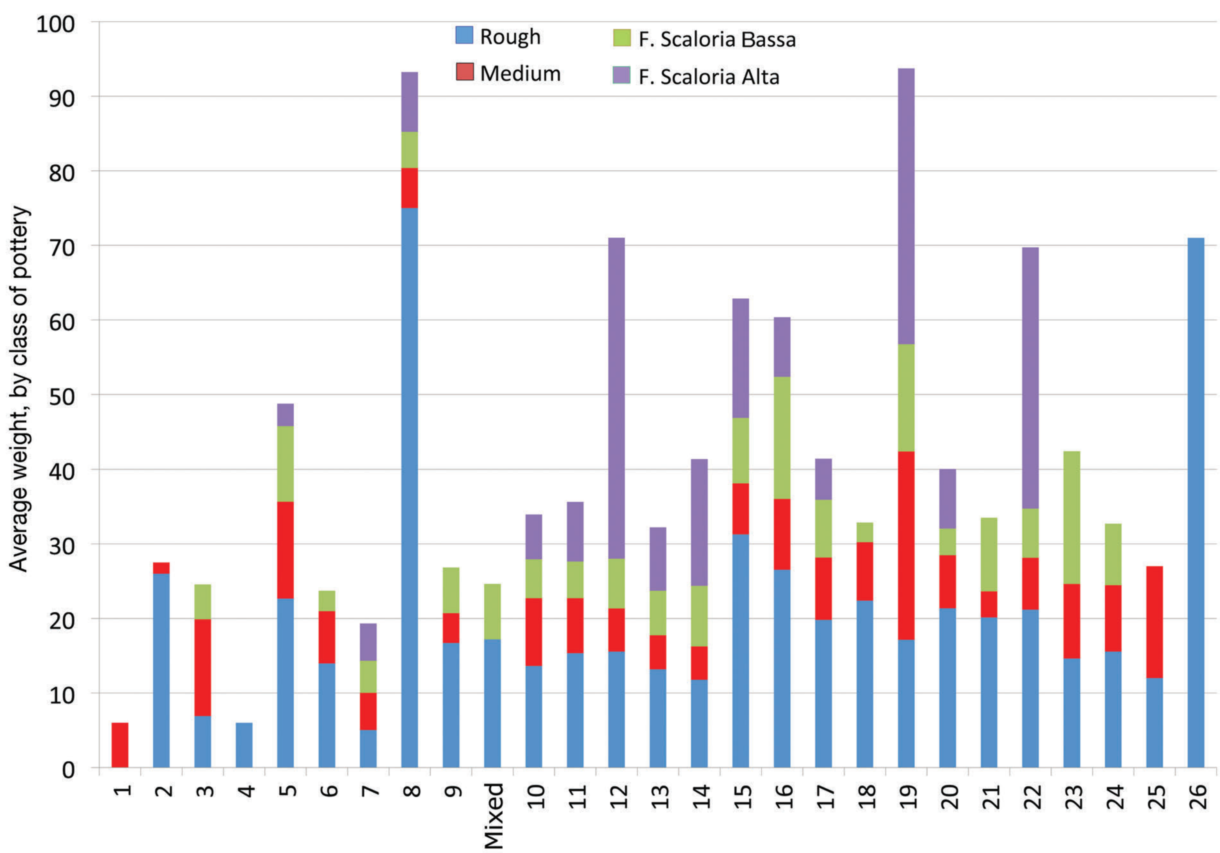


Fig. 5.2.9. Histogram of sector 2 levels showing ware types and average weight of all pottery per level (F = figulina).

General Discussion

In the three internal trenches, rough pottery wares are in evidence for only some forms among those we identified in the cave. The vase and the slightly convex walled bowl are absent. There are some shapes typical of impressed ware, although several shapes are missing. The troncoconic bowl with slightly convex walls is attested only in the external trench (level 19) and in trench 3. All recognized decorative patterns appear in the three trenches—impressed, incised, and graffita—except for the impressions produced by unidentified shells (3D) or with human fingernails (1B); these are attested only in the external trench. Medium-class pottery was present in virtually all levels of all trenches, from the uppermost to the deepest. Forms of medium-class pottery included hemispheric bowls, vases with necks, and pots, but no cups. The graffita decoration is particularly preserved in remains from trench 2, level 11. Concerning the figulina class, pottery with decoration of simple red bands or of the "reserved" type of Scaloria-Catignano style is found in several small vessel forms in all trenches, such as the carinated bowl, cup, necked vase, and small biconic vase. Missing or insufficiently attested, however, is the larger amphora form that characterizes the remains from the Lower Cave, which is present only in a few fragments from trench 1.

A meaningful comparison can be established among the deposits across the three internal trenches, particularly with regard to weight of recovered materials. In Figure 5.2.10, we have compared such values from trenches 1 and 2: here all the classes, but primarily the medium and figulina classes, peak in level 6, while the Scaloria Alta (tricromica) is found only in level 4 of both trenches with larger fragments. A different situation exists for the rough class in trench 1 (dark blue in Figure 5.2.10), with constant values in all levels and a drop in those levels (e.g., level 6) where the other classes are best represented. If we compare the average weight of fragments in the internal trenches and those from the external sounding, sherds from the external trench are generally smaller, probably due to preservation conditions and to stress in the depositional process. This suggests that the external deposits may be secondary, perhaps representing an accumulation during external habitation or collapse that caused the closure of access to the cave. The presence of Scaloria Alta pottery all the way down to the basal level 22 (Figure 5.2.9) may suggest a secondary landslide rather than deposits in the original position (contra Winn and Shimabuku 1980:7, and Appendix 2 [online]).

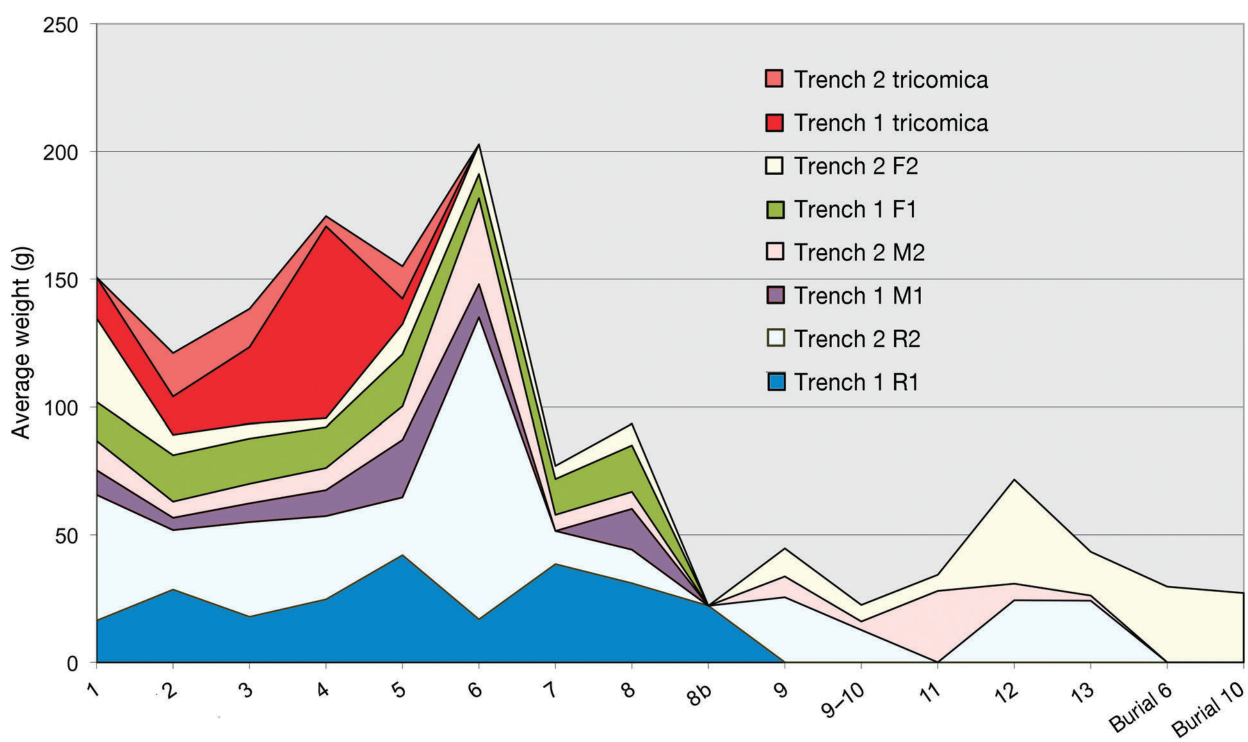


Fig. 5.2.10. Comparison of weight values between trenches 1 and 2.

RIASSUNTO

In questo capitolo vengono prese in considerazione le ceramiche provenienti di sondaggi effettuati nella porzione superiore della grotta nella campagna del 1978, articolate nei sondaggi da 1 a 3, e in un saggio esterno eseguito in prossimità della probabile apertura antica.

I materiali dalle trincee 1 e 2 hanno messo in evidenza la presenza di ceramica appartenente alla facies di Scaloria Alta/Ripoli anche nei livelli intermedi, che probabilmente si riferisce alla presenza di elementi di corredo di alcune deposizioni funerarie qui individuate. Gli altri materiali si riferiscono invece per la maggior parte a ceramica impressa e a ceramica dipinta nello stile definito da Tiné (1983) della Scaloria Bassa.

La trincea n. 3 invece non ha restituito materiale relativo alla fase più tarda della Scaloria Alta, confermando l'impressione che questa porzione marginale della grotta fosse stata frequentata solo nel momento di maggior utilizzo del complesso ipogeico.

Resta il fatto che la trincea esterna è la sola che ha restituito gli elementi decorativi impressi di tipo caotico ed indifferenziato, ed il materiale da qui proveniente presentava caratteristiche di maggior stress deposizionale rispetto ai depositi interni.

5.3. Pottery from the Lower Chamber

Eugenia Isetti and Antonella Traverso

Introduction

This chapter describes pottery vessels from Scaloria's Lower Chamber and uses the available documentation to try placing them in their original archaeological setting, although the archive provides sometimes contradictory documentation on the location of specific vessels. After establishing the extraordinary nature of the cult site discovery in the Lower Chamber, Santo Tiné mapped the plan of the Upper and Lower Chambers so that water in the deepest part of the cave would be noted (see Figure 5.3.1). The film taken on that occasion by Tiné and his working group, later restored, allowed us to locate precisely where the most important pottery vessels were positioned. This is especially important for the initial part of the gallery and for such areas as the small lake and basin area toward the slope to the Lower Chamber. Unfortunately, the film stops just where the Lower Chamber expands; therefore the film does not show the finds in the context of the cave's deepest area.

Morphology of the Lower Portion of the Cave

Along the northwest side of "Camerone Quagliati" (the Upper Chamber), it is possible to reach a downward-sloping and oblique gallery about 15 m wide by 35 m long, and between 50 and 60 cm high, along which the first vessel groups had been found. This gallery allowed access to the lower complex. The lower complex of the cave was initially divided into three parts at the time of the cave's discovery; now, however, we define five areas:

1. "Diaclasis" (so-called because it is a fracture line in this limestone formation): first part of the access gallery
2. "Gallery": further extension of the access gallery, up to the area of the small lake
3. "Crossroad" (labeled with R in the original plan from 1967 exploration): the place in the gallery where different paths branch out to the basin, the lower cave, and the small lake
4. "Basin area," which is divided in two parts:
    a. Upper basin area: area behind the basin, which is slightly inclined, with a very low ceiling
    b. Lower basin area: lower part, where the real basin was excavated into the bedrock; the basin has a rectangular shape, with sharp edges cut at right angles, and is located in an almost flat area, and since its discovery it has been considered evidence of the ritual use of this part of the cave (Tiné 1972:203)
5. "Lower Chamber" proper: large steeply sloping chamber (about 1,600 m^2), entered among huge boulders, and partially covered by collapsed rocks; on the bottom, several variously deep and wide pools belong to a single lake, divided by subsequent collapses of the ceiling. The average chamber height is about 10.7 m. Upon its discovery, the Lower Chamber was divided into C, A, D, and D5 areas/sectors.

Archaeological Groupings

Along the route leading to the deepest part of the cave, the Lower Chamber, at a height of 45 m below the ground surface, 40 groups of vessels were discovered and partially recovered (cf. Isetti, Chapter 2.1). Pottery find spots were numbered on the plan (Figure 5.3.1) but the link between the numbers and the pottery has been lost. In the following catalogue we list the current museum inventory number (IN) for 55 vessels; however, those numbers are not linked to the 1967 plan but refer specifically to the archives in the Museo di Manfredonia (figure callouts refer to Traverso, Chapter 5.1).

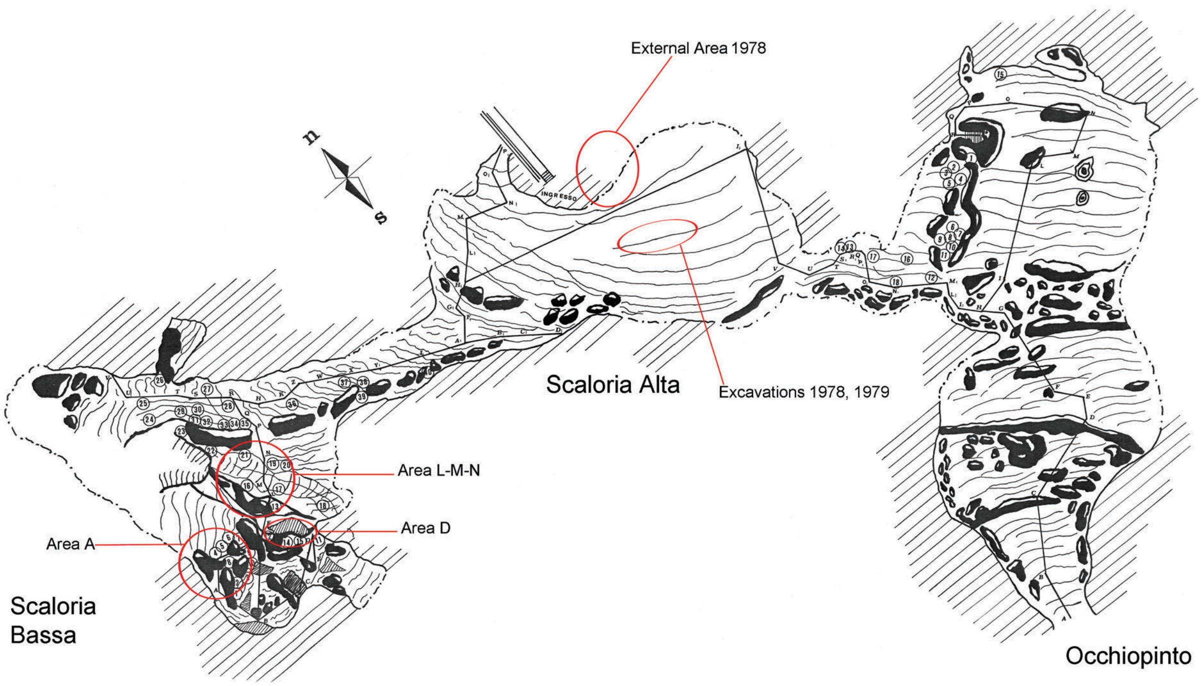


Fig. 5.3.1. Plan of cave: Upper and Lower Chambers.

Upon descending from the Upper Chamber toward the cave bottom, it is possible to subdivide those groups based on general location as they appeared in the available documentation made by the first explorers. The key is matching vases to locations marked on maps and to locations shown in the film mentioned above, but it is no longer possible to find some of the vases recovered at that time. However, the graphic documentation produced at that time must have made use of drawings carried out at the moment of discovery. The shape designation (e.g., "Figulina cup" [Figure 5.1.8a–b]) refers to the typology, drawings, and figures in Chapter 5.1 and the decoration to Tables 5.1.21–5.1.23, also in Chapter 5.1.

DIACLASIS AREA (SLOPING PASSAGE, HIGHEST PART OF LOWER CAVE COMPLEX)

The following vessels (catalogue numbers 1–9) belong to this first section of the route (measurements refer to height of surviving fragment; decoration consists of paint unless other is indicated; IN = inventory number in museum).

1. Figulina hemispherical bowl (Figure 5.1.5) fragmentary shape (18 sherds). Height 14 cm. Rim diameter 15.5 cm. Internal decoration type 3A, external decoration probably missing (IN 13).
2. Figulina cup (see Figure 5.1.8a–b) type 3A, incomplete shape (4 sherds). Scaloria Alta–style pottery. Rim diameter cm 13. Internal brown decoration near lip, motifs type 3A, external decoration motif type 8B, handles with small painted points (IN 9).
3. Figulina biconic vessel (Figure 5.1.10) type 1A, reassembled shape (6 sherds). Height 12.2 cm. Rim diameter 9.3 cm. Red-painted pottery, fading decoration. Internal decoration red line on rim, traces of painting at different points dripped inside the vase. External diaphanous decoration type 6 (IN 11).
4. Figulina ovoid beaker (Figure 5.1.8b) type 1B, fragmentary shape (5 sherds). Red-painted pottery, fading decoration. Two knobs vertically pierced and oriented, one at 5.5 cm from the rim, the other at 3.5 cm. Height 11.9 cm. Rim diameter 13 cm. Maximum diameter 16 cm. External decoration located between handles and rim, type 6. Below the knobs, a triangle with vertex pointed downward, 1.5 cm from the bottom. Fading decoration type 6 (IN 26).

5. Figulina ovoid beaker (Figure 5.1.8b) type 1B, fragmentary shape. Red-painted pottery, fading decoration. Height 15.5 cm. Rim diameter 12 cm. At 2 cm from the rim, a small swelling divides the vase in two parts; large knob vertically pierced. External decoration types 5c and 6 (IN 1).

6. Figulina hemispherical bowl (Figure 5.1.5) type 1B2, reassembled shape (19 sherds). Red-painted pottery, fading decoration. Height 13 cm. Rim diameter 23 cm. Fragmented knob. Internal red decoration in basketweave pattern with red disk on the bottom, hanging semicircles on the rim joined to radiating brushstrokes. External fading decoration type 6 (IN 15).

7. Figulina hemispherical bowl (Figure 5.1.5) type 1B1, reassembled shape (26 sherds). Red-painted pottery. Two old repair holes. Two handles horizontally pierced at 4 cm from rim, both located on the same side, 6 cm apart. Height 18 cm. Rim diameter 29.5 cm. Internal decoration type 3 A–B, external decoration type 5D (IN 19).

8. Figulina hemispherical bowl (Figure 5.1.5) type 1B1, complete shape (3 sherds). Red-painted pottery with fading decoration. Five old repair holes. Two knobs vertically pierced at 5 cm from rim, distance between them 16 cm. Height 13 cm. Rim diameter 26 cm. External decoration type 5D (IN 20).

9. Figulina amphora (Figure 5.1.12) type 1A, fragmentary shape (15 sherds). No decoration. Four vertical ring-shaped handles on largest part of body. Maximum diameter 35 cm (IN 21).

Gallery Area Leading to Small Lake

The first (upper) part of the gallery leading to the shallow pool was designated the “small lake” in 1967. A number of vessel groups (catalogue numbers 10–20) were found sealed beneath a thin layer of concretion.

10. Figulina patera (Figure 5.1.4) type 3. Almost entire vessel (missing only 1 fragment). Red-painted pottery. Rim diameter 23 cm; height 4–5 cm. Painted decoration type 5B (IN 27).

11. Figulina biconic vessel (Figure 5.1.10) type 1A. Almost entire vessel (missing only 1 fragment). Red-painted pottery, fading decoration. Three old repair holes. Height 13 cm. Rim diameter 12.5 cm. Stalagmite concretion on surface and inside. External decoration only, of type 5B and 6 (IN 36).

12. Figulina biconic vessel (Figure 5.1.10) type 1, fragmentary shape concretized by stalagmite. Undecorated pottery. Height 9 cm. Rim diameter 10 cm (IN 41).

13. Figulina hemispherical bowl (Figure 5.1.5) type 1C, large sherd partially including vase bottom and body. Red-painted pottery. Height 13.5 cm. Rim diameter 26 cm. Internal red decoration type 5A, external decoration type 5B and 6 (IN 43).

14. Medium cup (Figure 5.1.3) type 1C, reassembled shape (4 sherds). Undecorated pottery. Flat base. At 1.2 cm from rim, traces of two small knobs, slanting and slightly curved. Height 12 cm. Rim diameter 13 cm (IN 42).

15. Figulina biconic vessel (Figure 5.1.10) type 1B, reassembled shape. Red-painted pottery. Several internal and external stalagmitic concretions. Height 8.5 cm. Rim diameter 8 cm. External decoration type 6 and curving bands (type 5 B–C) (IN 40).

16. Figulina amphora (Figure 5.1.12) type 1A, fragmentary shape. Undecorated pottery. Sherd preserves part of vessel body with two large ring-shaped handles, vertically pierced. Height 26 cm. Maximum diameter 23 cm. Surfaces with rough traces of broad knife or shaping tool (IN 44).

17. Figulina biconic vessel (Figure 5.1.10) type 1A, 2 sherds from lip and rim. Red-painted pottery. Height 6 cm. Rim diameter 11 cm. Internal decoration 1A, external decoration 5B (IN 45).

18. Medium ovoid pot, 2 base sherds from different vessels. One of height 6 cm and base diameter 11.4 cm; the other of height 5 cm and diameter 10 cm (IN 46).

19. Figulina hemispherical bowl (Figure 5.1.5) type 1A, reconstructed partial vessel from several fragments, red-painted pottery, fading decoration. Height 18 cm. Rim diameter 28 cm. Internal painted decoration type 2B, external painted decoration of types 5B, 5D, and 6. Several old repair holes near the rim. Incomplete shape filled by stalagmites (IN 2).

20. Figulina vessel with neck (Figure 5.1.9) type 1A. Large sherd (perhaps related to 8 sherds from a necked vessel), red-painted pottery. Height 11 cm. Small knob vertically pierced below the rim (IN 37).

Crossroads Area

Some large, red-painted, closed vessels (catalogue numbers 21–24) come from point where "path" to ritual basin starts. These vessels are partially described as follows, although some vessels known to have existed are now missing and cannot be described.

21. Figulina amphora (Figure 5.1.12) type 1B, 50 sherds from vase without neck. Red-painted pottery, fading decoration. Height 17 cm. Maximum diameter 21 cm. Four ring-shaped handles, vertically pierced, placed on the shoulder; external slanting painted decoration of types 5C and 6 (IN 10).

22. Figulina ovoid beaker (Figure 5.1.8b) type 1B, undecorated pottery. Part of rim and body. Height 10 cm. At 4 cm from lip, a small pierced knob (IN 54).

23. Figulina amphora (Figure 5.1.12) type 1E, large sherd partially including vessel body and neck. Red-painted pottery. Height 32 cm. On largest point there is a ring-shaped handle, vertically pierced, with a short elbow bend. External decoration type 4B (IN 52).

24. Figulina biconic vessel (Figure 5.1.10) type 1A, a reassembled vessel. Red-painted pottery. Height 19.5 cm. Rim diameter 15 cm. External decoration of type 5B plus 3 brown bands type 4B from the base (IN 53).

Basin Area

From the "crossroads" area, proceeding up a slight rise, one can reach the almost flat area where the basin had been excavated. Several pottery fragments (catalogue numbers 25–29) were found around it; most were positioned to the north of area. In 1978, human bones were found next to the basin, perhaps a ritual deposition (Tiné and Isetti 1980; see also Isetti, Chapter 2.1, Figure 2.1.10). The areas close to the basin can be divided as follows.

Alongside Basin on Slope to Lower Chamber

25. Figulina hemispherical bowl (Figure 5.1.5) type 1A, reassembled vessel from 2 sherds. Red-painted pottery. Height 9 cm. Rim diameter 22 cm. Horizontally pierced lug. Internal decoration with 4 lines converging on bottom (IN 12).

26. Figulina hemispherical bowl (Figure 5.1.5), type 1B1, reassembled vessel from 3 sherds. Red-painted pottery. Height 21.5 cm. Rim diameter 33 cm. Two pairs of old repair holes. Only a few external traces of evanescent decoration (IN 30).

27. Figulina hemispherical bowl (Figure 5.1.5) type 1B2, reassembled shape (8 sherds). Horizontally pierced lugs. Red-painted pottery. Height 21cm. Rim diameter 32 cm. External decoration type 5B. Internal evanescent decoration type 2A (IN 31).

28. Figulina amphora (Figure 5.1.12) type 1, reassembled vessel, missing lip. Red-painted pottery. Height 26 cm. Rim diameter 18 cm. Four ring-shaped handles (two broken) with short elbows. External painted decoration of type 5G with 1 line at neck and 4 triangles with apex downward (IN 32).

Attached to One of Basin's Short Sides

29. Medium cup (Figure 5.1.3) type 1A, 14 sherds. Undecorated pottery. Flat base. Height 12 cm. Rim diameter 13 cm (IN 1/09).

Lower Chamber Areas (Catalogue Numbers 30–55)

Pots from the "Lower Chamber" area come from distinct sub-areas.

C Area

Before reaching the large chamber on the bottom, one has to negotiate a narrow passage, where ceiling and bottom almost join together through long, narrow and tight concretions. Vessels originally labeled "C Area" come from here.

30. Figulina patera (Figure 5.1.4) type 1A, recomposed vessel (9 sherds). Red-painted pottery, fading decoration. Height 9 cm. Rim diameter 20 cm. Internal decoration types 5F and 6. External decoration type 3A (IN 29).

A Area

Beyond the passage at the bottom of the diaclasis, along the steep slope leading to the Lower Chamber, a human skeleton had been found among clastic boulders (see Isetti, Chapter 2.1). This section of the Lower Chamber was originally designated "Area A."

31. Figulina vessel with neck (Figure 5.1.9), fragmentary necked red-painted vessel. Height 11 cm. Rim diameter 11 cm. At base of neck, decoration type 4B. Eight base sherds (perhaps from the same vessel) were found in the vicinity (IN 48).

32. Figulina amphora (Figure 5.1.12). Large sherd, with part of its handle vertically pierced. Red-painted pottery. Height 16 cm. Decoration type 4A (IN 49).

33. Figulina (?). Two sherds, probably from a necked vase. External red-painted decoration type 5B (IN 51).

34. Figulina biconic vessel (Figure 5.1.10). Large sherd. Red-painted pottery. Elliptical rim. Diameter 9.5 cm. Red-painted decoration type 5C (IN 51).

D Area

Several vessel groups were found in the Lower Chamber, placed on top of boulders collapsed from the ceiling. Unfortunately, they cannot be placed more accurately using the available documentation. These vessels were divided into "D area" and "D/5 area." The vessels from the first area follow.

35. Figulina biconic vessel (Figure 5.1.10) type 1A, reassembled vessel. Red-painted, bordered with "reserved" decoration. Height 18.5 cm. Rim diameter 16 cm. External decoration of type 5D and 6 (IN 2).

36. Figulina biconic vessel (Figure 5.1.10) type 1A, reassembled vessel. Red-painted external decoration, fading. Height 5.5 cm. Rim diameter 11.5 cm. Decoration type 5B and 6 (IN 3).

37. Figulina biconic vessel (Figure 5.1.10) type 1B, fragmentary vessel. Red-painted fading external decoration. Height 14 cm. Rim diameter 12cm. Decoration between rim and carination types 5D and 6 (IN 4).

38. Figulina biconic vessel (Figure 5.1.10) type 1A. Red-painted decoration. Height 13 cm. External decoration type 1B (IN 24).

39. Figulina biconic vessel (Figure 5.1.10) type 2A, reassembled vessel (11 fragments). Red-painted pottery. Height 14 cm. Rim diameter 9 cm. External decoration type 5B and 6, internal decoration type 1B (IN 23).

40. Figulina hemispherical bowl (Figure 5.1.5) type 1B2, reassembled vessel. Red-painted pottery. Height 20 cm. Rim diameter 29 cm. A horizontally pierced handle at 5 cm below the rim. External decoration type 5C, internal 5G (IN 22).

41. Figulina hemispherical bowl (Figure 5.1.5) type 1A, reassembled vessel (14 fragments). Red-painted pottery. External decoration type 5C; internal 5G (IN 28).

42. Figulina hemispherical bowl (Figure 5.1.5) type 1A, reassembled vessel. Red-painted decoration. Rim diameter 28.5 cm. Two vertically pierced handles at 6.5 cm from the rim, separated by 14 cm. External red-painted decoration type 5D, internal 2A (IN 14).

43. Figulina hemispherical bowl (Figure 5.1.5), type 1B2, reassembled vessel (five fragments). Red-painted pottery with fading decoration. Height 20 cm. Rim diameter 29 cm. Internal decoration type 2A; external decoration type 5B and 6. Two small vertical handles on the same side (IN 33).

44. Figulina hemispherical bowl (Figure 5.1.5) type 1B2, reassembled shape. Red-painted pottery. Height 23.5 cm. Rim diameter 31.5 cm. Two handles on the same side. Internal decoration type 2A (IN 34).

45. Figulina ovoid beaker (Figure 5.1.8b) type 1B, reassembled shape. Height 18.5 cm. Rim diameter 16 cm. A vertically pierced knob. Probably originally decorated but decoration now missing (IN 35).

46. Figulina ovoid beaker (Figure 5.1.8b) type 1B, reassembled vessel. Red-painted pottery. Height 12 cm. Rim diameter 16.5 cm. Vertically pierced knob. Decoration on knob type 5E (IN 57).

47. Figulina amphora (Figure 5.1.12) type 1A, reassembled shape (23 sherds). Red-painted decoration. Height 34 cm. Rim diameter 10 cm. Maximum circumference 90 cm. Decoration type 4B (IN 18).

48. Figulina amphora (Figure 5.1.12) type 1A, reassembled shape (25 sherds). Height 35 cm. Rim diameter 9.8 cm. Maximum circumference 88 cm. Probable decoration now missing (IN 25).

49. Figulina patera (Figure 5.1.4) type 1B. Red-painted pottery. Height 4.8 cm. Rim diameter 16 cm. External decoration type 3C, internal 4A (IN 56).

50. Figulina patera (Figure 5.1.4) type 1B. Height 5 cm. Rim diameter 20 cm. External decoration type 6, internal decoration 5F (IN 5).

D5 Area

Finally, some of the finds archived at the Manfredonia Museum are labeled "Area D5"; this seems to refer to finds from the lowest part of the Lower Chamber, close to one of the farthest water pools still active. The following vessels belong to this group:

51. Figulina biconic vessel (Figure 5.1.10) type 2B, 1 large sherd. External red-painted decoration. Height 16.5 cm. Rim diameter 15 cm. Decoration type 1B (IN 38).

52. Figulina amphora (Figure 5.1.12) type 1A, reassembled vessel (6 large sherds). Red-painted pottery. Height 34 cm. Rim diameter 9.4 cm. External decoration type 5A (IN 16).

53. Figulina biconic vessel (Figure 5.1.10) type 1C, reassembled vessel (26 sherds). Missing decoration, some red evidence on bottom. Height 14 cm. Rim diameter 12.5 cm (IN 17).

54. Figulina biconic vessel (Figure 5.1.10) type 2B, 1 large sherd. Missing decoration, and with stalagmitic concretions. Height 14 cm. Rim diameter 12.5 cm (IN 39).

55. Figulina ovoid beaker (Figure 5.1.8b) type 1A, reassembled vessel (20 sherds). Red-painted pottery. Height 16 cm. Rim diameter 18 cm. A vertically pierced knob placed on a horizontal strap handle. Fading decoration on the neck vase, type 5G (IN 6).

Discussion

All the vessels found on the rocky bottom in the Lower Chamber belong to one phase, except those coming from the diaclasis: the decorated pottery is either red-band painted or red-band painted bordered by black motifs. This style has been named by Tiné "Lower Scaloria Style" (Tiné 1972, 1975) and more recently "Catignano-Scaloria Bassa" (Tozzi-Zamagni 2003). Based on the catalogue and the observations of this portion of the cave, materials related to later phases are not documented in the Lower Cave. The sole exception is the vessel listed above as catalogue no. 2, which comes from the diaclasis, the sloping passage that is the highest part of the lower cave complex and which may have washed down from the Upper Chamber deposit. We are fortunate in having at our disposal a culturally and typologically homogeneous complex. We can therefore draw a complete picture of this pottery with correlations between vessel classes and their uses (see Figures 5.3.2 to 5.3.7).

As a starting point, vessels in the "rough" class of fabric, particularly "ellipsoidal" shapes and large jars (such as the ones found at Catignano [Tozzi and Zamagni 2003:141, fig. 77:1–2]), are missing. This presumably indicates the specific use of this area of the cave for ritual purposes. In fact, the only vessels not belonging to the figulina class are small vessels of medium fabric. Among them, the only represented type is type 3 (e.g., cat. no. 29; a similar vessel was found during the 2009 exploration near the basin). This type is a small-sized vessel, found also in the Upper Chamber. This form, too, is similar to materials from Catignano (Tozzi and Zamagni 2003:140, fig. 76: 2, 7), and from Villa Badessa (Radi 1979). This form is represented in two base fragments of two different vessels (cat. no. 18); their larger dimensions (diameter 11.4 cm and 10 cm) and a rougher paste would indicate that they had once been jars. None of these medium-fabric vessels come from the cave bottom or from the cave's deepest part (the Lower Chamber); they come from the small lake gallery (cat. no. 14) or from the basin area (cat. no. 29).

The figulina class, as found particularly in the cave's lower part, is characterized by two open shapes and four closed shapes. Descriptions of open shapes follow.

- *Patera:* Found only in this area of the cave, it includes types 1A and 1B and type 3, in small sizes, often decorated on the bottom (cat. nos. 10, 30, 49, and 50). The pateras can be compared with similar pieces from Catignano (Tozzi and Zamagni 2003:128, fig. 69:3–4). Only broadly similar shapes can be found at Passo di Corvo (phase IVb) in some vessels possibly serving as inverted lids (Tiné 1983:table 103, n. 470). At Scaloria, patera decoration is either simply red-painted with motifs types

Fig. 5.3.2. Figulina cup (see Fig. 5.1.8b:3A and Chapter 5.7, Fig. 5.7.4a #23010).

Fig. 5.3.3. Figulina biconic vessel (see Fig. 5.1.15:5).

(*Left*)**: Fig. 5.3.4.** Figulina pot.

(*Below*)**: Fig. 5.3.5**. Exterior: figulina troncoconic bowl (see Fig. 5.1.6:1B). Interior: figulina troncoconic bowl (see Fig. 5.1.6:1B).

Fig. 5.3.6. Figulina patera (see Figs. 5.1.4:A3 and 5.1.14: 5B, and Chapter 5.7, Taranto Museum catalogue # 21939).

Fig. 5.3.7. Figulina biconic vessel (see Fig. 5.1.15:4).

3 and 4, or negatively bordered (cat. nos. 10, 30, and 50). Three of the four recognized cases (cat. nos. 30 and 49–50) show internal red-painted decoration of the 5F type presenting tree motifs or fringing. The patera is a form that, in a different fabric, will survive into the later Upper Scaloria phase (type 2), although not in this area of the cave.

- *Hemispheric bowl:* This is the most frequent shape (27% of the collected material) and is present all the way through the Lower Cave. It exhibits either vertical or horizontal handles. There are frequent cases with two handles placed on the same side, which is paralleled only in a single case from Villa Badessa (Radi 1979). Generally, this shape is large, between 22 and 33 cm, with an average diameter of 28 cm. The height is between 20 and 23 cm, with only one smaller vase 9 cm high (catalogue no. 25, and see Tiné and Isetti 1975–1980, fig. 12, 1, and 1a). These vessels are often decorated internally and externally; in some cases the decoration on this form is very faint. Externally, when present, decoration is composed of straight and oblique bands crossing and forming fields, filled with rhomboi, triangles, or circles. The internal decoration consists of festoons (catalogue no. 3), filled semicircles, from which lines branch (catalogue no. 6), converging on the bottom as if to simulate a basket, and semicircles filled with vertical lines (catalogue no. 1). In some cases the external decoration is type 6 (zigzag) executed in negative. This last technique has been designated the "cancelled" technique (Tiné 1972), but at Catignano, where it is common, it has been more accurately defined as "reserve" or "negative" technique (Tozzi and Zamagni 1999), a hypothesis confirmed experimentally. Unfortunately, the zigzag bands, alternating with triangles and rhomboi, often cannot be distinguished from simple red-band decoration or dark negative decoration with any certainty, due to faded paint. Finally, this vessel form often displays multiple repair holes, generally placed near the rim, which testify to its continuous use. Hemispheric bowls occur in every trench of the cave's upper part, and can also be compared (especially for type B1B, deep basin variety) with examples from Catignano (Tozzi and Zamagni 2003:123, figs. 66, 68) where, however, the handles are placed at the same distance from each other. The published Catignano shapes are generally smaller, with an average diameter of 18 cm and a depth of 12 to 20 cm. Scaloria bowls are larger not only in diameter but also in capacity: they average 10 liters as opposed to a maximum of 2.80 liters at Catignano. Decoration similarities are also found at the nearby village site of Masseria Candelaro (Cassano and Manfredini 2004:pl. VII, nos. 3-3 ff).

The four closed forms found in the Lower Cave are described herewith.

- *Ovoid vessels:* There are a few examples of this form, two of them whole. It is found throughout the Lower Cave, with two vessels along the diaclasis (cat. nos. 4 and 5), one at the crossroads (cat. no. 22) and three in the Lower Chamber (cat. nos. 45, 46, and 55). We only have drawings and pictures from the original explorations of the two intact vessels, and no more vessels have been found. All the type 1 varieties showing flat or convex bases are represented here. These are generally small vessels (although type 1 ranges from 12 to 18 cm in height), equipped with handles or pierced knobs and showing complex decoration, mainly type 6 (negative decoration).

- *Necked vases:* There are only two examples of this (cat. nos. 20 and 31), both type 1. They have a high neck with a rim diameter of 8 to 10 cm. In one case the external surface presents traces of decoration type 4B, but the fragmentary nature of decoration makes further comment impossible. Catalogue no. 20 shows two small suspension devices (one pierced knob and a horizontal handle) located on the same side. These could indicate the use of a suspension string, but this remains hypothetical due to the fragmentary state of preservation.

- *Biconic vase:* This is the most recurring shape other than the hemispheric bowl, accounting for 27.2 percent of all vessels. Most of the vases, which are often not truly biconic, are present; they show a low carination and round bottom (cat. nos. 11, 15, 24, 37, 38, and 54). Others have a higher and more curvilinear carination and a generally more globular profile (cat. nos. 3, 35, 36, 39, 51, and 53). Commonly, this vessel form is rather small, between 8 cm (cat. no. 17) and 16 cm (cat. no. 35) with an average diameter of 12 cm. All the documented examples present external decorated surfaces, except for two cases (cat. nos. 53 and 54) for which concretion obscures the surface, even if, as in catalogue no. 53, we can see red traces on the bottom. Decoration is either simple red or brown band decoration (cat. no. 24) or negative decoration, sometimes with complex alternated sketching (cat. no. 3). The motifs include zigzag cross-bands alternating with circles or triangles, hanging triangles, and curvilinear bands. In one case (catalogue no. 38), a horizontal band underlines the hanging triangles.

- *Amphora:* These are ubiquitous, found in the diaclasis (cat. no. 9), the small lake gallery (cat. nos. 16 and 20), the crossroads (cat. nos. 21 and 23), the basin (cat. no. 28), and in the Lower Chamber the A area (cat. no. 32), D area (cat. nos. 47 and 48), and D5 area (cat. no. 52). They are medium to large size, with a height between 26 and 32 cm; the exception (cat. no. 21) has a height of 17 cm but is missing the neck, which would bring it to about 21–22 cm. All the amphorae show horizontal handles, usually four, and they can be closely compared with the "fiasco" (flask) vessel form at Catignano (Tozzi and Zamagni 2003:131, figs. 1, 5). The decoration, when preserved, is represented by flame motifs, and by hanging triangles that branch from the neck, as in catalogue no. 28 (cf. Tozzi and Zamagni 2003:131, fig. 5). Negative decoration also appears on catalogue no. 21.

All the other vessel forms (such as pots, carinated bowls, and troncoconic bowls) that occur elsewhere in Scaloria Cave (see Chapter 5.1) are absent here.

In terms of decoration, we are dealing with a homogeneous group of vessels. Only 5 out of 55 samples present no decoration, but we do not know if this lack is due to a real absence of decoration or to pigment deterioration and surface erosion; for example, in catalogue nos. 26, 53, and 54, the vessel surface is covered with concretion but traces of red on clear spots on the surface allow us to assume that decoration was once present.

It is possible to distinguish two major decorative styles. The first features simple red bands (types 1 to 5) (Figure 5.1.14 and Figure 5.3.6), and the second features bordered red bands with "negative" hatching (type 6) (Figure 5.1.15 and Figures 5.3.3 and 5.3.7). There was no difference in the topographic distribution of these two decoration technologies, but the simple red-band decoration is most frequent, especially in the form decorated with straight, oblique bands that when converging in zigzags, create spaces filled with triangles, rhomboi, or circles. The zigzag starts from the rim and covers the entire body, except for the base that in some cases is set off by an outlining band. Only in two cases (cat. nos. 40 and 41) do the zigzags turn into crossed lines on the body vessel. This type of decoration occurs on open shapes such as pateras and hemispherical bowls,

but also on closed shapes such as the biconic vessels and amphoras. A variant of the zigzag band could be the curvilinear band (cata. nos. 38 and 51), perhaps simply the result of an increasing flow motion during the drawing. The ovoid vessel catalogue no. 46 presents a decoration with red bands crossing at right angles at the handle's point of attachment. This pattern seems typical of this facies and underlines the clear comparison with material from Catignano (Tozzi and Zamagni 2003:122, fig. 65, 1). The necked vase form usually involves a more simple decoration, characterized by groups of strokes drawing bundles of straight lines angled so as to outline the rim or neck (cat. nos. 23, 31, and 32); in all cases, the decoration appears on the external surface, except for the single case of catalogue no. 49, which has decoration inside a more open shape.

The second category of decoration, employing negative motifs, is documented on about a third of the finds from the cave's lower part. It focuses on medium- to small-sized shapes, including one that is almost a small "fiasco" (catalogue no. 21). This example certainly represents a unique vessel, with its complex decoration of obliquely crossing bands that creates alternating rhomboidal spaces, themselves filled by rhomboi. A negative, dense pattern fringes all the bands. Generally, this kind of decoration prevails on closed forms, such as biconic vessels (cat. nos. 3, 11, 15, 35, 36, 37, and 39), small necked vases (cat. no. 21), and ovoidal vases (cat. nos. 4, 5, and 55). The only open forms in this pattern are two pateras (cat. nos. 30 and 50) and four hemispherical bowls (cat. nos. 6, 13, 19, and 43).

In conclusion, Lower Scaloria cave shows a homogeneous complex predominantly composed of a single class of pottery in which two decorative typologies account for more than 90 percent of the material: simple red-band decoration, and bordered red bands with negative technique hatching. The forms present (patera, hemispherical bowl, necked vase, biconic jar, ovoid jar, and amphora) represent only a portion of the vessel forms recognized in the cave; the other forms found in other parts of the cave but not in the Lower Chamber represent a different period of pottery production. The forms absent from the cave's lower chamber do not appear in the contemporary village at Catignano, but are attested at Passo di Corvo facies IV a2–b (Tiné 1983:pl. 91, figs. 301–302, pl. 103, 453, 456, and pl. 104, 471–476). This suggests that Scaloria and Catignano are contemporaneous, and that the Scaloria Bassa figulina pottery belongs to a widespread facies rather than being produced for a particular cultural purpose.

Riassunto

Il lungo ed articolato percorso per raggiungere la parte bassa della grotta era stato già nel 1967 diviso in 5 diverse parti: prima parte, galleria per il lago piccolo, incrocio per la vaschetta, il lago piccolo e la camera bassa, area della vaschetta, camera bassa. Sulla base della documentazione fotografica, del filmato girato nel corso della spedizione del 1967 da Santo Tiné e dal Gruppo Boegan è stato possibile riposizionare una buona parte dei gruppi di vasi di cui 9 lungo la diaclasi, una decina lungo il percorso per il lago piccolo, quattro in corrispondenza del bivio da cui si diramano i diversi percorsi, quattro vasi in prossimità dell'area dove è stata rinvenuta la vaschetta intagliata nella roccia ed altri 25 vasi dal grande camerone inferiore.

Dall'analisi di questo materiale emerge la conferma di quanto già ipotizzato da Tiné Isetti a seguito delle ricognizioni, ossia che il materiale rinvenuto in questa parte della grotta sia omogeneo dal punto di vista cronologico, poiché tutti i vasi rinvenuti appartengono alle tipologie poi identificate nel villaggio di Catignano (Tozzi–Zamagni 2003). Tutti i vasi rinvenuti, per la grande parte appartenenti alla classe di impasto figulina, presentano una decorazione a bande rosse semplici o a bande marginate da sottili tratti in bruno ad andamento obliquo (solo cinque elementi su 55 non presentano una decorazione, ma ciò potrebbe esser dovuto a cattive condizioni di conservazione e a deterioramento del pigmento). Nel 1978 alcune ossa umane furono rinvenute in prossimità del bacino, forse una deposizione rituale, non in contrasto con la presenza nella camera bassa dello scheletro interpretato come frutto di un incidente occorso ad un frequentatore occasionale.

La forma ceramica più ampiamente attestata è rappresentata dalla larga ciotola emisferica, spesso con coppia di anse disposte sullo stesso lato e con una capacità significativa rispetto a forme simili documentate altrove (dieci litri di capacità media per le forme di Scaloria contro tre litri a Catignano). Anche il vaso a profilo biconico è abbondantemente attestato in diverse tipologie formali e decorative.

5.4. Pottery from the Upper Chamber 1979 Excavations

Antonella Traverso and Eugenia Isetti

Introduction

During the 1979 campaign, seven new trenches were opened in the upper chamber (see Figure 5.3.1). All aimed to explore areas that already had significant abnormalities visible on the surface, thereby completing the investigation started in the previous year. Observations from the pottery analysis are presented here; see Isetti (Chapter 2.1, this volume) for descriptions of the trenches and deposits. Unfortunately, only three trenches of these seven (trenches 5, 6, and 10) yielded enough materials to allow quantitative and qualitative observations about the use of the cave and the typology of the pottery.[1]

Trench 5

Trench 5 was divided into 11 levels, from which were recovered 1,224 sherds of rough paste, 318 of medium paste, and 1,346 fragments of figulina. The different levels were covered by a thin layer (10 cm) of concretion slightly higher along the northeast side of the trench. From level 3, the area excavated was reduced by the presence of rocks in the northwest corner, perhaps the remains of a landslide. At the bottom of this level and in the next (level 4), there was a probable hearth with a large amount of pottery (see Figure 5.4.1) mixed with bones and stones. From level 5, numerous "cavities" were discovered, although these are not further described in the available excavation documentation. Lastly, from level 8 to level 10, S. Winn noted some fragments of "large pithoi" with oblique incised lines on their exterior surface. Winn and Shimabuku (1980: 11) interpreted similar features in the 1978 excavations as terracotta slabs placed to protect burials. Although this interpretation is questionable, some pottery fragments were noted in this trench.

Materials from different levels display large amounts of figulina and rough wares, with peaks in level 2, and from level 4 to level 8.

Average fragment weight has been calculated in order to highlight the relative preservation of pottery in different levels and therefore to shed light on the depositional processes. Figure 5.4.2 shows that all materials are roughly homogeneous in their degree of conservation or size of fragments, except for the rough pottery from level 10 that are few in number (Figure 5.4.1) and relatively heavy (Figure 5.4.2). These large sherds are called "pithos walls" in the excavator's diary.

Figure 5.4.3 presents the same data, excluding the rough pottery. Here, level 10 has the best-preserved material. Level 4 has large quantities of material, but also high rates of breakage; this may indicate a more constant use of the area and thus greater depositional stress.

From the typological point of view (Table 5.4.1), trench 5 displays a few fragments of the later Serra D'Alto facies in its uppermost two levels. A few sherds of the Scaloria Alta style are associated with significant amounts of pottery of other wares through level 8. Impressed pottery as well as the Masseria la Quercia style are documented throughout the trench; in combination with the relatively late Scaloria Alta style down through level 8, this strongly suggests a disturbed stratigraphy. In levels 9 and 11, well-preserved Scaloria Bassa pottery is present. These levels also afforded a quantity of large pithoi. Only these lower levels (9 and 11) do not yield materials from later facies and thus may be interpreted as undisturbed layers, although these are unfortunately limited to a few patches of deposit dug among the stones. In this trench, for example, among the painted pottery of the red Scaloria

[1] Masseria La Quercia was defined as Guadone (Tiné 1980); Scaloria Bassa and figulina red-painted are interchangeable ceramic styles. Among figulina styles, Masseria La Quercia is chronologically earliest and Serra d'Alto latest.

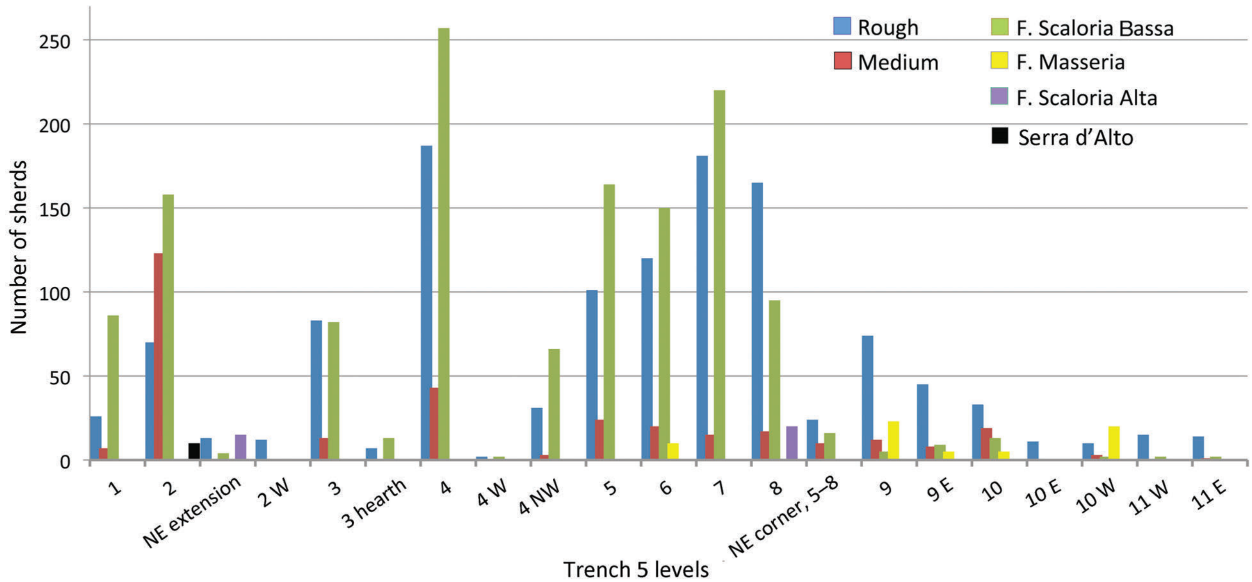


Fig. 5.4.1. Number of sherds distributed throughout trench 5 by level. F = Figulina.

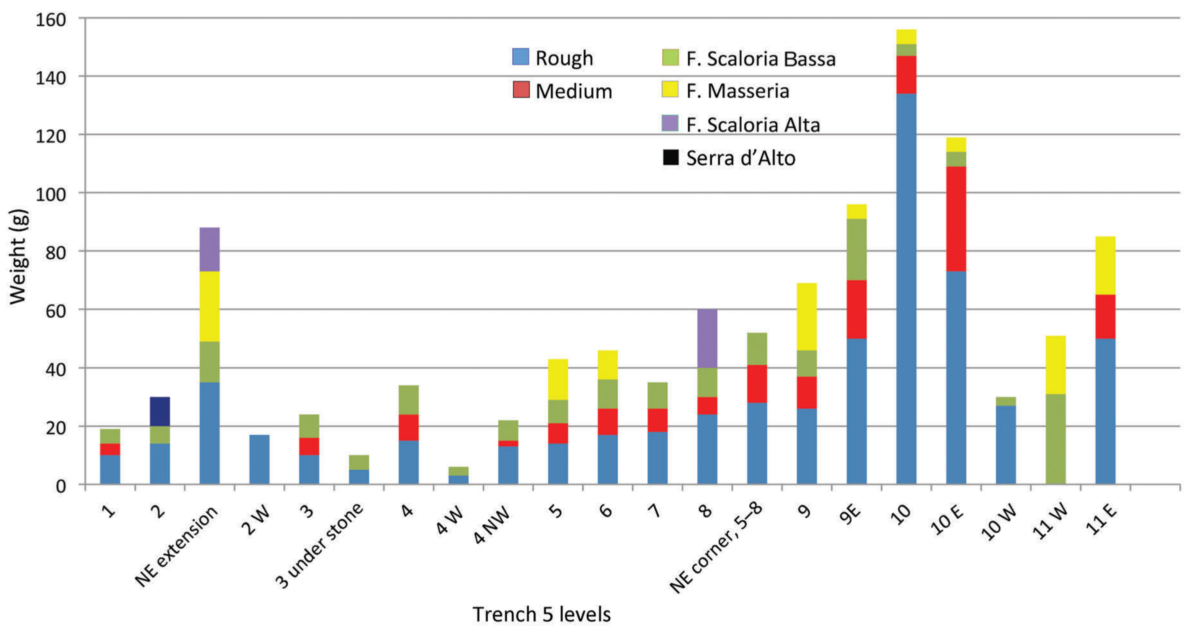


Fig. 5.4.2. Average weight of sherds (g) from trench 5 levels. F = Figulina.

Bassa type that is present, there are no examples of the patera and carinated bowl. This seems in agreement with finds from the Lower Cave, where these forms were absent. Similarly, in the lower levels (from 6), cups and biconical vessels are found, a type also found in the Lower Cave.

Trench 6

This trench was divided into seven levels, excavated in 17 contexts; ceramic finds included 1,144 fragments of rough pottery, 713 of medium pottery, and 1,114 of figulina (Scaloria Bassa). While in the upper levels there

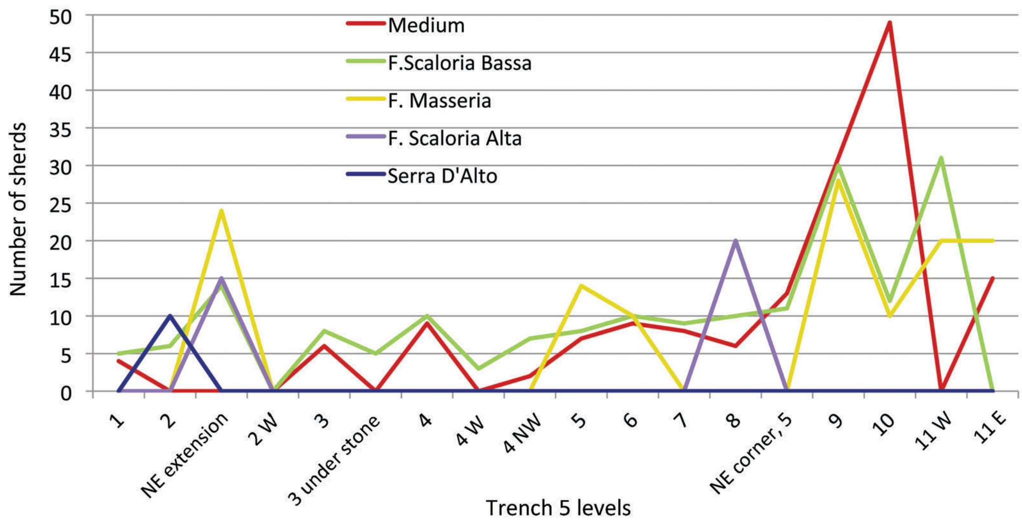


Fig. 5.4.3. Number of sherds by level, minus rough pottery, trench 5. F = Figulina.

were no obvious features, starting at level 6, the excavation diaries describe evidence of "the remains of a skull fragment and a disturbed burial of a child…." The level adjacent to the bedrock, in level 7, had a distinct clay matrix and yielded Guadone pottery in good quantities, evidence of the earliest occupation of the cave.

Figure 5.4.4 shows the absolute quantities of pottery divided by class; pottery was most abundant in the upper levels (1 through 4) and in level 6. Some contexts yielded low amounts of pottery due to specific features (e.g., the pit in level 4). Note also the presence of Scaloria Alta pottery down to level 5; it may be intrusive owing to pits dug into earlier deposits, or possibly to "graves" dug down to level 6—indeed, as suggested in some of the field notes. Note also the generally high quantity of medium wares compared with trench 5. The presence of a few but unmistakable fragments of Diana facies in the uppermost level 1 (not on Figure 5.4.4), provided important evidence of the most recent Late Neolithic use of this part of the cave.

Figure 5.4.5 shows the average weight of fragments divided by pottery class. In the Rough pottery, there are some significant peaks in levels 2, 3, and 4 (pit), and in the pit SW level 6. The pit in level 4 may be a Scaloria Alta feature, dug into a context containing red-painted pottery of the Scaloria Bassa facies, which is attested almost to the base of the stratigraphy. There is a significant presence (level 7) of big sherds of Guadone style, evidence of oldest use of the cave. On the other hand, equally significant is the discovery in this trench of Diana pottery from the upper level 1, north (not included in figure), evidence of more recent use of the upper chamber.

Table 5.4.2 shows the correspondence among wares, levels, and vessel forms, from trench 6, based on the decorative syntax described in Chapter 5.1 (Tables 5.1.21– 5.1.23).

Some types of decoration are represented by few examples, such as cardial type 3D (in the rough class), which is found only in the level 4 pit; it may be more recent than the other cardial motifs (Traverso 1999). The same is true for decoration 2C and 2D from the lower levels 5 and 6; this circular or semicircular design of small impressed circles also occurs at Passo di Corvo, where Tiné suggested a degree of similarity with the Aegean "pointillée pottery" type (Tiné 1982). In the medium class, in the lower levels, we note the presence of the cup, in the variety of rounded rim, straight lip, hemispheric body, flat or convex (if deep), and with a small knob on the rim. In the figulina class, Scaloria Bassa style, we have a patera and amphora, the typical shapes of the lower chamber in levels 6 and 7, just above the bedrock.

In general, Figure 5.4.5 shows a greater decorative variety in the basal levels. The presence of Scaloria Alta pottery in the pit and from level 5 suggests evidence of stratigraphic disturbance and mixing, at least down to this level, presumably from the intrusion of negative features such as pits. On the other hand, it is noteworthy that figulina elements are absent from level 7 except for figulina Scaloria Bassa (see Figure 5.4.5, level 7), while there are numerous varieties of impressed ware decorat-

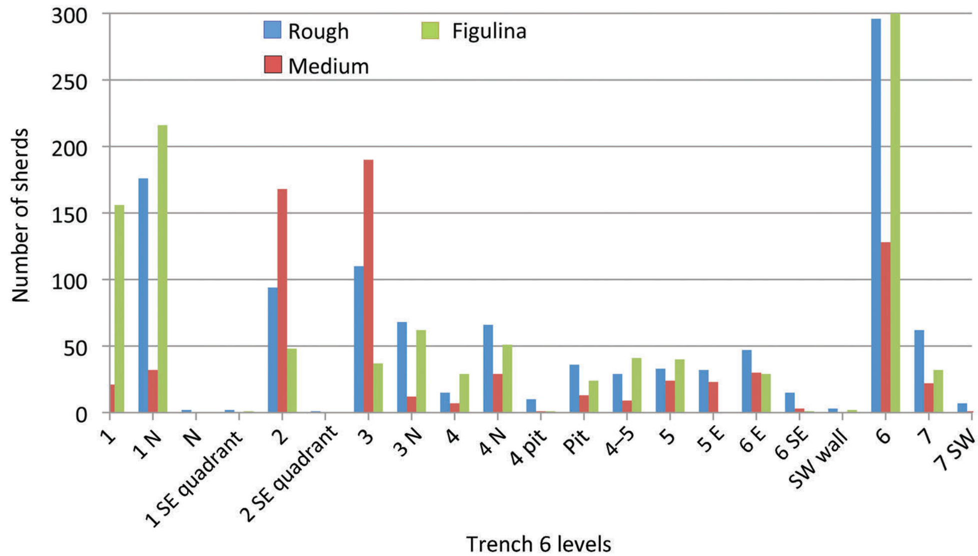


Fig. 5.4.4. Histogram showing number of sherds per ware type in trench 6 levels.

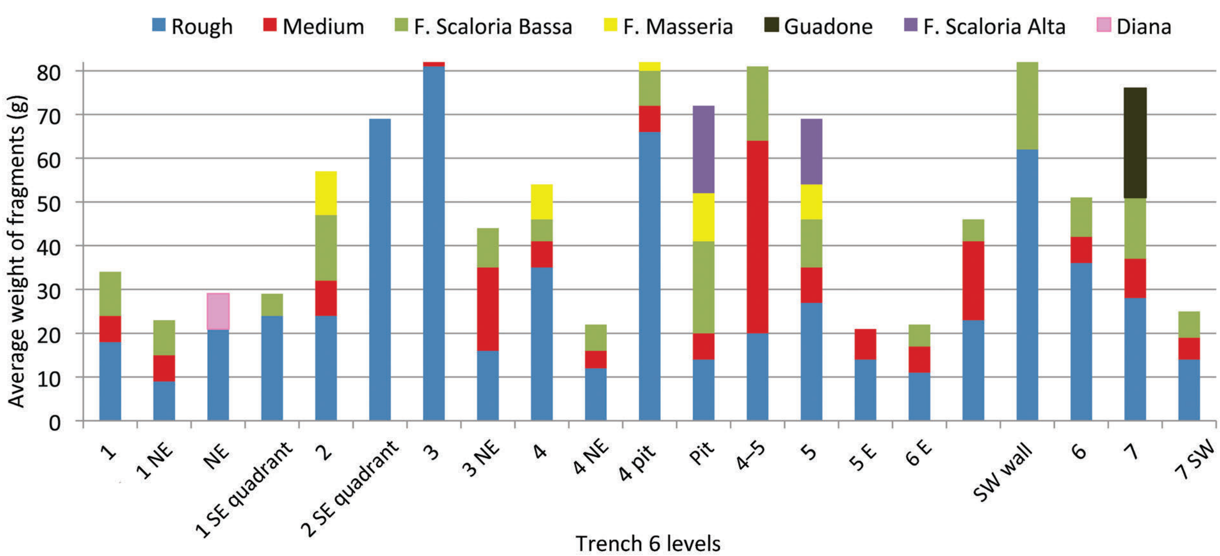


Fig. 5.4.5. Average weight of pottery fragments from trench 6 levels. F = Figulina.

ed with cardial shell and other instruments, as well as Guadone S. Severo–style pottery. This suggests that the basal facies of impressed– Guadone wares was not disturbed and may indicate the exact period of the Neolithic in which use of the cave was initiated.

Trench 10

Opened near the modern, artificial access to the cave, trench 10, located to continue investigations near trench 8, revealed an Epipaleolithic component. The goal was to obtain a complete sequence of the use of the Upper Cave. As early as level 1, the excavation daybook reports the emergence of a skull along the south wall of the trench. The most striking data, which distinguishes this trench from the others, is the absence of Scaloria Alta pottery. The most recent pottery facies represented here is the simple red-painted figulina pottery, very similar to materials from the Lower Cave. Excavation diaries suggest that red-painted pottery vessels were

Table 5.4.1. Occurrence of vessel forms, trench 5

Level	Decoration												Rough			Medium			Figulina Scaloria Bassa						
	3B	3E	3C	2D	2E	2A	2B	1B	1C	1D	4	5	Pithoi	Pot	Base	Hemi-spheric	Neck	Tronco-conic	Neck	Pot	Hemi-spheric	Tronco-conic	Cup	Bi-conic	Amphora
2							1				1								2A						
3						1			1	1															
4					1		1				2						1A			1		1A			1
5			1			1	1			1						1A					1	2A			
6																1A	1A				1A	1A	1	1	
7		1		1	1					1	2				1	1A				1A	1		1	1	1
8	1					1		2	1				1	1A	2	1C,1B	1A	1A	1B			1A			
9	1	1							1	1	1	1	1		1	1A,C					1	1		1	2
10		1			4						9		1		1	1C									
11					1										1	1A						1	1		

Notes: Shading indicates data missing for large area. Alphanumeric codes are defined in Chapter 5.1 (Traverso, this volume), wares in Figures 5.1.1–12, and decoration in Figures 5.1.13–16 and in Table 5.1.22.

Table 5.4.2. Trench 6, levels 1–7: Distribution of decorative syntax, wares, vessel forms/typology

Level	Decoration													Rough				Medium					Figulina Scaloria Bassa						
	3A	3B	3C	3E	2A	2B	2C	2D	1A	1B	1C	1D	4	Neck	Pithoi	Pot	Jar	Cup	Tronco-conic	Hemi-spheric	Neck	Pot	Hemi-spheric	Tronco-conic	Neck	Cup	Bi-conic	Patera	Amphora
1	1		1	4	2																	1B	1C, 1B1, 2	1B, 1C	1A	3C	1A		
2	2		2						2	2										1A, 1C	1A	1B					1B		
3		1						1		1						1							1A, 1B, 2, 1C		1A, 1B		1A, 1B		
4	1	1	1										1						1A	1C			1D				1B		
5		1	2		1	1		1	1	2			1			3				1A, 1C	1A		1A, 1C	1A			1A, 1B		
Pit		2	1		1	2			1	1	1			1B										9B					
6	1	3		1	1	1	2		2	1			1			1	1A		1A	1C, 1A	1B		1B, 1A		1B		2B	1A, 1B	1
7		1	3		3	2			1									1A	1A			1B	1A						

Note: See Chapter 5.1, Tables 5.1.21–5.1.23.

found overturned in the uppermost levels, including a flat base associated with human remains plus exposure of stones. From level 3, some of the concentrations of human bone found were associated with material culture, including pottery (see Chapter 3.5, Isetti et al., this volume).

From this trench, we have 449 fragments of rough pottery, 119 of medium pottery, and 208 figulina sherds. In this trench, we have numerous fragments from the context of "tomb 11," "group 8," "levels 1, 2, and 2 E." In the other levels there are fewer fragments (see Figure 5.4.6).

In terms of fragment weight, the few available data for fragments with an average weight between 45 and 70 g suggest the presence of possible intact vessels (or at least large sherds) from groups 6 (for the figulina class) and 8 (for the rough class), perhaps in association with funerary depositions in which the skeletal elements are mixed, disarticulated, and highly incomplete (see Figure 5.4.7).

Trenches 4, 7, 8, and 9

In the campaign of 1979, four other trenches were opened, but none gave substantial results in terms of features and quantity of materials recovered. For example, trench 7 was soon abandoned due to the presence of soil concretions below the first level. Trench 4 yielded no pottery and appeared to have a disturbed stratigraphy. Trench 9 was placed in the area of trenches 5 and 6 in order to complete the stratigraphic sequence; it was in a relatively undisturbed area. Beneath a layer of concretion, it contained archaeological soil. Extending the trench to the south, an intact Scaloria Alta bowl was found, along with some unfired fragments of a sandy ceramic paste, possibly due to a clay surface semi-fired by exposure to fire. Trench 8 was located at the base of the ancient landslide that sealed the entrance. It was divided into two archaeological levels rich in charcoal, overlying sterile soil. Excavation reports give the impression that the undisturbed basal layers may have dated to the Epipaleolithic period. It should be noted that Scaloria Alta pottery is absent from the upper levels of this trench (as in the nearby trench 10), and there is a strong presence in levels 2 and 3 of cardial impressed ware and graffita pottery. This suggests a generally early date for the Neolithic elements of this trench, while figulina class sherds were found in all higher levels.

Discussion

The pottery sequence from Scaloria Cave presents a number of well-known facies. The earliest use of this branch of the cave complex is evidenced by some fragments of Guadone–S. Severo pottery, which date to the

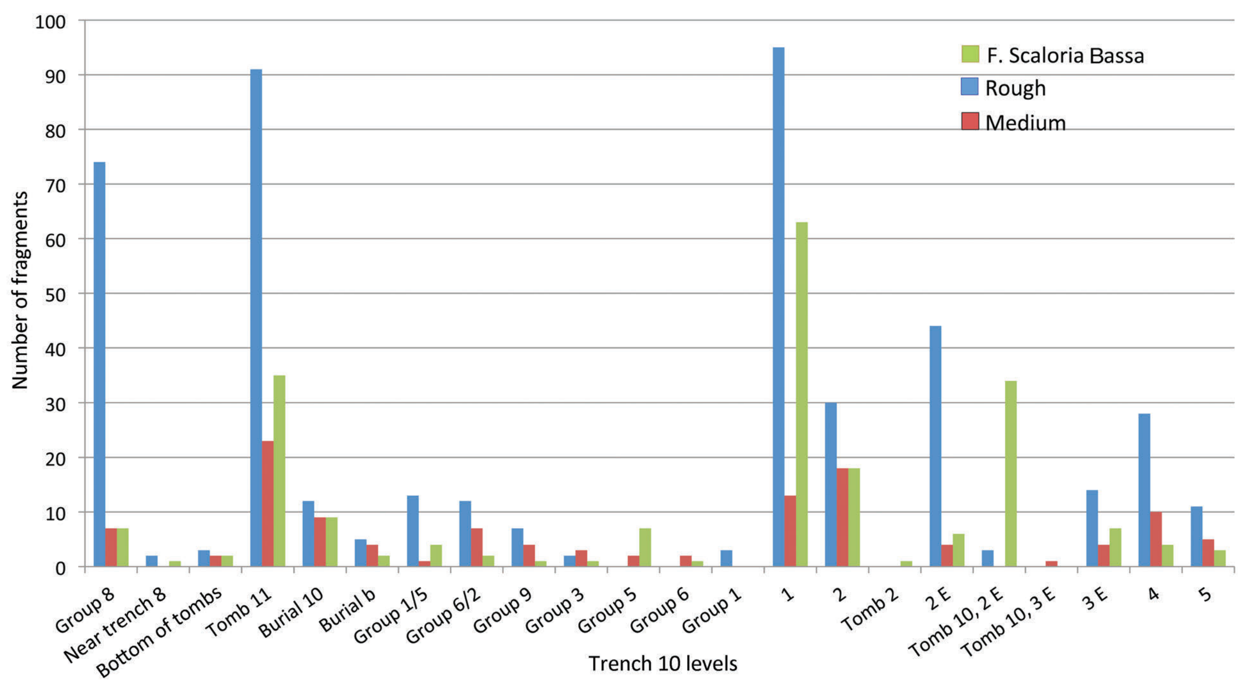


Fig. 5.4.6. Number of fragments from trench 10 levels and contexts. F = Figulina.

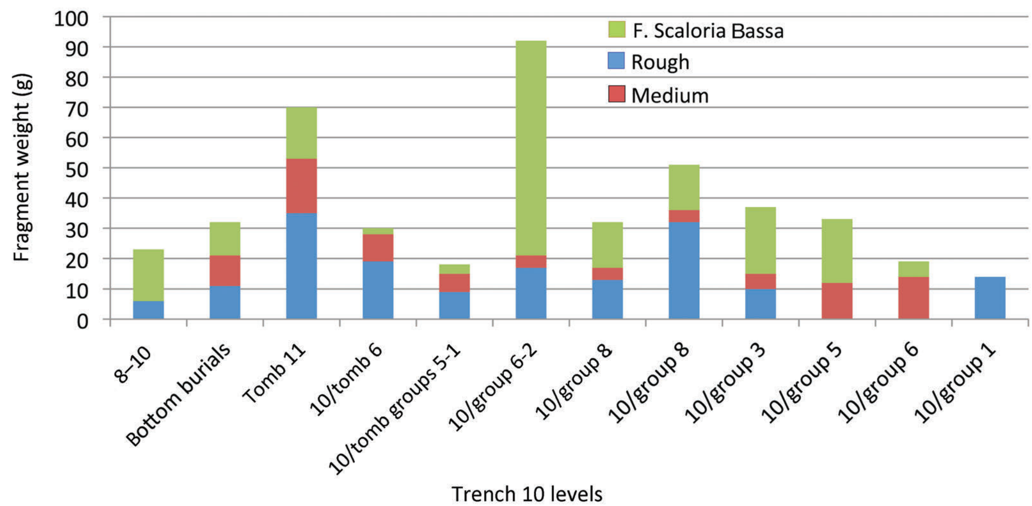


Fig. 5.4.7. Average weight of ware fragments from trench 10 levels and contexts. F = Figulina.

Early Neolithic. These are characterized by a rough paste and impressed decoration, particularly carefully structured areas of cardial decoration in a typical chevron pattern. These decorative elements appear in basal levels, such as the fragment from trench 2 level 9, the fragment coming from a trench structure described in the diaries as "pit" from trench 5 level 4, and the fragments from the bottom levels of trench 6. Much of the impressed pottery from the cave may also date to this Early Neolithic occupation, but it is not possible to distinguish here how much of this pottery dates to the Guadone facies and how much simply represents the coarse pottery from later phases. In any case, among coarse/rough pottery, decorative elements from the 1978 and 1979 excavated trenches represent about 80 percent of the recovered material; Table 5.1.21 shows the division among the types of instruments used to make them; Table 5.4.1 refers to the various impressed decorations (see Figure 5.1.13 for illustrations). The types attested are cardial decoration, instrumental, finger printed, and engraved. Perhaps the most obvious point is the strong presence of cardial pottery in trenches 6 and 10, which suggests that these trenches may be early. In the same table, note that decorated pottery of the Masseria la Quercia facies is considered as transitional between impressed decoration and painted decoration; it is characterized by dark painting upon an impasto fabric rather than a figulina fabric. Unfortunately, although Masseria la Quercia ware is present in the cave, it is difficult to identify its vessel forms and decorative syntax due to fragmentation of the material.

Following this Early Neolithic impressed ware phase and the transitional Masseria la Quercia phase, the sequence in the Upper Cave includes first the Scaloria Bassa/red-painted facies that bears similarities to both the red-banded pottery of Passo di Corvo and Catignano pottery. It then develops into the Scaloria Alta pottery, which bears affinities to the trichrome Capri-Ripoli styles, and finally Serra d'Alto (see Figure 5.4.8).

Three fragments of pottery decorated with white bands should probably be associated with the figulina pottery decorated with red bands; they are of the type found in ditch "gamma" at Passo di Corvo (Libanati 2002). Although few in quantity, these may be significant chronologically as referring to a facies attested at Passo di Corvo (A1 IV) immediately preceding the typical red-banded decoration (see Tiné 1983:162).

In later Neolithic developments, there are also a small number of fragments representing the Late Neolithic facies called Serra d'Alto; examples include, among others, pieces from trench 5 level 2 and from trench 2 levels 1 to 4. There may be others that are poorly preserved but are recognizable by the greenish color of their fabric (see Muntoni and Erano, Chapter 5.6, this volume) and which are found in several levels of the trench outside the cave. The beautiful Scaloria Alta vessels (e.g., Figure 5.1.16:8B and Figure 5.1.8) were found together with this type of material in trench 2. Similarly, the clay spoon from trench 1 level 4 (unillustrated) may possibly date to the same moment, as it is comparable with those from Grotta dei Piccioni, which originate in the trichrome Ripoli culture (Cremonesi 1976:pl. 29). From the same level, in fact, come

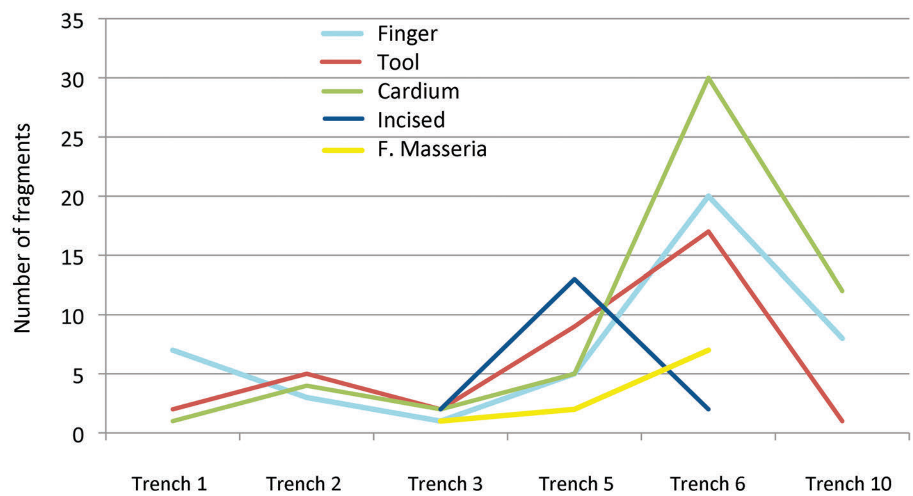


Fig. 5.4.8. Number of fragments recovered from trenches 1, 2, 3, 5, 6, and 10 in relation to tools used for impressing pottery and occurrence of Masseria la Quercia ware. F = Figulina.

the fragments of a large amphora with the typical Ripoli culture decoration (Cremonesi and Tozzi 1987).

Use of Scaloria Cave in the later periods is demonstrated by finds of Late Neolithic Diana facies and Serra d'Alto pottery inside the cave (Winn and Shimabuku 1980:16 and Appendix 2 [online]), but none reported from the external trench stratigraphy (levels 8–17). Following this, use of the cave does terminate, although evidence of use does become increasingly sporadic. Quagliati reports having recovered Bronze Age pottery during his inspection of the site in the 1930s; a few rare fragments of Passo di Corvo type from the 1978 excavations, particularly from trench 1 (Winn and Shimabuku 1980:8, 14), may be attributed to later Neolithic cultural phases. Moreover, if this branch of the cave complex seems to be used mostly during the Neolithic, the adjoining Occhiopinto branch, which is still open and accessible, was used through the Iron Age Daunian period (Bianchi et al., Chapter 2.2). Nonetheless, Scaloria Cave was used principally during the Middle Neolithic; all other recovered materials suggest a sporadic presence in other periods. The only possible exception may be the Early Neolithic. However, the diagnostic Guadone pottery itself is relatively rare, and other impressed designs survived into the Middle Neolithic and hence cannot be dated exclusively to the Early Neolithic.

Within the cave, in some cases a certain primary stratigraphic sequence is apparent, with baseline levels exclusively of impressed styles (e.g., trench 6 and the outside trench levels 24 to 26). Later materials (Scaloria Alta) seem to be attested mainly in trenches close to the original entrance (now closed by a rock fall). In contrast, the most interior areas of the cave show either traces of an earlier occupation such as the Epipaleolithic (trench 8: see Bartosiewicz and Nyerges, Chapter 3.3, this volume), or the complex of funerary deposits in trench 10 dated to the Lower Scaloria–Catignano facies (trenches, 10, 3, and 8). Only the other trenches more central to the Upper Cave (1, 2, 5, 6, 7, and 9) display a more complete stratigraphic sequence.

RIASSUNTO

In questo capitolo sono evidenziati i materiali provenienti dai saggi del 1979, in particolare dalle trincee 5, 6 e 10 poiché dalle altre quattro trincee non è emersa una quantità di materiale significativo dal punto di vista tipologico.

Si segnala in particolare dalla trincea 5 materiale relativamente antico soprattutto nei livelli più bassi rappresentato da ceramica impressa e da ceramica dello stile di Masseria la Quercia.

La trincea 6, che ha restituito un'abbondante quantità di materiale, si connota per la presenza fino ai livelli intermedi di ceramica in buone condizioni di conservazione appartenete alla facies Scaloria Alta, il che ha fatto ipotizzare la sua relazione con un corredo funerario.

Sono molto significativi i dati relativi alla trincea 10 aperta in una delle aree più interne della grotta da dove proviene materiale ceramico molto omogeneo e si può osservare l'assenza di materiale appartenente alla facies tarda.

5.5. Marija Gimbutas's Notes of Tavoliere Sites and Drawings of Scaloria Pottery: 1976–1980

Ernestine S. Elster

Co-principal director of the Scaloria Cave excavations Marija Gimbutas prepared notes and drawings as she surveyed the pottery and other artifacts before and during the 1980 study season. Although she never finished what would have been a contribution to the publication, partly due to her health, these documents stored in her archive at OPUS Pacifica Graduate Institute, Montecito, California, are presented below. I am sure she would have used these data in her interpretation of Scaloria and its relationship to the Tavoliere and the world of Old Europe because she so indicates in her summaries of the Scaloria excavations in later publications (see Appendix 4 [online] for Gimbutas 1989:223, 1991:292).

Marija Gimbutas had an enduring interest in prehistoric ritual practice and belief systems (see Gimbutas 1974, 1975, 1989, 1991). At Scaloria she was searching for patterns and examining context; her charts echo that investigation. She examined hundreds of sherds on which she identified a variety of painted motifs (Figure 5.5.1),[1] each numbered (Table 5.5.1), inventoried, and tabulated as to where and on what pottery form they appeared (Table 5.5.2).

Based on the archival papers, Gimbutas had been focusing on these markings which she believed reflected those she and her students (e.g., Winn 2009) had earlier documented as "signs"[2] repeated on pottery and figurines from Old Europe's Neolithic and Chalcolithic sites (Gimbutas 1975).

The quote below comes from her archive and introduces her abiding interest in these motifs as belonging to a "pre-script."

> Discovery of the Script: The greatest surprise of this season's research was the finding on much of the pottery of the Old European script signs. Thus far these signs known from Vinča, Tisza, and Karanovo cultures of Yugoslavia, Hungary, Romania, and Bulgaria, respectively, date to circa 5500–4000 BC. The incisions discovered on Scaloria pottery and polished bone objects show use of the script in Italy. (Marija Gimbutas, Manfredonia, August 1980)

During her first visit to Apulia, subsequent to their meeting in Val Camonica in 1972, Santo Tiné introduced her to the Tavoliere. For each site visited, she noted location, environment, and chronology based on pottery forms and incised or painted motifs, and listed photos taken. A selection of her handwritten notes on Mezzana Comunale and other Tavoliere sites are reproduced in Figures 5.5.2 and 5.5.3. These demonstrate how she built up her knowledge of the archaeological materials and how she thought about the prehistory of southeast Italy.[3]

The notes in the archive did not include Gimbutas's controversial and challenging interpretation of the motifs as signs belonging to an Old Europe "script." That analysis (Gimbutas 1974) has been and continues to be challenged by archaeologists in the West (e.g., Bailey 1994; Talalay 2005). However, others find much to consider carefully (Robbins-Dexter 2010, 2014), while scholars in the eastern Balkans continue to

[1] Compare to Chapter 5.1 pottery drawings.

[2] Gimbutas introduced the Old Europe pantheon at a colloquium in Athens in the early 1970s (Gimbutas 1973). The paintings or incisions on the pottery and figurines are variously referred to as motifs, signs, and symbols.

[3] Gimbutas's notes on the Tavoliere read:
"the village type, land use, and population growth
1. chronology
2. geology (ecology), geology
3. size
a. C-shaped compounds
b. outer ditches
(see difference)"

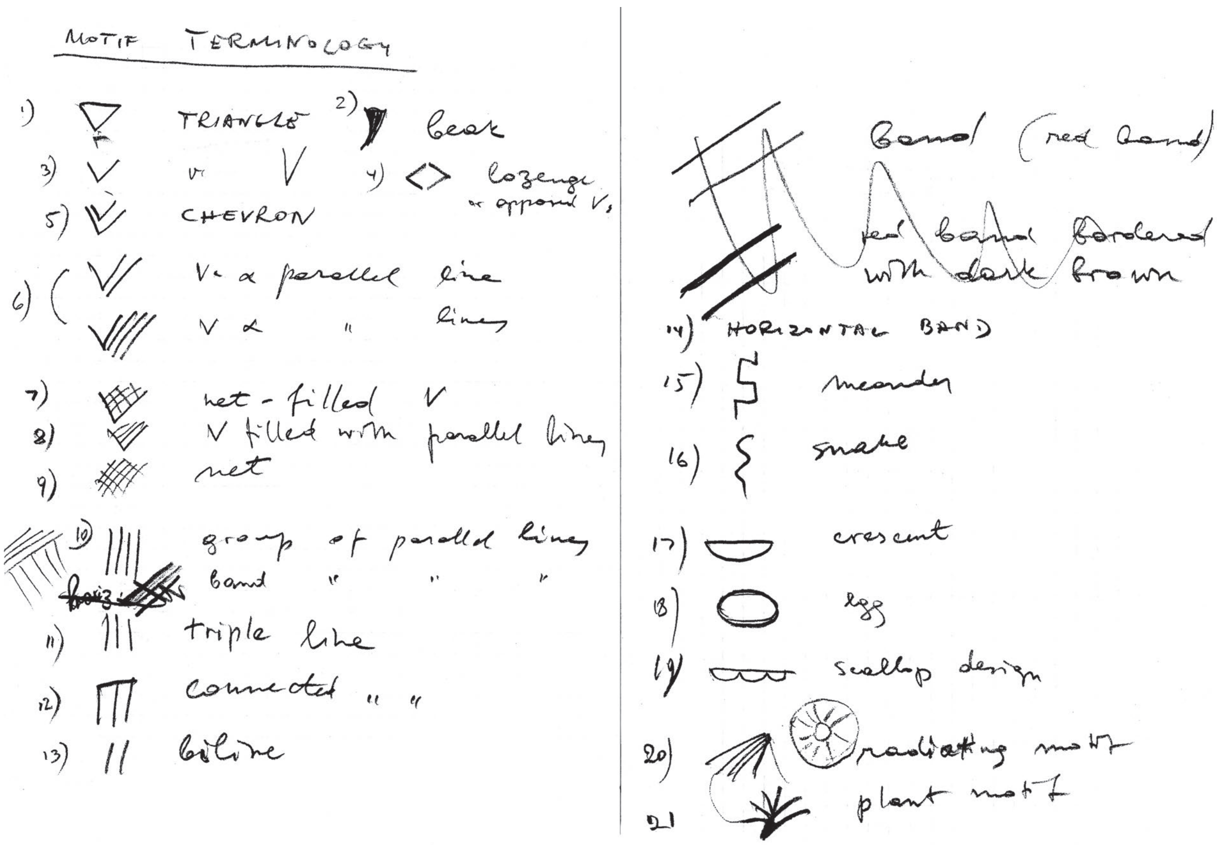


Fig. 5.5.1. Drawings of the pottery motifs (Marija Gimbutas 1980).

explore Gimbutas's ideas (Lazarovici 2003; Lazarovici-Mantu 2005). Indeed, before his untimely death, Shan Winn reinterpreted the motifs not as signs but as part of a "pre-script" (Winn 2009).

Recently, and I write this in 2014, more than a generation since the UCLA-University of Genoa Scaloria Cave excavation closed in 1980, a few Western scholars have noted the recurrence of motifs on prehistoric pottery from many sites of Old Europe (Anthony 2007: 162–163). Some motifs repeat and thus may represent more than decoration, and perhaps a notation system (Anthony 2010:35). Indeed, the duplication and regularity of incisions on the small cormorant bone from trench 6, level 7 (Figure 5.5.4) could signify counting, but counting of what? (see Marangou 2001).

Looking for significance and ultimately meaning from recurring marks on clay is an old, respectable study; it led to the decipherment of Linear B (Chadwick 1970) and continues to be pursued. The author of one of the latest of Çatalhöyük reports, Ali Umut Türkan, recently wrote of repeated marks on clay but emphasized that:

> Common shapes such as spirals, concentric circles and mazelike shapes are found over a broad geographic region, from Mesopotamia to the Balkans, and may have generated broad cultural affinities. The importance of symbols in any society, prehistoric or modern, lies in what they signify to the community in which they are used. (Türkan 2014: 246)

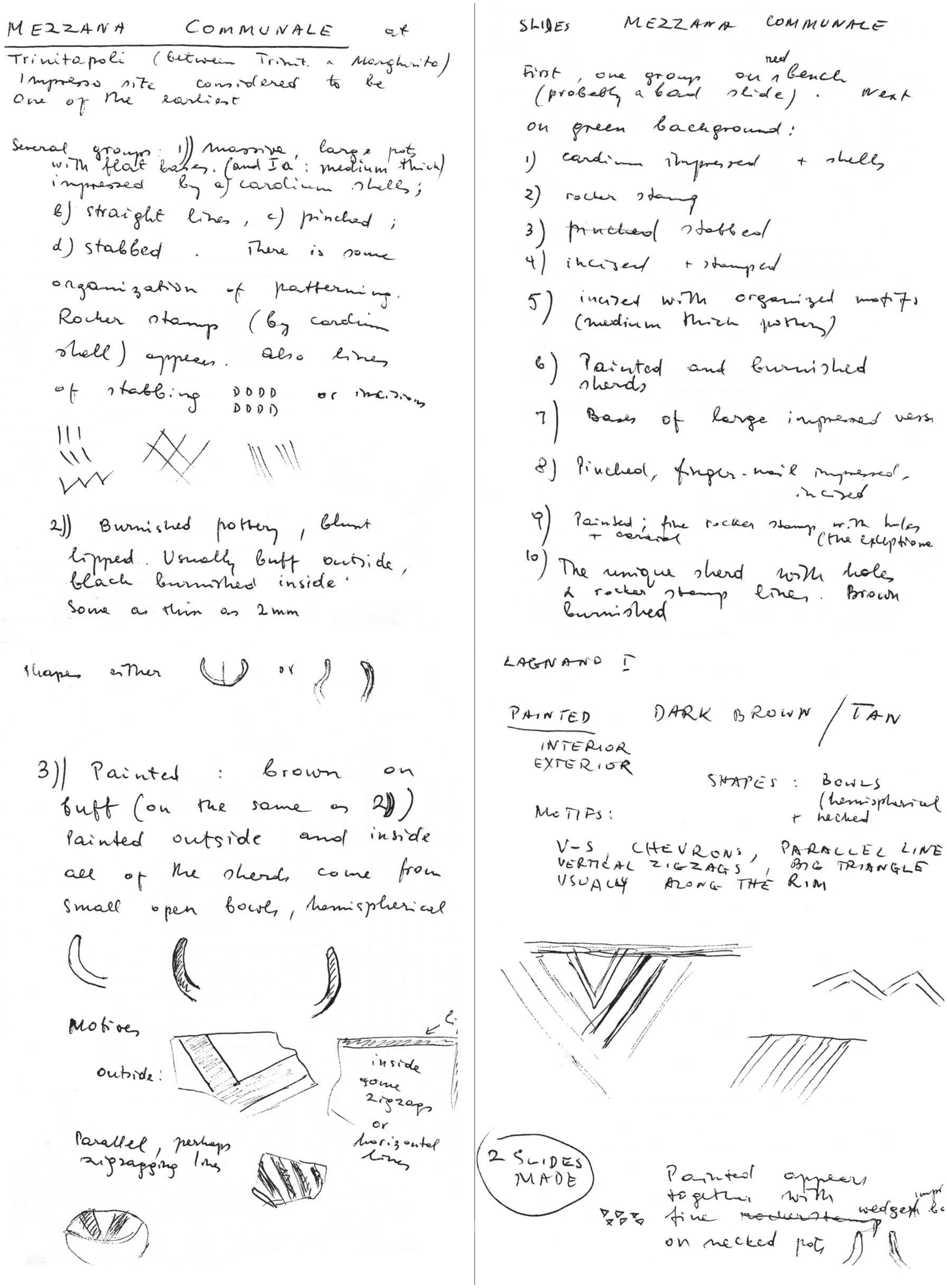
Indeed, performance is central to understanding how symbols resonate in a culture, and that is the link Gimbutas researched in the final years of her life. As co-principal investigator of Scaloria, the paths she pursued are fundamental to the history of Scaloria along

Table 5.5.1. Motif (terminology) and distribution on pottery forms (Marija Gimbutas 1980)

Motifs	Exterior	Interior	Bowl	Pear shaped	Shallow dish	Jug with worked handles	Globular bowl	Carinated bowl	Unknown	Pithos
Triangle	45	3	10	1		12	28			
Beak	11	5	7			3	5		2	
V	307	11	197	6		29	49	4	4	
Lozenge	1		1							
Chevron	11		8	1		2				
V + parallel lines	35	10	33		1	4	5		1	
V filled with net										
V filled with parallel lines	21	5		17			6			
Net	4						4			
Group of parallel lines	49	44	44	1	3	21	26	1		
Triple lines	7	2	3	2		2	2			
Connected lines		1					1			
Double line	3	6	4	1	1	1	1			
Horizontal band	43	12	14		3	7	25	9	1	
Meander	1	2					2			
Snake	1	8	7				2			
Crescent										
Egg	20	5	3		14		7			2
Scallop	10	26	18		5	1	10			
Radiating	4	38	34		3	3	8			
Scallop + vertical lines		6	6							
Concentric semicircles	15	43	35				15	1		
Discontinuous parallel lines	2	7	5				4			
Plant	1							1		
Rocker stamp + parallel lines	1						1			
M	1							1		
Breast	1						1			
X	1	1					2			
Checkerboard	1						1			
Snakeskin		4		1			3			

Table 5.5.2. Motifs (numbered) and distribution on interior/exterior of pots (Marija Gimbutas 1980)

Motif #	Exterior/interior	Pots	Motif #	Exterior/interior	Pots
1	48	51	16	9	9
2	16	17	17		
3	318	289	18	25	26
4	1	1	19	36	34
5	11	11	20	42	48
6	45	44	21	6	6
7	21	2	22	58	51
8	26	23	23	9	9
9	4	4	24	1	1
10	93	96	25	1	1
11	9	9	26	1	1
12	1	1	27	1	1
13	9	8	28	2	2
14	55	59	29	1	1
15	3	3	30	4	4



MEZZANA COMMUNALE at Trinitapoli (between Trinit. & Margherita) Impresso site considered to be one of the earliest

Several groups: 1)) massive, large pots with flat bases. (and Ia: medium thick) impressed by a) cardium shells; b) straight lines, c) pinched; d) stabbed. There is some organization of patterning. Rocker stamp (by cardium shell) appears. Also lines of stabbing DDDD DDDD or incisions

2)) Burnished pottery, blunt lipped. Usually buff outside, black burnished inside. Some as thin as 2mm

shapes either or

3)) Painted: brown on buff (on the same as 2)) painted outside and inside all of the sherds come from small open bowls, hemispherical

Motives

outside:

inside some zigzags or horizontal lines

Parallel, perhaps zigzagging lines

SLIDES MEZZANA COMMUNALE

First, one group on a red bench (probably a bad slide). Next on green background:

1) cardium impressed + shells
2) rocker stamp
3) pinched/ stabbed
4) incised + stamped
5) incised with organized motifs (medium thick pottery)
6) Painted and burnished sherds
7) Bases of large impressed vess.
8) Pinched, finger-nail impressed, incised
9) Painted; fine rocker stamp + cereal; with holes (the exceptions
10) The unique sherd with holes & rocker stamp lines. Brown burnished

LAGNANO I

PAINTED DARK BROWN / TAN
INTERIOR
EXTERIOR

SHAPES: BOWLS (hemispherical + necked

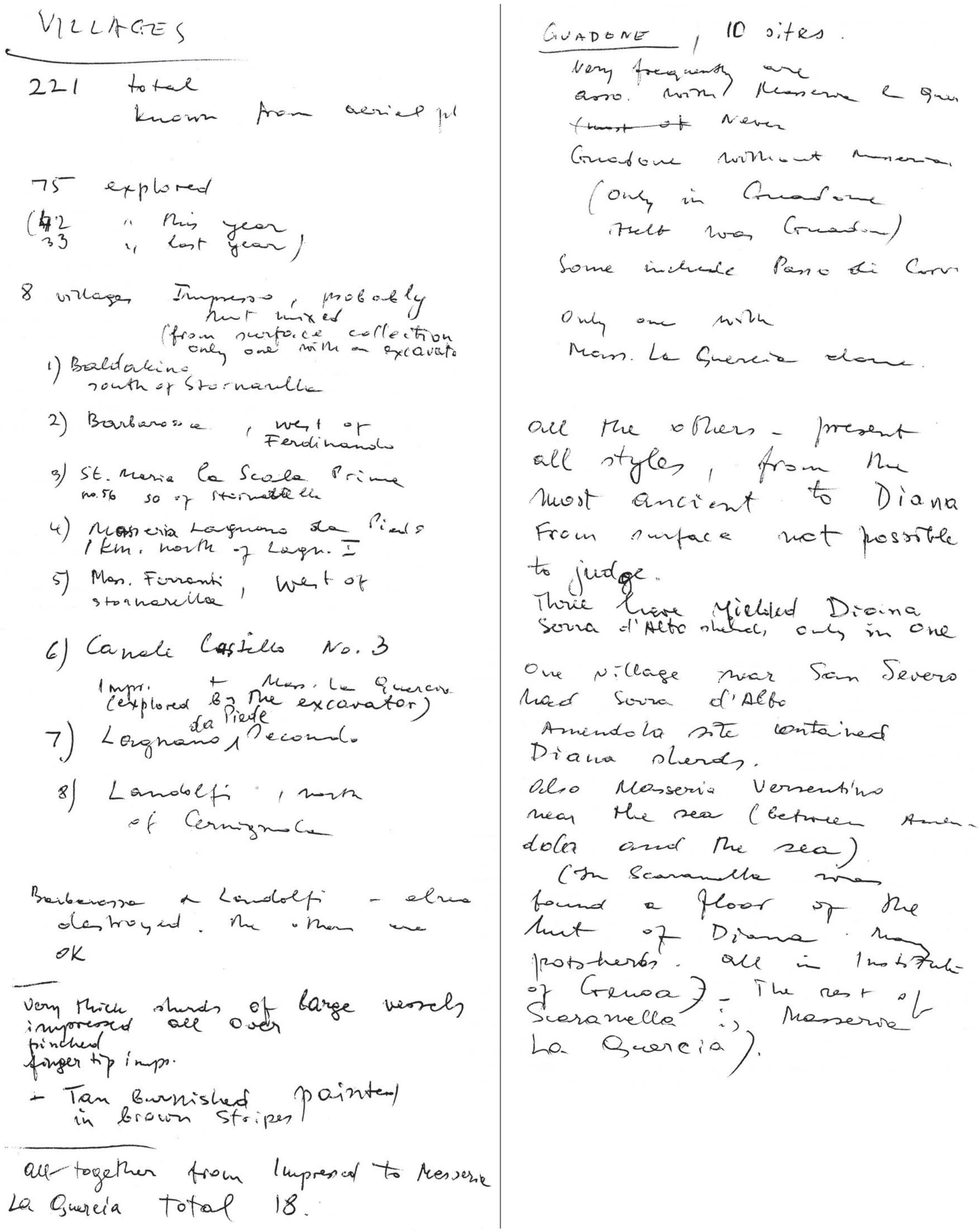
MOTIFS:

V-S, CHEVRONS, PARALLEL LINE VERTICAL ZIGZAGS, BIG TRIANGLE USUALLY ALONG THE RIM

2 SLIDES MADE

Painted appears together with fine ~~rocker stamp~~ wedge impr on necked pots

Fig. 5.5.2. Notes on Tavoliere sites: Mezzana Comunale (left and upper right); and Lagnano da Piede I (lower right) (Marija Gimbutas 1977).


VILLAGES

221 total
known from aerial ph

75 explored
(42 " this year
33 " last year)

8 villages Impresso, probably
most mixed
(from surface collection
only one with an excavatn
1) Baldalino
south of Stornarella
2) Barbarossa, west of
Ferdinando
3) St. Maria la Scala Prime
no. 56 so of Stornarella
4) Masseria Lagnano da Piede
1 km. north of Lagn. I
5) Mas. Ferronti, west of
stornarella
6) Canale Castillo No. 3
Impr. + Mas. La Quercia
(explored by the excavator)
7) Lagnano da Piede, secondo
8) Landolfi, north
of Cernignola

Barbarossa & Landolfi – almost
destroyed. The others are
OK

Very thick sherds of large vessels
impressed all over
pinched
finger tip imps.
+ Tan burnished painted
in brown stripes

All together from Impressed to Masseria
La Quercia Total 18.

GUADONE, 10 sites.
Very frequently are
asso. with Masseria La Quercia
Never
Guadone without Masseria.
(Only in Guadone
itself was Guadone)
Some include Passo di Corvo

Only one with
Mass. La Quercia alone.

All the others – present
all styles, from the
most ancient to Diana
From surface not possible
to judge.
Three have yielded Diana
Serra d'Alto sherds, only in one

One village near San Severo
had Serra d'Alto
Amendola site contained
Diana sherds.
Also Masseria Versentino
near the sea (between Amendola
and the sea)
(In Scaramella was
found a floor of the
hut of Diana. Many
potsherds. All in Institute
of Genoa) – The rest of
Scaramella ;) Masseria
La Quercia).

Fig. 5.5.3. Notes on Tavoliere sites: Villages (left); and Guadone, 10 sites (right) (Marija Gimbutas 1977).

VILLAGES
221 total—known from aerial photo
75 explored
(42 explored this year
33 last year)
8 villages Impresso, probably most mixed (from surface collections, only one with excavation)
1) Baldalino—south of Stornarella
2) Barbarossa—west of Ferdinando
3) Sta. Maria la Scala Prime—no. 56 so. of Stornarella
4) Masseria Lagnano da Piede—1 km N of Lagnano I
5) Masseria Ferronti—west of Stornarella
6) Canale Castillo No. 3—Impresso + Mass la Quercia (explored by excavator)
7) Lagnano da Piede II—secondo
8) Landolfi—north of Cernignola?

Barbarossa and Landolfi destroyed—the others are OK
Very thick sherds of large vessels
Impressed all over
Pinched
Fingertip impressed
Tan burnished painted in brown stripes
All together from Impressed to Masseria La Quercia: Total: 18

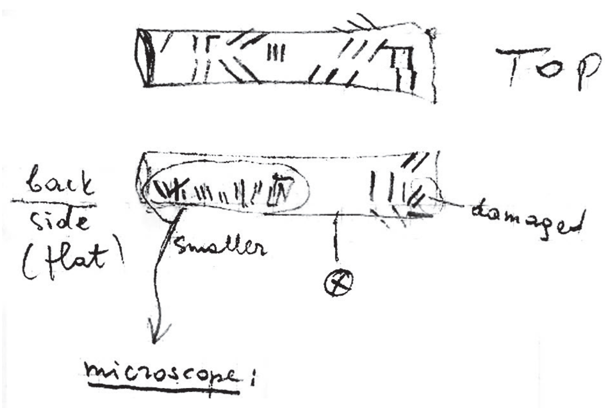


Fig. 5.5.4. Incised hollow bone, cormorant humerus (identification: Dr. Thomas Wake, UCLA); length: 42 mm; width: 9–12 mm; trench 6, level 7 (drawings: Marija Gimbutas 1980).

with the ideas and thoughts of her co-principal investigator, Santo Tiné, which together characterize the historiography of their excavation.

RIASSUNTO

Marija Gimbutas, direttrice co-principale con Santo Tiné degli scavi della Grotta Scaloria, preparava note e disegne mentre faceva la ricognizione del vasellame e altri reperti durante e prima della stagione del 1980 in preparazione per il suo contributo alla pubblicazione. La sua morte prematura nel 1994 spinse ad archiviare questi documenti nel "Marija Gimbutas and Joseph Campbell Archive" al OPUS Pacifica Graduate Institute a Montecito, CA. Gran parte di questi dati è presentata qui e sarebbe stata usata nella sua interpretazione di Scaloria, la sua relazione ai siti della Pianura Tavoliere e il mondo dell'Europa Antica (che ella delinea come il neolitico e calcolitico della Grecia e dei Balcani). Nei suoi commenti sugli scavi di Scaloria in pubblicazioni successive (vedi Appendice 4 e Gimbutas 1989, 223; 1991, 292), Gimbutas si riferisce a questo vasellame, le sue superfici dipinte incise con una "simbologia" ripetitiva. A causa della sua interessa continua nelle pratiche rituali e credenze preistoriche, ella cercava schemi, esaminava contesti, e inventariava migliaie di frammenti ceramici da Scaloria. Le note nell'archivio non comprendevano la sua interpretazione controversiale ma affascinante dei motivi come segni appartenenti a uno "scritto" dell'Europa Antica. Quella analisi (Gimbutas 1974), è stata e continua a essere contestata da alcuni studiosi ma accettata da altri. Infatti, prima della sua morte prematura, Shan Winn aveva re-interpretato i motivi non come segni ma come parte di un "pre-scritto" (Winn 2004).

Più recentemente, archeologi (Anthony 2010, Turkan 2014) hanno cominciato a prestare attenzione a forme dipinte o incise che appaiono sui vasellami ritrovati da Mesopotamia ai Balcani come rappresentanti di ampie affinità culturali—i simboli di una società. Che cosa significano in qualsiasi società non è ancora riconosciuto. La storia e la storiografia della ricerca di Scaloria compredono le idee e gli scopi degli investigatori co-principali, e quelli fondamentali a Marija Gimbutas sono presentati qui.

5.6. Archaeometric Analyses of Ceramic Materials

Italo M. Muntoni and Giacomo Eramo

Research Aims

This chapter presents the results of characterization analyses of 32 samples of Neolithic pottery from Scaloria Cave (SCL 1–32). Another three Neolithic samples from the cave (1356–1358), which had previously been analyzed by Tiziano Mannoni in the 1980s (Mannoni 1983), are also considered.[1] The aim is to verify the compatibility of the ceramic petrofacies with the geological substratum and with the petrographic database of previously analyzed Neolithic pottery from the Tavoliere area (Cassano et al. 2004). In addition, we discuss the existing relationships among the various ceramic classes, as well as their chronology and fabric.

Sampling and Analytical Methods

Taking the complex history of the cave's archaeological excavation into account, as well as its composite stratigraphic sequences, materials from excavations carried out between 1931 and 1979 were sampled only according to their typological and then chronological values (Table 5.6.1). No specific archaeological contexts were considered, even though the two larger groups of samples came from 17 different internal and 12 external trenches dug during the 1978 excavations. Diverse wares have been sampled: Early Neolithic coarse ware (impressa [impressed]; n = 6), Early/Middle Neolithic plain wares (burnished or brown-painted or scratched; n = 8), Middle Neolithic fine red- and/or brown-painted wares (n = 16), Middle Neolithic coarse and plain wares (n = 3) and Middle/Late Neolithic trumpet-shaped lugs (n = 2). Five Early/Late Neolithic hut-daub fragments (SCL 33–37) and three natural red-clay lumps (SCL 38–40) were also analyzed.

Archaeometric analyses were performed at the Dipartimento di Scienze della Terra e Geoambientali of the University of Bari "Aldo Moro." Petrological observation of thin sections was carried out with a Carl Zeiss Axioskop 40 Pol polarized light microscope (OM). Petrographic description took into account nonplastic inclusions (NPI), matrix, and porosity. The pigments used for red- and/or brown-painted decorations were analyzed with an SEM coupled with an ED spectrometer. The electron microscope used in this research was a 50XVP LEO scanning electron microscope, equipped with an Oxford-Link pentafet Si(Li) energy-dispersive spectrometer (EDS).

Geological Context

Scaloria Cave is in a transition zone between two different geological and geomorphological domains: the Gargano promontory (part of the Apulian Foreland) to the north and the Tavoliere Plain (part of Bradanic Trough) to the southeast (Figure 5.6.1). The interlayer cave is located within the Cretaceous limestone formations of the *Calcari oolitici di Coppa Guardiola Fm* (Merla et al. 1969)—namely, the upper portion (Aptian) of this formation that crops out at the foot of the Gargano promontory and was recently renamed "Calcare di Bari" (Spalluto et al. 2005).

The Gargano is an almost entirely mountainous peninsula and part of the Mesozoic/early Cenozoic Apulia carbonate platform. It is bordered by steep slopes that abruptly separate the massif from the surrounding Tavoliere plain and Adriatic Sea. The landscape has been shaped by karst and fluvial processes; the plateaus are marked by a number of dolinas. A dense network of rivers runs across the Cretaceous limestone from the highest altitudes to the sea, although nowadays they are almost inactive (Caldara

[1] Many thanks are due to Dr. Claudio Capelli who kindly provided the three thin sections from the databank of the DIP.TE.RIS of the University of Genoa (Capelli et al. 2006).

Table 5.6.1. Archaeological characteristics of analyzed Neolithic pottery samples

N	Context	Thickness (mm)	Class	Decoration	Chronology
SCL 01	SC 78, H8 2, L. 21	0.8	Coarse grained		Middle Neolithic
SCL 02	SC 78, Tr. 2, L. 9-10 SW	0.65	Depurated	Trumpet-shaped lug	Middle–Late Neolithic
SCL 03	SC unknown provenance	0.6	Depurated	Trumpet-shaped lug	Middle–Late Neolithic
SCL 04	SC 78, Tr. 2, L. 2	0.6	Depurated	Red and brown painted	Middle Neolithic
SCL 05	SC 78, Tr. 1, L. 1	0.6	Depurated	Red painted	Middle Neolithic
SCL 06	SC 78, Tr. 1, L. 6	0.85	Coarse grained	Impressed	Early Neolithic
SCL 07	SC 78, Tr. 1, L. 8	1.35	Coarse grained	Impressed	Early Neolithic
SCL 08	SC 78, Tr. 1, L. 8	0.85	Coarse grained	Impressed	Early Neolithic
SCL 09	SC 78, Tr. 1, L. 5	0.7	Depurated	Brown painted	Middle Neolithic
SCL 10	SC 78, Tr. 1, L. 4	0.7	Depurated	Red and brown painted	Middle Neolithic
SCL 11	SC 78, H8 7, L. 15	0.6	Depurated		Middle Neolithic
SCL 12	Interior SC cave surface	2.7–1.6	Coarse grained	Impressed	Early Neolithic
SCL 13	SC 78, Tr. 1, Liv. 2	0.4	Depurated	Brown painted	Middle Neolithic
SCL 14	SC 78, H8 2, L. 18	0.6	Medium-fine grained		Early–Middle Neolithic
SCL 15	SC 78, Tr. 2, L. 3	0.4	Medium-fine grained		Early–Middle Neolithic
SCL 16	SC 78, Tr. 2, L. 3	0.6	Medium-fine grained	Pinched rim	Middle Neolithic
SCL 17	SC 79, Tr. 6, L. 4, pit	0.5	Depurated	Brown painted	Early–Middle Neolithic
SCL 18	SC 79, Tr. 6, L. 4, pit	0.55	Depurated	Brown painted	Early–Middle Neolithic
SCL 19	SC 78, H8 2, L. 8	0.6	Depurated	Brown painted	Middle Neolithic
SCL 20	SC excavation Quagliati 1931	0.5–0.6	Depurated	Red painted	Middle Neolithic
SCL 21	SC 78, Tr. 1, L. 4	0.4	Depurated	Red painted	Middle Neolithic
SCL 22	SC excavation Quagliati 1931	0.3	Depurated	Red painted	Middle Neolithic
SCL 23	SC excavation Quagliati 1931	0.6	Depurated	Brown painted	Middle Neolithic
SCL 24	SC excavation Quagliati 1931	0.4	Depurated	Brown painted	Middle Neolithic
SCL 25	SC 78, H8 2, L 19	0.6	Depurated	Brown painted	Middle Neolithic
SCL 26	SC 78, H8 2, L 10	0.4	Depurated	Red/brown painted	Middle Neolithic
SCL 27	SC 78, T 2, L 3	0.6	Medium-fine grained	Scratched	Early–Middle Neolithic
SCL 28	SC unknown provenance	0.9	Coarse grained		Middle Neolithic
SCL 29	SC 78, T 1, L 7	0.8	Coarse grained	Impressed	Early Neolithic
SCL 30	Interior SC cave surface	0.5	Medium-fine grained		Early–Middle Neolithic
SCL 31	Interior SC cave surface	0.55	Depurated	Red painted	Middle Neolithic
SCL 32	Interior SC cave surface	1.1	Coarse grained	Impressed	Early Neolithic
SCL 33	SC 78, H8 4, L 4	2.9	Hut-daub		Early–Late Neolithic
SCL 34	SC 78, H8 4, L 4	2.2	Hut-daub		Early–Late Neolithic
SCL 35	SC 78, H8 4, L 4	2.2	Hut-daub		Early–Late Neolithic
SCL 36	SC 79, T 5, L 6	1.7	Hut-daub		Early–Late Neolithic
SCL 37	SC 79, T 5, L 6	1.9	Hut-daub		Early–Late Neolithic
SCL 38	SC 78, T 2, surface	—	Red-clay lump		—
SCL 39	SC 78, Tr 1, L 1	—	Red-clay lump		—
SCL 40	SC 78, T 1, L 1	—	Red-clay lump		—
1356	SC 78, H8 2, L 10	0.6	Depurated		Middle Neolithic
1357	SC 78, H8 4, L 6	0.5	Medium-fine grained		Early–Middle Neolithic
1358	SC 78, H8 2, L 22	0.7	Coarse grained		Early–Middle Neolithic

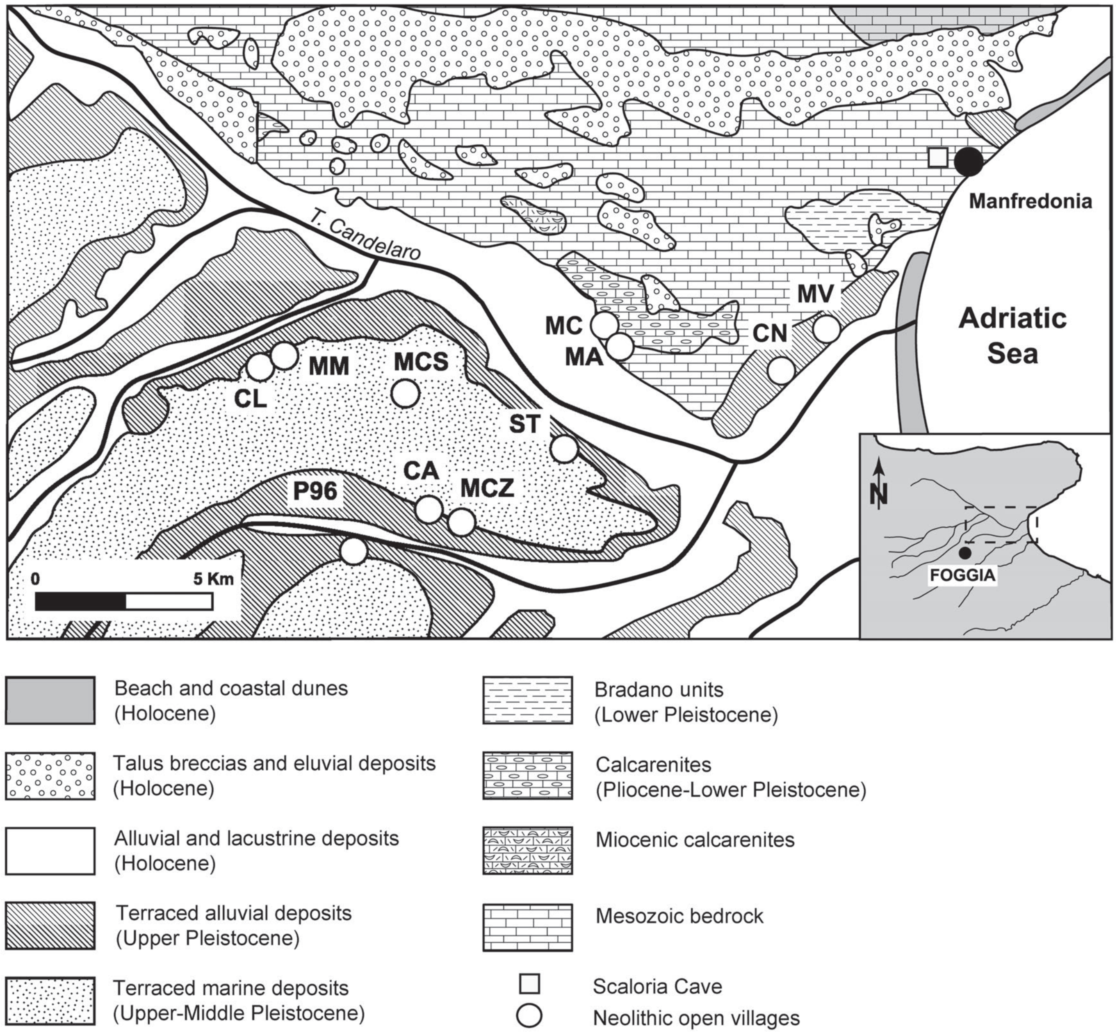


Fig. 5.6.1. Geological sketch map of Scaloria Cave area (modified after Cassano et al. 2004) showing location of Scaloria Cave (empty square) and other Neolithic open villages in same area (empty dots) where archaeometric characterization of Neolithic pottery production has previously been carried out (data from Cassano et al. 2004).

and Palmentola 1991). The outcrops characterizing the Gargano promontory consist of calcareous and dolomitic formations, the age of which varies between Upper Jurassic and Early Cenozoic, sometimes overlain by Paleogenic calcarenites, Neogenic biocalcarenites, and, finally, by Upper Pleistocene alluvial and colluvial fan deposits composed of unsorted and heterogeneous material, containing coarse, mostly angular limestone fragments in reddish micromass. The limestone formations are frequently covered by terra rossa deposits. Terra rossa soils are residual silty clays, very poor in carbonate, composed of dominant clay minerals (illite and kaolinite) and iron oxides or hydroxides, with subordinate quantities of quartz, feldspars, micas, and rare pyroxenes. SiO_2, Al_2O_3, and Fe_2O_3 are the main oxides, both in the clay fraction and in the whole specimen (Dell'Anna 1967; Dell'Anna and Garavelli 1968).

The Tavoliere plain is the largest alluvial plain in peninsular Italy. The generally level topography, which slopes gently down toward the sea, is marked by a series of marine terraces and crossed by streams, of which the most important are the Ofanto and the Fortore rivers. It is a Mesozoic/Paleogenic limestone depression filled with marine deposits of Plio-Pleistocene silty clay (Bradanic cycle), often overlain by post-Calabrian marine sands (terraced marine deposits), Upper Pleistocene (terraced alluvial deposits),

and Holocene alluvial and lacustrine deposits of continental origin (Caldara and Pennetta 1993; Caldara et al. 2004).

Marine Plio-Pleistocene clays of the Bradanic cycle, also known as *Argille subappennine*, crop out extensively along the western edge of the Tavoliere (Dell'Anna and Laviano 1991; Tropeano et al. 2003). The exposed formation varies in thickness but measures up to a few hundred meters. The clays consist of silty clay or clayey silt, with little sand, and have very similar mineralogical compositions (clay minerals, carbonates, quartz, and feldspars). The clay minerals are a mixture of 2M illite, magnesium-bearing smectite, iron-bearing chlorite, kaolinite, and randomly interstratified illite/smectite. Natural NPIs consist of carbonates (calcite, as bioclastic or detrital granules, and dolomite), quartz, and feldspars (orthoclase, microcline, and sodium-plagioclase).

Quite different Holocene alluvial clays can be found on the coastal plain, deposited by numerous ancient rivers and streams. Clay composition is quite variable, depending on the erosion of different clayey and arenaceous/marnous deposits that crop out in the Tavoliere area (Cassano et al. 1995; Eramo et al. 2004). Alluvial clays contain distinctive volcanic minerals and rock fragments. Heavy minerals include dominant diopside/augite pyroxene, magnetite, biotite, and garnet, together with volcanic glass rock fragments.

Marine and alluvial clays are characterized by a relative abundance of SiO_2, Al_2O_3, CaO, Fe_2O_3, K_2O, and MgO. Due to their mainly calcareous composition (up to 17 wt% CaO), they can be classified as marly clays. Clay fractions (<2 μm) have a lower CaO content than the whole specimens, whereas the Al_2O_3 and Fe_2O_3 concentrations are higher (Dell'Anna and Laviano 1991).

Ceramic Fabrics

The samples from Scaloria Cave are almost petrographically inhomogeneous, and 10 different pottery fabrics can be distinguished from their composition and grain-size distribution (Figures 5.6.2–5.6.3; Table 5.6.2).

The five fragments of hut daub (SCL 33–37) show a common petrofacies (fabric QO) but different textures (Figure 5.6.2a–b). The distinctive features are the occurrence of volcanic rock fragments and clay pellets (Whitbread 1986), along with carbonaceous matter dispersed in the inner portion of the samples. SCL 36 differs from the rest of the samples in its bimodal texture due to the presence of coarse calcareous rock fragments. The porosity in thin section (Table 5.6.2) was not estimated because it was partially altered during sample preparation.

The potsherds can be preliminarily grouped into coarse, fine, and very fine textured pottery. Fabrics BC, C, QBC, and CS can be ascribed to the first group, fabrics QCh and QChC to the second group, and fabrics QM, QV, and QC to the third.

SCL 01 is the only sample of fabric BC (Figure 5.6.2c), which shows bimodal texture due to the bivalve and gastropod bioclasts coexisting with a silty terrigenous component of the NPI. Fabric C (SCL 28) is characterized (Figure 5.6.2d) by calcareous rock fragments dispersed in a very fine iron-rich clay matrix. Fabric QBC has typical bioclast content and a relatively coarse texture (Figure 5.6.2g–h) compared with the rest of the fine-textured pottery. The three samples of fabric CS (SCL 16, SCL 27, and 1358) show the coarsest grain size associated with bimodal texture (Figure 5.6.3a–b). The samples contain angular spathic calcite clasts, comprising 15–25 volume percent of the total. In thin section, these fragments are readily distinguished by their large size (≥0.4 mm up to 1.4 mm). SCL 17 shows a larger amount of bioclasts and a smaller amount of ferruginous aggregates than the other two samples.

Fabrics QCh and QChC share a fine texture and are relatively rich in chert and volcanic rock fragments. Micrite dispersed in the clay matrix is masked by the carbonaceous matter. More rounded NPIs and clay pellets feature the fabric QCh (Figure 5.6.2e), while calcareous silt and angular sand are distinctive for fabric QChC (Figure 5.6.2f).

The potsherds with a very fine texture are frequently decorated with an optically dense paint, which is from 5 to 15 μm thick. The fine-textured samples show a fairly fat clay matrix, with some NPIs (≤250 μm) still detectable. The prevalent silt fraction is common in fabric QV and QM, which are instead distinguished by the volcanic rock fragments in the former (Figure 5.6.3d–e) and the calcareous silt and muscovite in the latter (Figure 5.6.3f–h). Fabric QC was distinguished (Figure 5.6.3c) by its high chert content and moderate amount of muscovite. Primary porosity and drying shrinkage are generally low, and they are sometimes filled with secondary calcite microcrystals.

The three samples of red-clay lumps (SCL 38–40) show very fine texture and noncalcareous clay matrix rich in iron oxides.

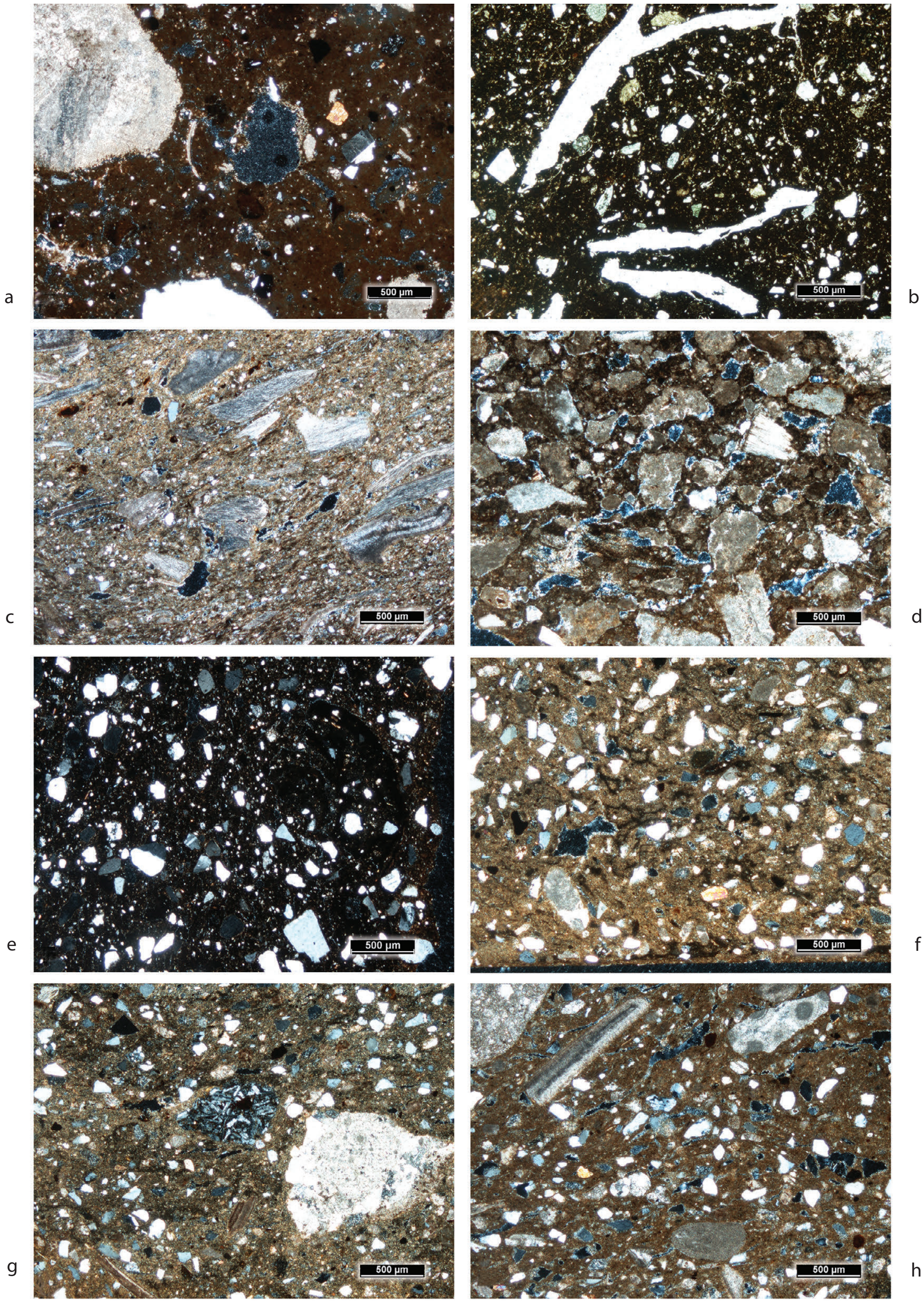


Fig. 5.6.2. Thin-section photographs of pottery fabrics (a, c–h: crossed polarized light; b: plane polarized light): (a) QO fabric (SCL 36); (b) QO fabric (SCL 35); (c) BC fabric (SCL 01); (d) C fabric (SCL 28); (e) QCh fabric (SCL 30); (f) QChC fabric (SCL 15); (g) QBC fabric (SCL 12); (h) QBC fabric (SCL 32).

Table 5.6.2. Petrographic features of pottery samples as observed in thin section

Samples	Fabric	Matrix				Porosity		Nonplastic inclusions													Notes
		FeOx	Cal	Str	Bir	% vol	Srnk	Txt	D mode	D max	Qm	Qp	Ch	Pl	Kfs	Micas	Px	Lithics	Fe agg	Fossils	
SCL 33	QO	+		Zoned	M		-	unim	vfs	0.6	+		~	~	~	+	-	VRF	+		Clay pellet
SCL 34	QO	+		Zoned	M		-	unim	ms	0.5	+		~	~	~	~	-	VRF (~)	+		Clay pellet Cal[2], Org
SCL 35	QO	+		Zoned	M		-	unim	silt	0.3	+		~	~	-	~	-	VRF (-)	+		Clay pellet Org
SCL 36	QO	+		Zoned	M		-	bim	silt+gran	8	+		~	~	~	~	~	Mcrfos CRF VRF	+		Clay pellet Cal[2], Org
SCL 37	QO	+		Zoned	M		-	unim	silt	0.9	+		~	~	~	~	~	VRF	+		Clay pellet Org
SCL 01	BC	~	+	Zoned	MH	15	+	bim	silt+vcs	1.6	+		~	~	~	~		Mcrfos		For	
SCL 28	C	+	+	Zoned	MH	20	+	unim	ms	1.6								CRF	-		
SCL 14	QCh		-		ML	15	+	unim	fs	0.8	+	~	-	~	-	~	~	VRF	+		Clay pellet Grt
SCL 30	QCh		-		ML	10	+	unim	fs	0.4	+	~	-	~	~	~	~	VRF	+		Clay pellet Grt
SCL 15	QChC	+	+	Zoned	MH	10	+	unim	fs	0.4	+	~	-	~	-	~	~	VRF CRF (~)	+	For	
SCL 06	QBC	+	+	Zoned	MH	15	+	unim	fs	1.4	+	~	-	~	-	~	~	Mcrfos VRF CRF	+	For (~)	Cal[2]
SCL 07	QBC		+	Zoned	MH	15	+	unim	fs	0.7	+	~	-	~	-	~	~	Mcrfos VRF(~) CRF	+	For (~)	
SCL 08	QBC	+	+	Zoned	MH	10	+	unim	fs	2.4	+	~	-	~	-	~	~	Mcrfos VRF CRF SRF	+	For (~)	Cal[2]
SCL 12	QBC	+	+	Zoned	MH	15	-	unim	vfs	3.6	+	~	-	~	~	~	~	Mcrfos(~) VRF(~) CRF	+	For (~)	
SCL 29	QBC	+	+		MH	10	+	unim	fs	1	+	~	-	~	-	~	~	Mcrfos(~) VRF(~) CRF	+	For (~)	Cal[2]
SCL 32	QBC		+		MH	15	+	unim	fs	2.4	+	~	-	~	~	~	~	Mcrfos(~) VRF(~) CRF	+	For (~)	Cal[2]

Continued on facing page

Table 5.6.2,, continued. Petrographic features of pottery samples as observed in thin section

Samples	Fabric	Matrix				Porosity		Nonplastic inclusions													Notes
		FeOx	Cal	Str	Bir	% vol	Srnk	Txt	D mode	D max	Qm	Qp	Ch	Pl	Kfs	Micas	Px	Lithics	Fe agg	Fossils	
SCL 16	CS	+			M	5	+	bim	silt+vcs	1.4	+		~		~			sCal (+)	+		Engobed
SCL 27	CS	+	+		M	5		ser	vfs	0.8	+		~		~	~		sCal (+) Mcrfos (-)			Fumigated
1358	CS	+	+	Zoned	M	15	+	bim	vfs+vcs	1.4	+		~	~	~	~	~	sCal (+) VFR	+	For (~)	Clay pellet grog fumigated
SCL 05	QC	+	+		M	10		unim	vfs	0.8	+		+	~	-	-	~	CcS VRF			Clay pellet Cal^2 fumigated
SCL 22	QC	+	+	Zoned	M	5		unim	silt	1.6	+		+	~	-	-		CcS VRF	~	For	
SCL 09	QV	+	+	Zoned	L	10		unim	silt	0.27	+		~			-		VRF	-		
SCL 11	QV		+		L	15		unim	silt	0.15	+				~	~			-	For	Cal^2
SCL 17	QV	+	+	Zoned	MH	10		unim	silt	0.5	+		~	~	~	~	~	VRF	+		Clay pellet
SCL 18	QV	+	+	Zoned	MH	10		unim	silt	0.5	+	~			~		~	VRF	++		Clay pellet
SCL 04	QM	+	+	Zoned	MH	10		unim	silt	1	+		~		~	+	~	CcS VRF Mcrfos	+	For	Clay pellet
SCL 10	QM	+	+		M	15		unim	silt	0.25	+		~	~	~	+		CcS VRF	+		Cal^2
SCL 13	QM	+	+	Zoned	M	10		unim	silt	0.15	+		~			+		CcS	+	For (~)	
SCL 20	QM	~	+		ML	10		unim	silt	0.25	+		~		~	+	~	CcS	+		Cal^2
SCL 23	QM	+	+		L	10		unim	silt	0.2	+		~		~	+		CcS	+	For (~)	
SCL 24	QM	+	+		L	10		unim	silt	0.15	+		~	~	~	+	~	CcS	+		Cal^2
SCL 26	QM	+	+		L	10		unim	silt	0.15	+		~	~	~	+		CcS	+		Cal^2
SCL 31	QM	+	+		ML	10		unim	silt	0.25	+		~	~	~	+		CcS	+		
SCL 02	QM	+	+	Zoned	H	10		unim	silt	0.5	+					+		CcS	+	For	Clay pellet
SCL 03	QM	+	+		M	10		unim	silt	0.25	+		~	~	~	+		CcS	+	For	Cal^2
SCL 19	QM	+	+		ML	10		unim	silt	0.5	+		~			+		CcS	+		Cal^2
SCL 21	QM	+	+		ML	10		unim	silt	0.15	+		~	~	~	+		CcS	+	For (~)	Cal^2
SCL 25	QM	~	+		L	10		unim	silt	0.2	+				~	+		CcS	+		
1356	QM	+	+		M	10		unim	silt	0.4	+		-	~	-	+		CcS	+		
1357	QM	+	+		L	10		unim	silt	0.5	+				-	+		CcS	+		

Notes: Matrix—FeOx = iron oxides; Cal = calcareous; Str = structure; Bir = birefringence; L = low, ML = medium-low, M = medium, MH = medium-high, H = high. Porosity—Srnk = shrinkage porosity. Nonplastic inclusions: Txt = grain size. Distribution of nonplastic inclusions: unim = unimodal; ser = seriate; bim = bimodal. D mode = prevalent grain size(s): vfs = very fine sand; fs =fine sand; ms = medium sand; vcs = very coarse sand; gran = granules; D max = maximum grain size; Qm = monocrystalline quartz; Qp= polycrystalline quartz; Ch = chert; Pl = plagioclase; Kfs = potassium-feldspar; Px = pyroxene. Lithics—VRF = volcanic rock fragment; CRF = calcareous rock fragment; Mcrfos = macrofossil; SRF = sedimentary rock fragments; sCal = spathic calcite; CcS = calcareoussilt; Fe agg = iron aggregate. Fossils: For = foraminifera. Cal^2 = secondary calcite; Grt = garnet; Org = secondary pores of original organic matter.

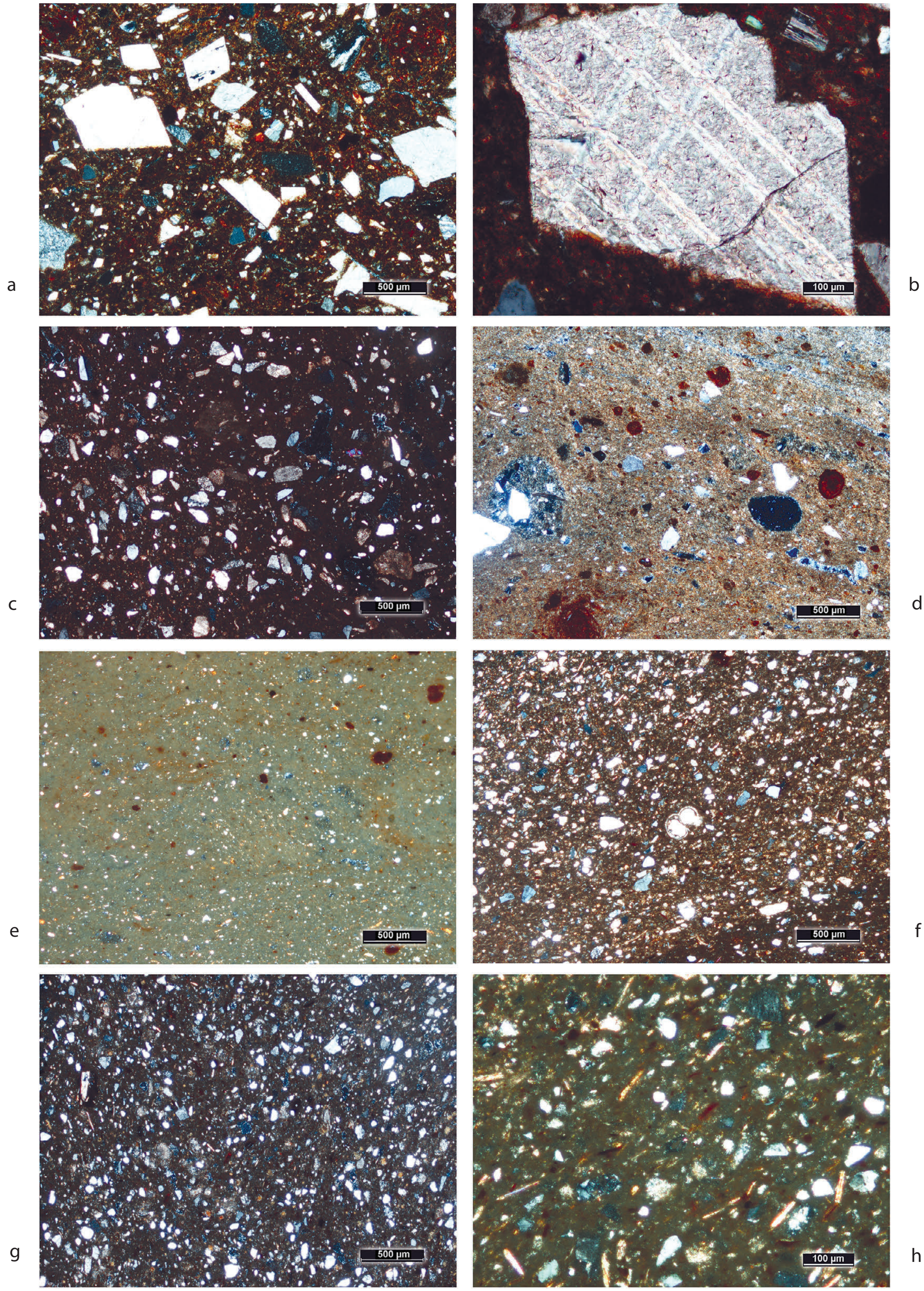


Fig. 5.6.3. Thin-section photographs of pottery fabrics (a–h: crossed polarized light): (a) CS fabric (SCL 16); (b) CS fabric (SCL 16); (c) QC fabric (SCL 05); (d) QV fabric (SCL 18); (e) QV fabric (SCL 09); (f) QM fabric (SCL 03); (g) QM fabric (SCL 10); (h) QM fabric (SCL 24).

Pigments

Scanning electron microscopy (SEM), with energy dispersive spectrometry (EDS), has been used on the red and black decorated areas of some samples, with the aim of defining the nature of the pigments used.

SEM images of the red pigments revealed a layer—about 5–15 μm thick—with a low degree of sintering. The XRF spectra showed that all three red pigments analyzed (from two samples of red bands style and one sample of Scaloria trichrome style) contained variable quantities of iron, with high silicon and low aluminum (Al/Si ≈ 1/2) and very low magnesium, calcium, and potassium contents, and sometimes also titanium (Figures 5.6.4–5.6.5). These results allow us to deduce that the pigment used was composed of a mix of clay minerals and iron oxides and hydroxides, such as hematite (Fe_2O_3), goethite [α-FeO(OH)], or a mixture of both.

EDS spectra of the two analyzed black pigments (from two samples of Scaloria style with black bands) revealed the same relative quantities of aluminum, silicon, calcium, and magnesium observed in the red samples, with small amounts and in almost equal proportions of iron and manganese (Figure 5.6.6). The Fe Kα and Mn Kα peaks are well separated, and their relative intensity ratios are around 1:1. SEM images of the black pigment again showed a slightly sintered, porous layer about 10 μm thick. These results allow us to deduce that the pigment used was composed of a mix of clay minerals and manganese, with iron oxides

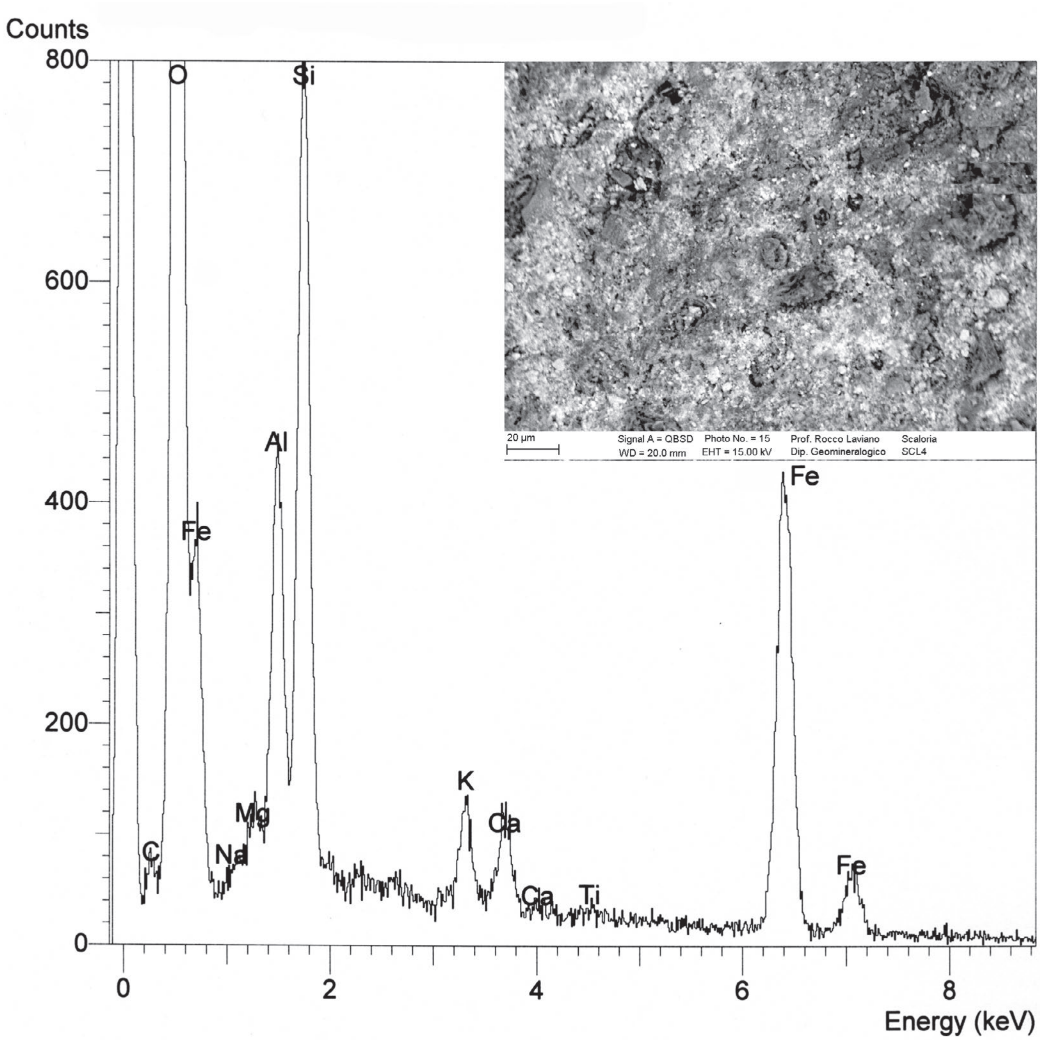


Fig. 5.6.4. ED spectra and SEM-BSE image (top right) of red pigment from sample SCL 04.

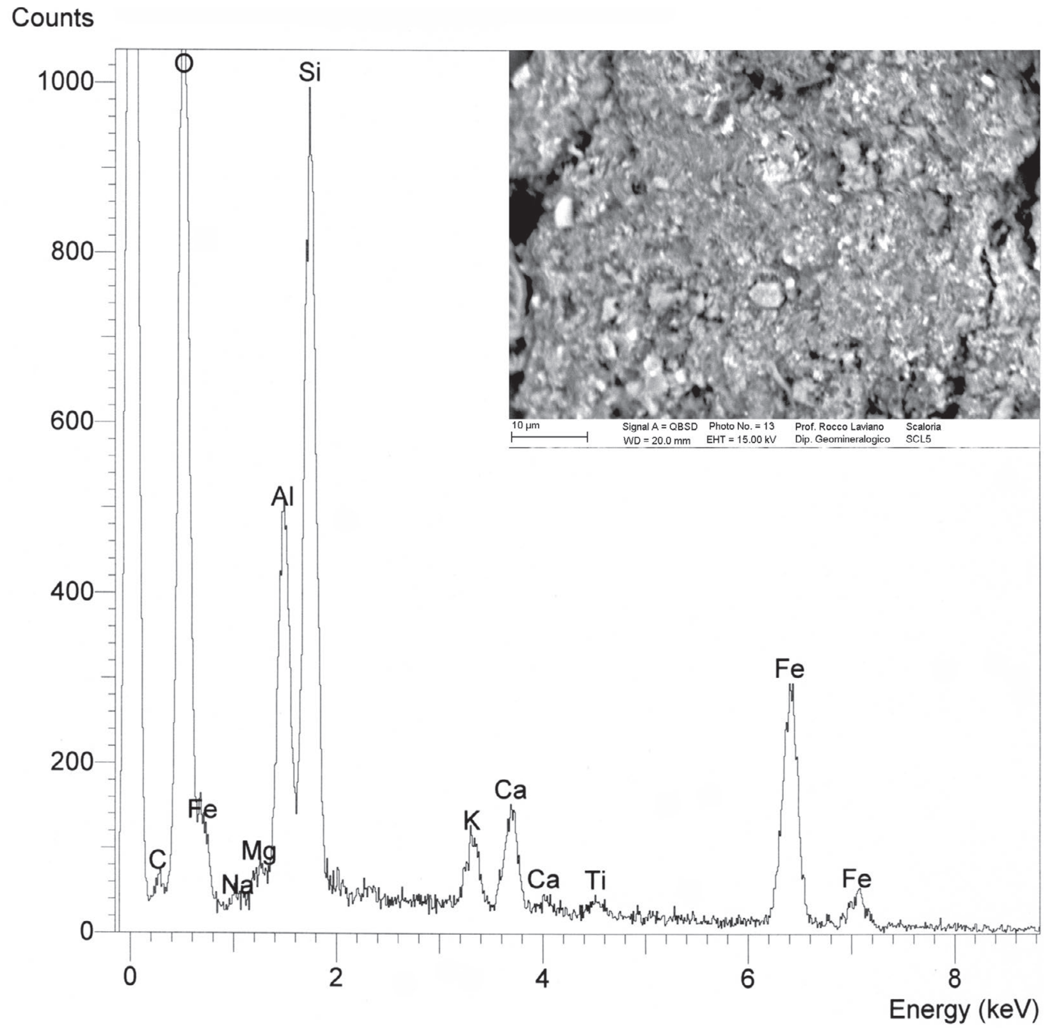


Fig. 5.6.5. ED spectra and SEM-BSE image (top right) of red pigment from sample SCL 05.

such as magnetite ($FeO{\cdot}Fe_2O_3$) or maghemite (γ-Fe_2O_3).

From a technological point of view, black manganese is of importance, as it enabled the potter to obtain both black and red colors in one oxidizing firing cycle, with temperatures around 950–1,100 °C. Both red and black slip were applied to the partially dried unfired ware, and fired under oxidizing conditions: red and/or black colors were then obtained simultaneously.

Discussion and Conclusions

Petrographical analysis brought to light a correlation between the Neolithic hut-daub samples (fabric QO) with the primary red-clay lumps (SCL 38–40) collected in the cave. The occurrence of a few volcanic tephra in the hut-daub samples suggests that the raw material was probably present outside the cave and could be identified with the silty-clayey continental sedimentary deposits of terra rossa. On the contrary, there is an absence of volcanic tephra in the red-clay lumps sampled in the cave, where the residual red clay was protected from such volcanic contribution. The 35 potsherds analyzed here show a variety of fabrics which suggest several provenances and different chronologies (Table 5.6.3) and are clearly different from the fabric of the hut-daub samples. Pottery was made of calcareous clay with different NPIs, which can be associated with some fabrics that have already been observed in nearby Early and Middle Neolithic sites in the Tavoliere area (Cassano et al. 2004).

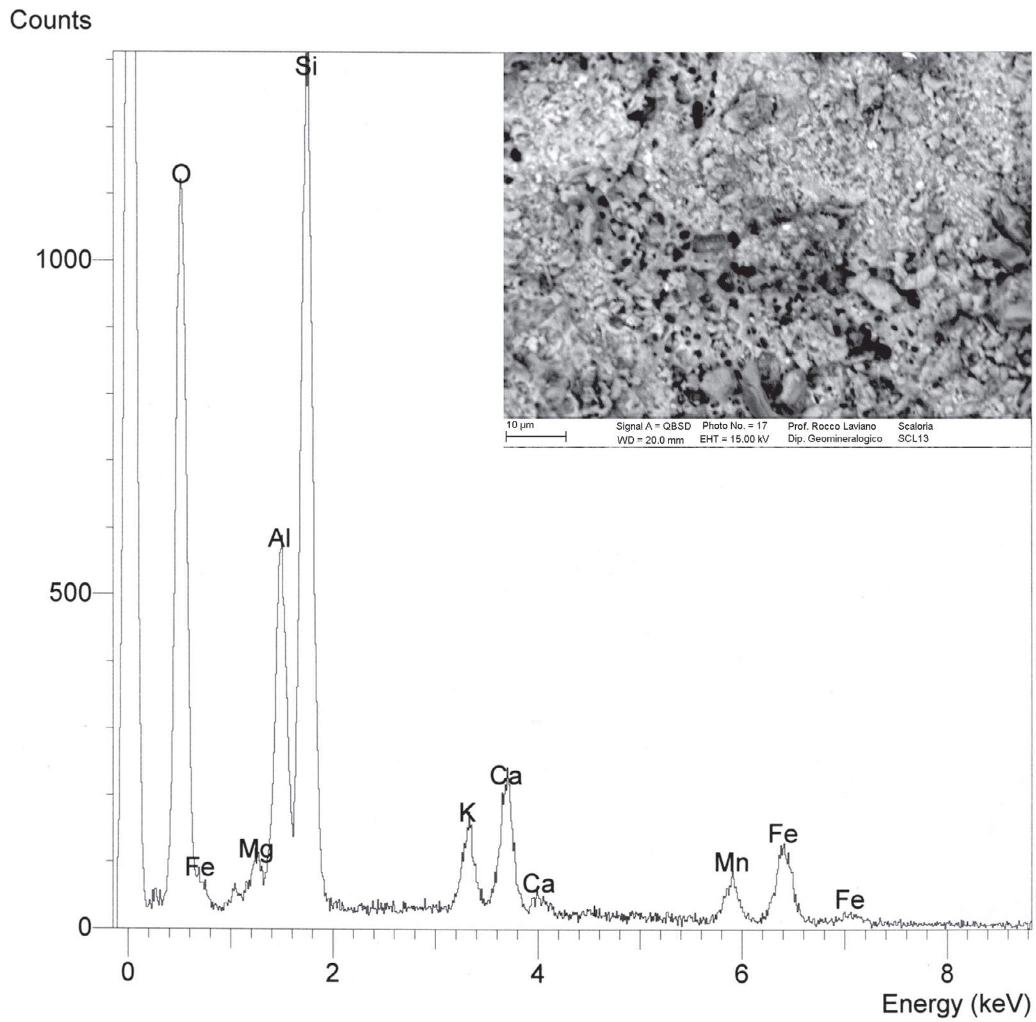


Fig. 5.6.6. ED spectra and SEM-BSE image (top right) of brown pigment from sample SCL 13.

Early Neolithic impressa samples of QBC fabric could easily be compared with the Early Neolithic productions of some villages in the Amendola area—namely, class A from the Masseria Candelaro site (MA in Figure 5.6.1). The petrological correspondence with Holocene alluvial deposits of continental origin suggest that alluvial clays were then exploited for the QBC fabric. Early/Middle Neolithic plain and black burnished samples of QCh and QChC fabrics are instead similar to samples from the Neolithic site located on the east bank of the Candelaro River (CL, MM, MCS, ST in Figure 5.6.1) where the NPIs reveal a minor contribution of the calcareous formation of the Gargano promontory. These data could also confirm the hypothesis that the cave was used as a dwelling in the Early Neolithic.

The petrofacies of Middle Neolithic fabrics BC and C do not match those of the analyzed potteries from the Tavoliere area, nor those from the northeastern coast of the Gargano in the Defensola area (di Lernia et al. 1993). However, a non-local provenance could not be assessed, due to the widespread calcareous and dolomitic formations that characterize the Gargano promontory. The subangular bivalve and gastropod bioclasts of SCL 01 (fabric BC) were probably added as temper.

The three samples of fabric CS, which were tempered with angular to subangular coarse-grained spathic calcite clasts, are very similar to the calcite-tempered Middle Neolithic Serra d'Alto coarse ware. Samples from Scaloria also show very fine angular calcite clasts: the finest part of the NPIs could have been

Table 5.6.3. Correlation between fabric and chronology of analyzed Neolithic pottery samples

Samples	Fabric	Chronology
SCL 06	QBC	EN
SCL 07	QBC	EN
SCL 08	QBC	EN
SCL 12	QBC	EN
SCL 29	QBC	EN
SCL 32	QBC	EN
SCL 14	QCh	EN–MN
SCL 30	QCh	EN–MN
SCL 15	QChC	EN–MN
SCL 09	QV	MN
SCL 11	QV	MN
SCL 17	QV	EN–MN
SCL 18	QV	EN–MN
SCL 16	CS	MN
SCL 27	CS	EN–MN
1358	CS	EN–MN
SCL 01	BC	MN
SCL 28	C	MN
SCL 05	QC	MN
SCL 22	QC	MN
SCL 04	QM	MN
SCL 10	QM	MN
SCL 13	QM	MN
SCL 20	QM	MN
SCL 23	QM	MN
SCL 24	QM	MN
SCL 26	QM	MN
SCL 31	QM	MN
SCL 19	QM	MN
SCL 21	QM	MN
SCL 25	QM	MN
1356	QM	MN
1357	QM	MN
SCL 02	QM	MN–LN

Notes: EN = Early Neolithic; MN = Middle Neolithic; LN = Late Neolithic.

caused by degradation processes of speleothems in the cave, rather than from intentional crushing by potters. The calcite temper was not significantly affected by firing and appeared unaltered. This ware has been found in different archaeological sites across the Tavoliere plain (also at Masseria Candelaro), Murge Plateau, and the Bradanic Trough (Muntoni et al. 2009). This type of pottery was produced at different sites using eluvial or colluvial deposits in a carbonatic area tempered with calcite, probably of speleothemic origin. The strong similarities in technological processes at different sites, including Scaloria Cave, confirm a large network of middle-distance exchanges of formal and technological production techniques between many Middle/Late Neolithic communities, located in different geographical areas of southeast Italy. LA-ICP-MS analyses of calcite inclusions, including samples from Scaloria, are still underway (Eramo et al. 2009) and seem to be a promising way of identifying the provenance of these ceramic vessels.

The Middle Neolithic fabrics QC, QV, and QM were widespread in southern Italian Neolithic sites during the fifth millennium BCE (Laviano and Muntoni 2006; Muntoni and Laviano 2008) and show homogeneous formal and technical features. The volcanic rock fragments and the chert that characterize the QV and QC fabrics, and are also attested in some Middle Neolithic samples from the Masseria Candelaro village (Cassano et al. 2004:fig. 6.77), suggest the use of alluvial deposits as raw material, with a significant elutriation as inferred from its very fine texture. Petrological data from QM fabrics fit very well with those of the marine Plio-Pleistocene silty clay (Argille Subappennine) that crops out along the western edge of the Tavoliere, at great distances from the site (up to 40 km from Scaloria). The systematic exploitation of Plio-Pleistocenic silty clays, including at sites where they could be considered as non-local materials, has been recently determined for many Apulian Middle Neolithic sites. Due to the great geochemical homogeneity of the Plio-Pleistocenic Apulian clays, we cannot identify the production sites of these samples, which can therefore be generally considered to be non-local products. From our data, we can only exclude the possibility that QM pots could derive from long-distance trade from areas outside the Tavoliere (Boschian et al. 2011).

As far as pigments are concerned, our results allow us to deduce the use of a pigment composed of a mix of clay minerals and iron oxides and hydroxides for producing the color red. This could easily be derived from terra rossa deposits outcropping largely in the Gargano and Murge areas. The pigment used for black is composed of a mix of clay minerals, manganese, and iron oxides or hydroxides. Naturally occurring manganese oxides, such as pyrolusite (MnO_2), are reported as small deposits or manganese-bearing nodules in different geological formations in Apulia (Balenzano et al. 1999; Dell'Anna and Laviano 1987:316). Our results

concur with previous analyses carried out on Early and Middle Neolithic painted pottery from southern Italy (Angeli et al. 2007; Colombo and Boschian 2009; Mannoni 1980).

Riassunto

Si presentano i risultati delle analisi archeometriche condotte, presso il Dipartimento di Scienze della Terra e Geoambientali dell'Università degli Studi di Bari 'Aldo Moro', su 32 campioni di ceramica neolitica provenienti da Grotta Scaloria e selezionati su base tipologica e cronologica tra i materiali delle ricerche del 1905 e del 1978–1979. I campioni, analizzati in microscopia ottica su sezione sottile, sono risultati da un punto di vista petrografico piuttosto disomogenei e sono stati distinti 10 gruppi su base composizionale e granulometrica, da correlare a diversità di provenienza delle materie prime e/o di tecnologia di manifattura. I campioni di intonaco di capanna sono compatibili con la terra rossa campionata nella grotta, ma differiscono dai frammenti ceramici analizzati. Questi ultimi condividono una matrice argilloso-calcarea confrontabile con i depositi alluvionali dell'area del Tavoliere e sono riconducibili ad altri casi di studio documentati nell'area. In alcuni casi, la presenza di bioclasti e clasti di calcite speleotemica dimostrano l'aggiunta intenzionale di degrassante nell'impasto argilloso. Le analisi al microscopio elettronico a scansione (SEM/EDS) dei pigmenti presenti sulle ceramiche dipinte hanno permesso di riconoscere una comune base di minerali argillosi miscelata con ematite e goethite per il rosso e con magnetite e ossidi di manganese per il nero.

5.7. Scaloria Cave Ceramics in Museo Archeologico Nazionale, Taranto: The Quagliati and Drago Collection

By Mariantonia Gorgoglione, Eugenia Isetti, and Antonella Traverso[1]

Introduction

This catalogue describes ceramics from Scaloria Cave recovered first by Superintendent of Apulian Antiquities Quintino Quagliati (1931) and after his sad death, by Superintendent of Apulian Antiquities Ciro Drago (1936). While the rest of Chapter 5 describes the pottery recovered in Tiné's research in the Lower Cave in the 1960s and 1970s and in the Gimbutas-Tiné excavations in the Upper Cave in 1978–1979, an important group of pottery collected during Quagliati's and Drago's work at the cave resides in the Museo Archaeologico Nazionale in Taranto.

Quagliati's excavations of 1931 are described in Chapter 2 and in Appendix 1 (online). In the "Camerone Quagliati" (Upper Chamber), he found a tightly flexed adult along with pottery, stone axes, and tools as described in his posthumously published *La Puglia Preistorica* (Quagliati 1936). Drago's excavation took place 80 m from the entrance, in the same chamber as Quagliati's. Among his finds were fragments he noted as belonging to the same vessel as that recovered by Quagliati (see 23030+53403 and 21939+53416: Figures 5.7.7. and 5.7.9). Drago excavated in two superimposed stratigraphic contexts (II and III), finding a few human bones, perhaps secondary depositions, but without find-spot identification. Excavating at a 20-cm depth and 20 m from the southwest side of the cave on July 27, 1936, he found the remains of a child aged 8 to 9 years, and on July 30, 1936, he found remains of two adults and two children, 2 and 6 years of age. These remains were analyzed in 1992 by Vito Scattarella of the Dipartimento di Biologia of the Università degli studi di Bari, in preparation for the prehistoric section of the Museo Nazionale di Taranto.

Drago noted that the pottery from Scaloria exhibited clear affinities with that found by Rellini in other Puglian sites and with finds from Occhiopinto Cave. The pottery also has affinities with painted panels in the Grotta dei Cervi di Porto Badisco; and the anthropomorphic face on one vessel has affinities with an "amulet" from San Domenico (Taranto). The discovery of Early Neolithic styles such as Guadone and Masseria la Quercia show the long use of Grotta Scaloria and the great diversity of pottery styles present. Aside from obvious affinities with the villages around the Candelaro, the Scaloria style shares decorative elaboration with pottery from around the south and east of the Mediterranean. The elaborate contrast of red and black is similar to Serra d'Alto, and a miniature pyxis resembles objects from Danilo contexts across the Adriatic in Croatia.

In the following catalogue, inventory numbers all refer to the Quagliati excavation with the exception of six (41002, 53402, 53409, 53419, 53425, and 53442), which belong to the Drago excavation. The catalogue does not illustrate all of the relevant pottery but provides a comprehensive sample,[2] including vessels of shapes: closed, open, and miniature; handles or lugs

[1] We are grateful to Dr. Giorgia Aprile, University of Lecce, who helped compile the catalogue below in the course of completing the *Scuola di Specializzazione in Archeologia, Università degli Studi di Lecce* and all the staff of the Soprintendenza per i Beni Archeologici della Puglia, Taranto, including Giuseppe Bagordo, Michele Brianza, Dr. Gemma Russo, Gianfranco Moscato, Piera Balbo, Vito Bozza, and Egidio Colella.

[2] A few other notable pieces not illustrated in this catalogue: 21945: Raised strap handle with a zoomorphic plastic decoration with elongated ears; red-painted band crosses the strap longitudinally on both faces. 21826: Hemispherical bowl: exterior: red paint of garland motifs on body; interior lip highlighted with a red band; interior: pale red garland motifs and vertical lines. 21889: Vase fragment with cylindrical neck; exterior: red angular motifs contained between two stripes; on the base, thin chevrons painted in negative. 21943: Necked vase with protuberances beneath the rim (neck diameter 11 cm); exterior: rectilinear motifs bordered by bands of brown lines. 23107: Cup fragment (maximum diameter 6 cm); exterior: red painted design of a wide band filled with cross-hatching, originating from a thin line below the rim.

vertical or horizontally placed; surface decoration impressed, incised, and painted; and includes several reconstructed examples. Note that the Quagliati collections contain a few reconstructed cups and pots and a few pieces of pottery attributable to the Eneolithic and the Bronze Age, although none are illustrated here. However, such recovery suggests that there may have been small areas of an uppermost stratum (removed by Quagliati in his work) which indicate entry/use of the cave after the Neolithic.

Catalogue of Pottery Finds from Scaloria Cave in the Taranto Museum

(For comparanda, refer to figures in Chapter 5.1.)

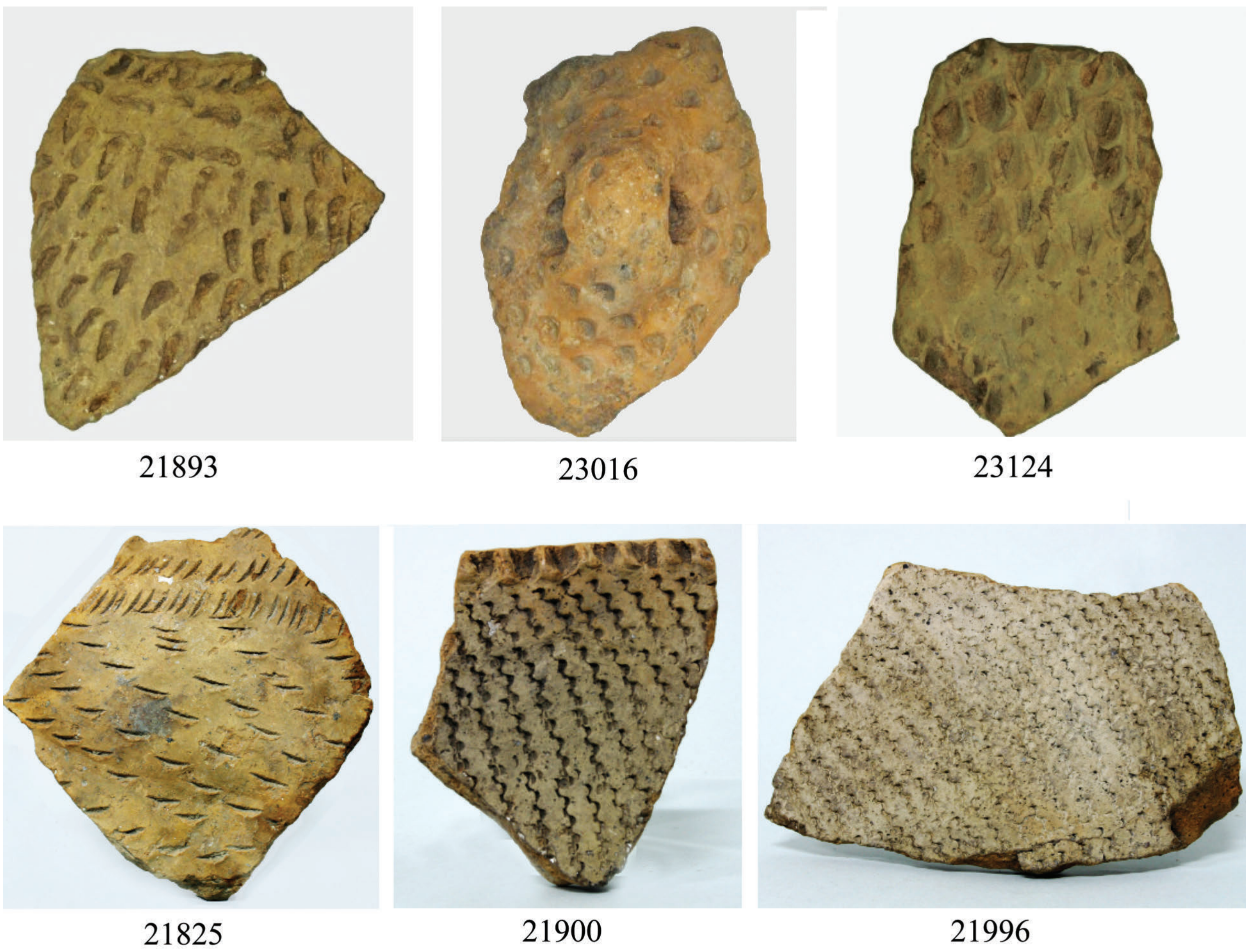


Fig. 5.7.1. Impressed and incised ware.

21893: Fragment of a closed form (body with attached neck?); exterior: deep tool marks in teardrop form over entire surface with variable orientations; probably made with an elliptical point (see Natali 2009); neck attachment marked with two oblique rows of same kind of impressions.

23016: Fragment of body and handle of closed vessel, pitcher, jar, or vase (*orcio*) (10 cm wide, 15 cm high, 1.3 cm thick); decoration: impressions made by random pattern of dragged fingermarks (see Natali 2004) covering entire surface.

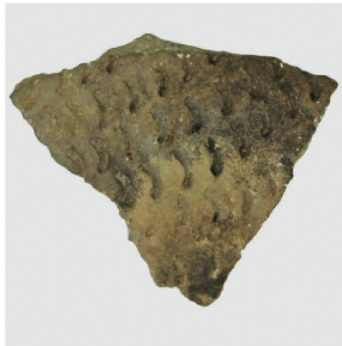
23124: Body fragment of large container; randomly patterned finger impressions, both pinched and dragged across entire surface.

21825: Body fragment of a pot (*olla); randomly* patterned linear marks made with a cardium shell cover surface.

21900: Pithos *(dolium)* fragment (rim diameter 23 cm); exterior: slanting, subparallel linear impressions made with a cardium shell, covering entire surface in an organized way.

21996: Body fragment of a pithos (*dolium*) (18 cm wide by 10 cm high, 1.3 cm thick); linear impressions made with a cardium shell cover entire carefully smoothed and burnished surface in an organized way.

23122



23045

23116

23018

23019

21835

139392

23100

Fig. 5.7.2. Impressed and incised ware.

23122: Body fragment of large container (7 cm wide, 11.5 cm high, 1.5 cm thick); decoration: lines of nail-marked impressions alternating with lines of drag marks.

23045: Body fragment of large container; decoration: impressed, curved tool marks arranged in subparallel rows.

23116: Necked vase fragment(?) (11 cm wide, 1.1 cm thick, rim diameter 20 cm); exterior: impressed pairs of opposed nail marks; on rim: parallel slanting nail marks; interior: carefully burnished.

23018: Body fragment with tubular strap handle (12 cm wide, 9 cm high, 1 cm thick); decoration: linear impressions made with a cardium shell cover entire surface.

23019: Flask fragment with vertical strap handle (11 cm wide, 18 cm high, 1.5 cm thick); decoration: linear impressions made with bivalve and monovalve shells (cardium) cover entire surface.

21835: Body fragment of large container (10 cm wide, 7 cm high, 1.0 cm thick); impressed large rocker marks.

139392: Neck fragment (8 cm wide, 11 cm high, 0.8 cm thick, rim diameter 16.6 cm); decoration: surface covered with thin linear impressions made with a cardium shell, arranged in subparallel lines with cardial tick marks on rim.

23100: Body fragment of vessel (width 7 cm, height 6 cm, thickness 0.8 cm); semi-fine paste; exterior: triangle motif(?) densely filled with thin cardial impressions bordered by a burnished surface with possible traces of reddish slip.

21956

21957

Fig. 5.7.3. Impressed and incised ware.

21956: Fragment of body (width 5 cm, height 7 cm, thickness 0.6 cm). Incised decoration in a grid design.

21957: Fragment of body (8 cm wide, 8.5 cm high, 1.8 cm thick). Impressed decoration with a tool such as a cane or twig, covering entire surface in disorganized way.

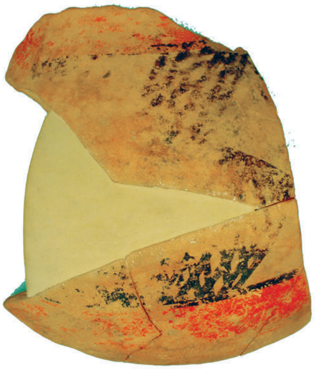
23010

41002

Fig. 5.7.4a. "Scaloria Alta" style.

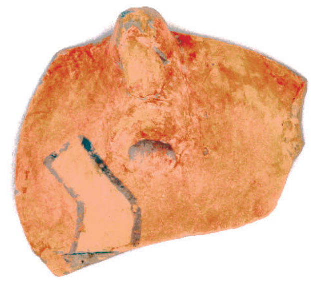
23010 (left, right): Cup with a distinct, short neck and a rounded, slightly everted lip, flattened base, and a horizontal strap handle forming a small circle. Exterior: a hook-shaped motif painted in red bordered in brown; handle is delimited with semicircular motifs painted in red. Interior: garland motifs in brown (see Figs. 5.1.8b:3B; 5.1.16:8B).

41002 (left, right): Fragment of pot (*olla*). Under outside lip, a thin line painted in red; under rim, vertical wavy bands painted in brown; body has an angular red motif cross-hatched in thin brown diagonal lines. Interior: extending downward from rim, plant-like motifs painted in red (see Figs. 5.1.12:1B; 5.1.16:7B).



53409

21940



23014

23094

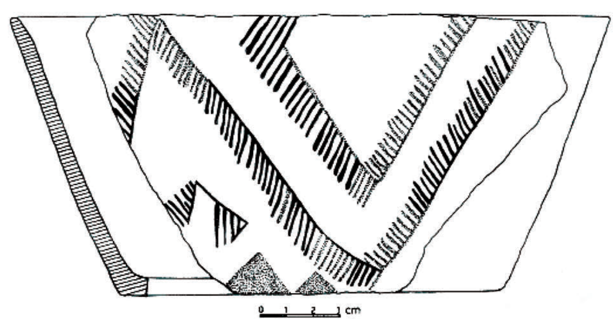
53409: Fragment of necked vessel. Exterior: on neck and on base, a red-painted decoration; on body, a hook-shaped motif filled with black cross-hatching and delimited by two lines in brown.

21940: Fragment of cup. Exterior: body painted in bright red with spiral and meandering motifs edged in brown; on horizontal handle, a brown cross-hatched motif which extends up to rim.

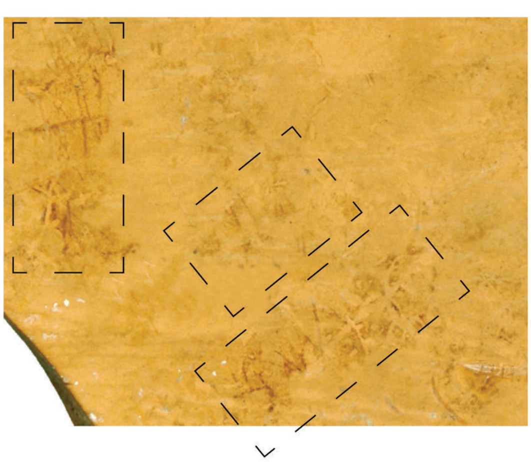
23014: Fragment of cup with tubular vertical handle with a large-beaked bird-shaped plastic decoration (Serra d'Alto–Scaloria Alta). Slipped in reddish-orange. Exterior: on body, a hook-shaped motif painted in white and edged in brown on an orange background.

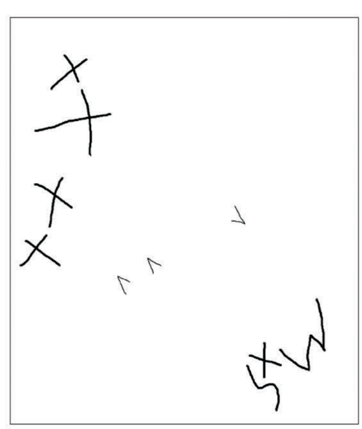
23094: Fragment of cup with short neck and fragment of horizontal handle. Exterior: on body, a step and spiral motif painted in purplish red and black.

Fig. 5.7.4b. "Scaloria Alta" style.



21941





21941: Troncoconic bowl. Exterior: negative decoration (in "*a risparmio*" style; see Chapter 5.1) with angular motifs painted in red and delimited with brown fringes. Interior: traces of dashed lines executed in negative (see Fig. 5.1.6:1A for shape and Fig. 5.1.10:1A.2 for fringe decoration).

Fig. 5.7.5. "Scaloria Bassa" style.

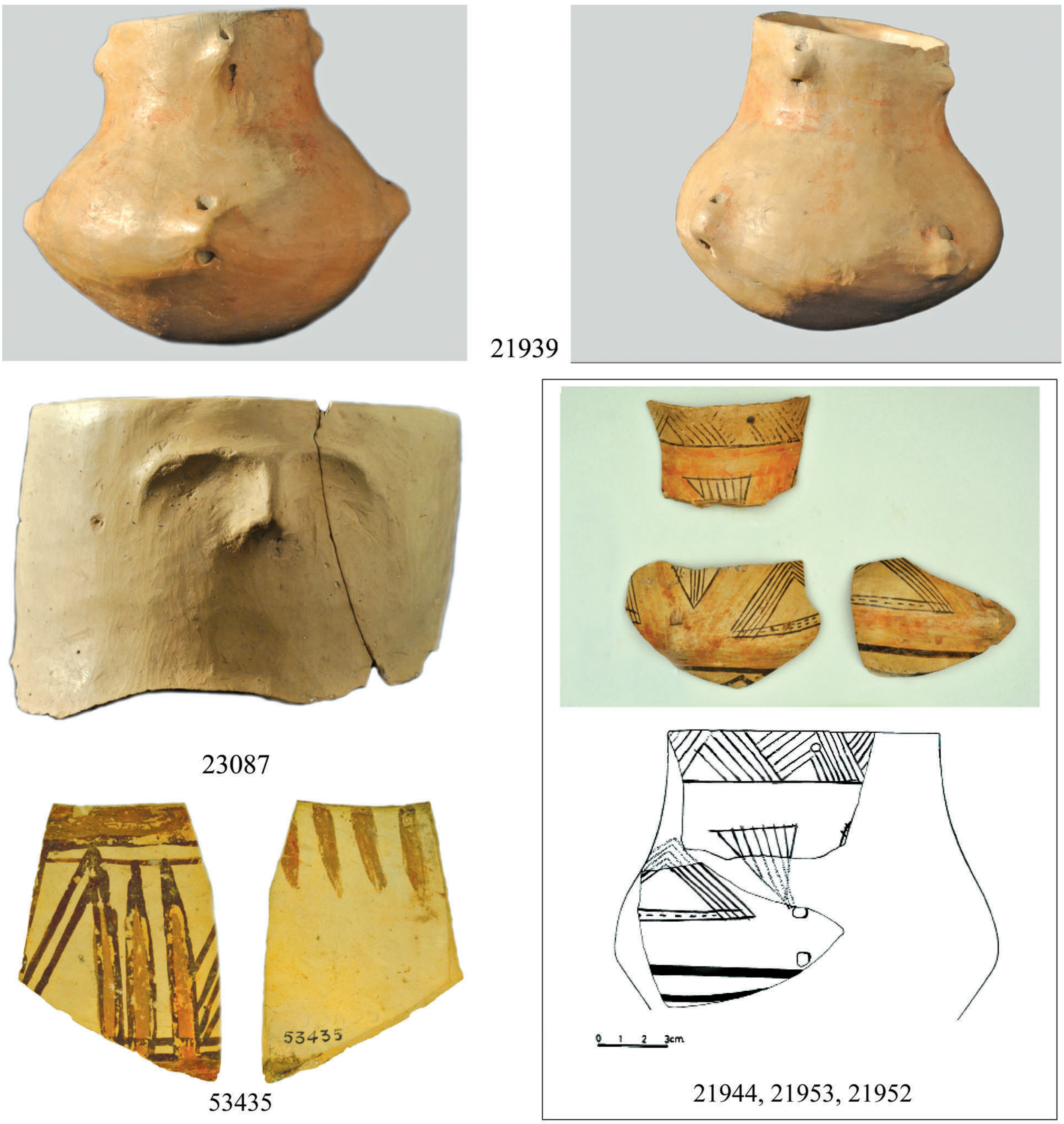


Fig. 5.7.6. "Scaloria Bassa" style.

21939 (left, right): Small flask with a cylindrical neck and a thin lip, globular body flattened toward flattish base. Four perforated attachments below rim. Painted decoration with negative technique. On the neck, a large red band from which extends a complex design in panels delimited by red-band edges with brown fringes; lower margin exhibits a brown line filled with small negative circles (hourglass-shaped motif). The panels frame small, vertically pierced protuberances (lugs), which are highlighted with painted decoration with a solar motif of a red circle and brown rays (see Fig. 5.1.9:1B.2 for shape minus lugs).

23087: Fragment of pot (*olla*) with handle decorated with anthropomorphic plastic decoration in a wide brow (minimum thickness 0.3–0.4 cm at base of neck; maximum thickness 0.5–0.7 cm at top of neck; compare to Fig. 5.2 for evidence of brow).

21944, 21953, 21952 (top, bottom): Three fragments of a necked flask with four perforated protuberances on shoulder and perforation below rim. Decoration in Cassano Ionio-Scaloria Bassa style: externally, below rim, bands of angular lines painted in brown; on body, triangular motifs in brown constituted by bands of parallel lines on their upper parts, and by a single strip filled with dots in their lower part (see Fig. 5.1.16:9B.2, 3).

53435 (left, right): Fragment of cup. Exterior: flame motif bordered in brown and filled in red. Interior: below rim, parallel diagonal bands painted in red.

Fig. 5.7.7. "Scaloria Bassa" style.

23002 (left, right): Fragment of bowl with a repair hole below rim. Exterior: vertical bands painted on body in brown. Interior: below rim, garland motifs with a hanging stripe painted in brown.

53415 (left, right): Fragment of bowl decorated in Scaloria Bassa-Cassano Ionio style: exterior, from rim downward, surface painted in red inside which is an angular motif filled with diagonal cross-hatching in brown. Interior: garland motifs with vertical hanging lines painted in red.

23111: Fragment of bowl. Interior: a plantlike red motif.

23112: Fragment of closed vessel (flask?) with handle attachment. Exterior: decorated with ray motifs surrounding handle attachment in red paint.

23030+53403: Two fragments of a large troncoconic bowl with a thinned rim (diameter 26–30 cm). Exterior: vertical bands painted in red from rim downward. Interior: garland motifs of concentric semicircles alternating with semicircles painted in red to form a garland motif below rim. On lower part there are traces of painted bands. Lip is highlighted in red (see Fig. 5.1.14:2A, B).

21830

53419

53408

23110

53442

Fig. 5.7.8a. "Scaloria Bassa" style.

21830 (left, right): Fragment of large bowl with a vertical strap handle and thinned rim. Exterior: a large red vertical band extends from rim to cover handle. Interior: extending from rim, garland motif of concentric semicircles flanked by red semicircles.

53419 (left, right): Fragment of bowl (diameter 18–20 cm). Exterior: base has very faint black painted decoration with nested triangles, and traces of red below rim. Interior: painted red motif of bands of opposed lines (Fig. 5.1.14:5F).

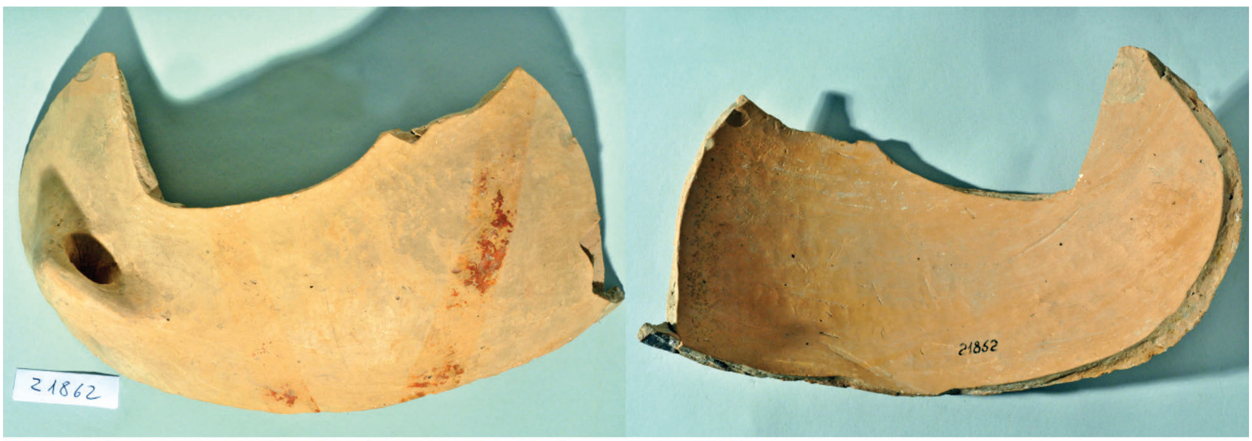
53408: Fragment of flask with attachment for horizontal ring handle. On neck is a thickening possibly attributable to presence of a small perforated protuberance. Exterior: on body, a motif of panels filled with cross-hatching in red and of bands of diagonal lines which depart from a horizontal line; decoration does not continue to handle.

23110 (left, right): Fragment of a flask (7–8 cm). Exterior: thin subvertical bands painted in red extending downward from rim. Interior: a motif of red diagonal bands.

53442: Fragment of closed vessel. Exterior: decoration has drop motifs painted in red and traces of a filled circular design.

23114

23001



21862

Fig. 5.7.8b. "Scaloria Bassa" style.

23114: Fragment of closed vessel. Exterior: red painted decoration with a curvilinear motif filled with dashed hatching.

23001: Fragment of a flask with ring handle; exterior: painted oval red decoration covers handle.

21862 (left, right): Fragment of a flask with a horizontal ring handle coming to a point and traces of another handle (diameter 40 cm). Exterior: broad chevrons decorated in red.

21939+53416

Fig. 5.7.9. "Scaloria Bassa" style.

21939+53416: Flask with vertically pierced ring handle coming to a peak and four perforations at neck attachment. Exterior: angular design painted in red inside of which are ovals surrounding four handles (see Fig. 5.1.4:A3 minus handle).

Fig. 5.7.10. "Masseria la Quercia" style.

21846: Necked vessel. Exterior: just below rim, painted motif in brown made of two small concentric circles; on neck, bands of lines in a chevron alternating with a vertical band filled with cross-hatching.

21847: Fragment of cup. Exterior: on body, a chevron crossed with a vertical zigzag painted in red; a strip of lines arranged in vertical chevrons is below handle.

21906: Fragment of bowl. Exterior: on rim, simple diagonal lines carried out in negative *a risparmio* technique on a reddish background; on body incised cross-hatching on a brown background. Interior (not illustrated): *a risparmio* decoration in triangular design, partly solid, partly hatched.

Fig. 5.7.11. Miniature vessels, "Danilo" style and unclassifiable pieces.

21920: Shallow dish. Interior: a central plastic applique in a bifacial zoomorphic form with an incision at height of muzzle.

21836: Miniature pot (*olla*) with short neck, two perforated handles made of circular flattened appliques. Four small holes below rim, fine paste. Traces of red overpainting on surface.

23074: Miniature cup in coarse pottery.

21833 (left, center, right): Miniature necked vase. Coarse paste rich in small calcareous inclusions, intensely exposed to fire. Four perforated protuberances (lugs) on side and two small perforations immediately below rim. Exterior: on base, incised decoration of parallel slanting lines.


21918


21913

Fig. 5.7.12. "Serra d'Alto-Diana" style.

21918 (left, right): Fragment of Serra d'Alto cup with plastic zoomorphic handle in form of a stylized bird with a hollow spiral body. On rim, fine diagonal tick marks; below them, light horizontal grooves which distinguish neck from body.

21913 (left, right, below): Small pot (*olla)* with lightly flattened, globular body with handle of folded clay (bow?); closed mouth, flattened rim, semi-purified beige figulina paste.

Fig. 5.7.13. "Serra d'Alto-Scaloria Alta" styles.

23032 (left, right): Fragment of cup with short neck. Exterior: body has brown painted decoration with meander design flanked by spiral design. The meander has vertices and center highlighted in brown; small brown dots are inside and outside design. A thin painted brown line distinguishes body from neck. Interior: squares painted in brown.

21841: Pintadera. Semi-fine paste, gray color due to fire exposure. Design of nested meanders, handle fractured.

21861: Fragment of bowl with spool handle (*rocchetto*), slightly lower in center. Exterior: below rim, a band of subrectangular panels with zoomorphic motifs painted in brown squares; at rounded carination, faded brown decoration with a design of bands filled with triangles; on handle. a design of a butterfly painted in brown. Traces of decoration on inside of lip.

23088 (left, right): Globular pot (*olla*) with a small neck, Scaloria Alta and Serra d'Alto styles. Exterior: brown faded design, of Serra d'Alto type; meander-shaped design distributed on globular body, with small spaces filled with brown.

21916 (left, right): Fragment of rim with elbow-shaped handle decorated with two small circular appliques on highest point (probably a zoomorphic motif). Traces of red painting.

21832

53425

21828 21946 23035

Fig. 5.7.14. "Passo di Corvo" style.

21832 (left, right): Fragment of pot (*olla*). Exterior: body has an angular design painted in red.

53425: Fragment of jug (rim diameter 10–12 cm). Exterior: red-painted diamond design.

21828: Fragment of hemispherical bowl with three perforations (two on rim, one below rim, diameter 24–25 cm). Exterior: from rim down, semicircles painted in red; on base, traces of a solid red circle (see Figs. 5.1.7:2A, 5.1.14:3C).

21946: Fragment of jug (diameter 10 cm). Exterior: red painted decoration of garlands and vertical stripes.

23035: Fragment of flask. Exterior: at neck, a red-painted band; on body, a design of diamonds painted in red.

23095

Fig. 5.7.15. "Passo di Corvo" style.

23095 (left, right): Fragment of shallow dish with two repair holes on base. Exterior: body with angular bands painted in red. Interior: just below rim, a triangular motif painted in red; rim highlighted in red.

Chapter 6

Material Culture II. Stone Tools and Artifacts of Bone and Shell

6.1. The Lithic Industry of the 1978 Excavation Campaign

Cecilia Conati Barbaro

Introduction

Lithics recovered during the 1978 excavations at Grotta Scaloria consist of 2,636 pieces: 428 were found in trenches excavated in the inner part of the cave; 2,189 come from areas excavated outside the cave; and 19 pieces are of unknown provenance. We also examined a few pieces (26) marked as "1967 excavation—area A." The main problem with this stone assemblage is the lack of stratigraphic information, which strongly limits the following interpretation of the data for all areas of the cave.

Outside the cave, lithics were present in areas 2 through 7. According to the Winn and Shimabuku preliminary report (1980; Appendix 2 [online]),[1] material from area 2 could be divided into three stratigraphic levels—I, II, and III—encompassing 24 excavated levels of 10 cm each (maximum excavated depth 240 cm). Their chronological and cultural links are unclear, requiring comparison with the results of pottery analysis. A few pieces have no specific area references ("between the rocks," "east pile," "northern pile").

According to Winn and Shimabuku, the cave interior (referred to throughout this chapter as "inside the cave") had been disturbed by grave robbers. Trenches 1, 2, and 3 in the cemetery area were explored in 1978, following artificial levels. Some burials were recovered, but there are no clear indications of which lithic elements belong to which burial. The report only mentions the presence of some pieces (e.g., big blades, or fragments of them) near or below the skeletons. Moreover, Winn and Shimabuku report the presence of ritual depositions of bones (animal vertebrae) associated with Campignian tools and/or big blades. In this case, likewise, we cannot state which of the Campignian tools or blades were part of these contexts.

Raw Material and Preservation

The following observations concern the entire 1978 lithic assemblage, there being no remarkable differences between the contexts of "inside" and "outside" the cave.

Flint is the most commonly used raw material: a few artifacts were manufactured on flint pebbles probably collected in the nearby river terraces, while the majority were produced with high-quality flint of different colors and textures. This material is not strictly local, as it comes from the mine sources of the Gargano promontory. There is one residual core and a blade made of obsidian recovered outside the cave (area 7 level 10, and area 2 level 6).

Most artifacts feature different degrees of patina: there are a few pieces with a strong white patina and/or smoothed edges, which may indicate they are older than

[1] Appendices are available online at www.dig.ucla.edu.

others. The diverse states of preservation could be related to postdepositional processes that affected the outer and inner parts of the cave. Most of the material also shows damaged edges as a consequence of inadequate storage conditions after the excavation. The scarcity of complete elements did not allow us to proceed with a typometric analysis, as the collection was not considered an adequate statistical sample. We cannot therefore verify whether the dimensions for blanks were standard.

Although some minor differences can be noted within the lithic complex, we observed a homogeneous distribution of technological elements both outside and inside the cave (Table 6.1.1).

Because of the disturbed nature of the deposit and the lack of stratigraphic information, our analysis relied mainly on a typological approach, with some technological observations. However, we consider this assemblage inadequate for functional analysis. We prefer to treat the two areas, inside and outside, separately, comparing the results in the final discussion.

OUTSIDE THE CAVE

The lithic material recovered is more abundant outside the cave than in the inner trenches. It consists of 2,189 pieces, which include 1,964 debitage elements, 53 cores/residual cores, and 172 tools (Table 6.1.2).

Cores

Cores are rare, often being residual cores and core fragments; most of the cores are made out of local flint pebbles, while only a small fraction is of Gargano flint. There is also one residual core for bladelets made of obsidian. Cores from local flint feature simple debitage patterns for flake production, although there are five residual cores for bladelets. The most common type is the single platform core, but there are also a few other core types, such as opposed platform and multiple platform. The few cores of non-local raw material are too fragmented for further analysis.

Debitage

All elements of core exploitation are present, from shaping-out phases to full debitage. The early-stage core preparation and primary flakes are mainly related to local flint pebbles, while the full debitage ones are mostly of Gargano flint. A very small number of full debitage elements, such as tertiary flakes and blades,

Table 6.1.1. Lithic industry from 1978 excavation

	Outside		Inside	
	n	%	n	%
Core	21	0.96	5	1.17
Fragment/residual core	32	1.46	10	2.34
Early-stage core preparation	10	0.46	1	0.23
Primary flake	55	2.51	13	3.04
II flake	128	5.84	33	7.71
III flake	797	36.38	133	31.07
Laminar flake	50	2.28	13	3.04
I blade	3	0.14	1	0.23
II blade	22	1.00	10	2.34
III blades/bladelets	323	14.74	109	25.47
Pebble	21	0.96	6	1.40
Pebble segment	33	1.51	6	1.40
Crest	3	0.14	2	0.47
Core trimming elements	34	1.55	8	1.87
Core tablet	2	0.09	1	0.23
Tools	172	7.94	58	13.55
Burin spalls	36	1.64	1	0.23
Microburins	1	0.05	0	0.00
Chips	258	11.78	7	1.64
Chunks	188	8.58	11	2.57
Total	2,189	100.00	428	100.00

Table 6.1.2. Outside the cave: Lithic material distribution by area

	2	3	4	5	6	7	East pile	Northern pile	S	PS	Total
Cores	19					2					21
Fragment/residual core	27			3	1	1					32
Early stage core preparation	10										10
I flake	46		3	1	3	1	1				55
II flake	110	3	6	2	2	4	1				128
III flake	658	2	33	19	14	52	10	2		7	797
Laminar flake	38		5	2	1	2		1		1	50
I blade	2			1							3
II blade	17	1	3		1						22
III blade	251	4	19	8	7	26		5		3	323
Pebble	18			1		2					21
Pebble segment	29			1		3					33
Crests	2		1								3
Core trimming elements	31	1		1		1					34
Core tablet	1					1					2
Tools	139		7	2	4	12		3	4	1	172
Burin spalls	29		3			4					36
Microburins	1										1
Chips	221		13	10	5	7	1			1	258
Chunks	173		3	2	3	1	6				188
Total	1,822	11	96	53	41	121	19	11	4	13	2,189

S = surface; PS = unknown provenance.

are unbroken; therefore it is impossible to proceed with typometric analysis. Flakes are of generally medium and small size, while blades are 10 to 12 cm long. The presence of a few crests, tablets, and core-trimming elements attests to the use of complex debitage patterning connected to blade production.

Burin spalls, together with burins, may suggest frequent maintenance of blades or tools made out of blades. Blades are mainly unretouched, some of them showing a glossy patina along one or both edges. According to the numerical distribution of lithics, area 2 is the richest among the different exposures. Winn and Shimabuku divided the trench 2 deposit into three layers (strata): 1 to 10 comprise level III; 11 to 15 level II; and 16 to 24 level I (Table 6.1.3).

As shown in Table 6.1.3, the upper layer, level III, is the richest in lithics, but it is also the most disturbed. For example, there are foliates that could be dated to the Late Neolithic together with more ancient artifacts (Paleolithic?). This may confirm Winn and Shimabuku's observation concerning the nature of the deposit. The assemblage does not exhibit any notable technological clustering. In sum, the various levels of area 2 have a wider range of categories, all quantitatively well represented. Despite this, a technological analysis of the material could be worthless, given the secondary origin of the deposits, which, according to Winn and Shimabuku, is the result of accumulation "through wash from intermittent occupation or abandonment of habitation" (1980:7) in level III, while in level II "the loose accumulation may indicate an abrupt, rapid deposit of material from collapse or an associated cleaning-up process" (1980:7). Only level I shows "clear habitation debris" (1980:7).

Tools

Tools total 172, representing 8 percent of the total number of lithics from outside the cave; 14 are composed tools and 188 are primary types (see Table 6.1.4). Blanks are almost exclusively made up of tertiary blades (62%). There are, however, some pieces on tertiary flakes (18%), while the others are on various blanks (II flakes, II blades, core). Almost half the retouched artifacts are broken, and many pieces show edge damage related to postdepositional phenomena.

Tool classification was carried out based on Laplace's typological list (1964), which is currently used for Italian Holocene industries (Figures 6.1.1 and 6.1.2; Table 6.1.5).

Table 6.1.3. Outside the cave, area 2: Lithic material distribution by layer

	Level III	Level II	Level I	Total
Core	**10**	**4**	**5**	**19**
Fragment/residual core	15	3	9	27
Early-stage core preparation	10			10
Primary flake	23	4	19	46
II flake	60	19	31	110
III flake	379	146	133	658
Laminar flake	19	12	7	38
I blade	1	1		2
II blade	10	1	6	17
III blade/lets	127	68	56	251
Pebble	10	1	7	18
Pebble segment	9	14	6	29
Crest	1	1		2
Core trimming elements	14	6	11	31
Core tablet			1	1
Tools	81	40	18	139
Burin spalls	21	5	3	29
Chips	116	38	67	221
Microburins		1		1
Chunks	127	18	28	173
Total	1,033	382	407	1,822

Table 6.1.4. Outside the cave: Type distribution by area

	2	4	5	6	7	Northern pile	S	PS	Total
Burins	28	1			2		1		32
End-scrapers	2								2
Truncations	25			1	2				28
Perforators	9								9
Backed points	2				1				3
Backed blades	2								2
Geometrics	23	2		1	2				28
Foliates	4								4
Points	1								1
Retouched blades	12	2	1		1	2			18
Blades with use-retouch (L0)	12	1				1	1		15
Side-scrapers	12				3				15
Denticulates	7		1		1		2		11
Campignian tools	15	1		2				1	19
Outils écaillées	1								1
Total	155	7	2	4	12	3	4	1	188

S = surface; PS = unknown provenance.

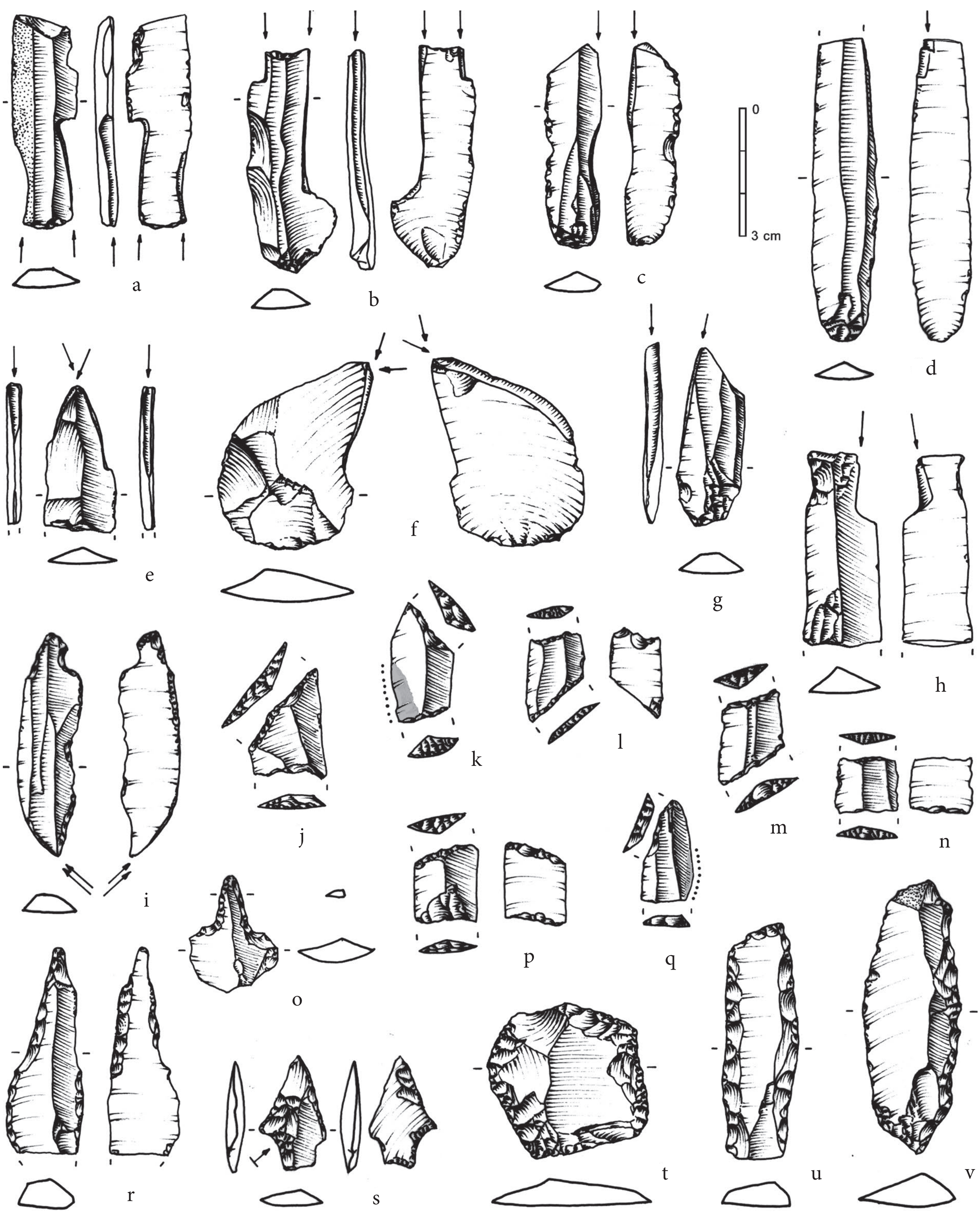


Fig. 6.1.1. Lithic industry: a–i, burins (a–c, e–g, outside area; d, h, inside area; I, unknown provenance); j–n, p, geometrics (j–l, p, inside area; m, n, outside area); q, u, truncations, inside area; o, r, v, perforators (o, r, outside area; v, inside area); s, arrowhead, outside area; t, end-scraper, inside area (drawings by Giovanni Carboni and Vanessa Forte).

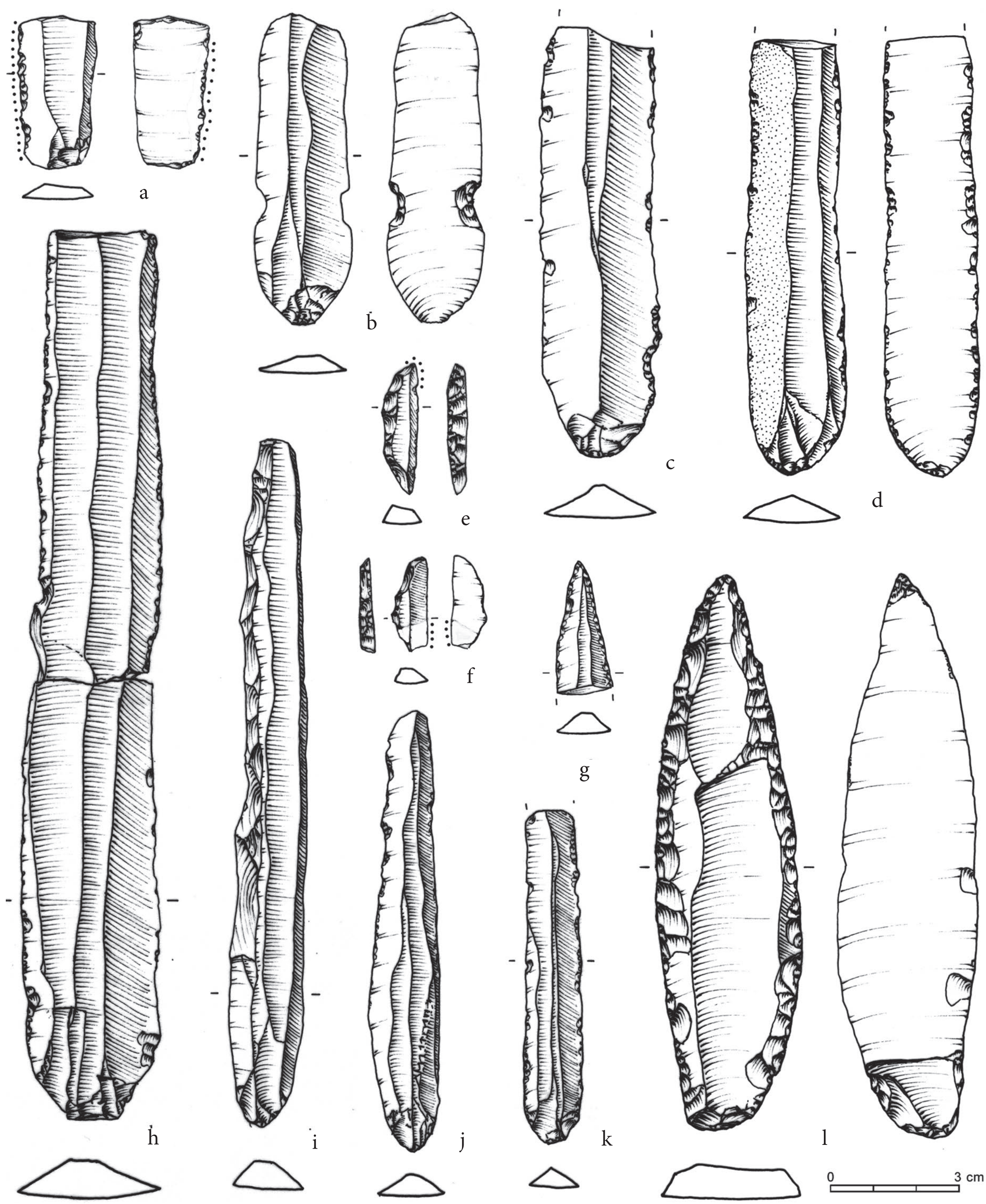


Fig. 6.1.2. Lithic industry: a, sickle element, outside area; b, c, notches (b, outside area, c, unknown provenance); d, h, j, k, retouched blades (d, outside area; h, k, unknown provenance; j, inside area); e, f, geometrics, outside area; g, backed point, outside area; i, crest; l, dagger (1967 excavations "area A") (drawings by Giovanni Carboni and Vanessa Forte).

Table 6.1.5. Outside the cave: elementary structure of lithic industry

		n	%
Burins		32	17.0
End-scrapers		2	1.1
	Truncations	28	14.9
	Perforators	9	4.8
Differentiated backed pieces	Backed points	3	1.6
	Backed blades	2	1.1
	Geometrics	28	14.9
Points		1	0.5
Foliates		4	2.1
	Retouched blades	18	9.6
Substratum	Side-scrapers	15	8.0
	Denticulates	11	5.9
Divers	Campignian tools	19	10.1
	Outils écaillées	1	0.5
Blades with use-retouch (L0)		15	8.0
Total		188	100.0

Table 6.1.6. Burins

	Area 2	Area 4	Area 7	S
B1 (simple burin, single facet)	3		1	
B1.B1 (opposed simple burins)	1			
B2 (simple burin, double facets straight)	1			
B3 (simple burin, double facets déjeté)	1			
B5 (burin on break)	8	1	1	
B5 + B5 (burin on break)	1			
B6 (burin on retouch)				1
B1 + T2 (simple burin + normal truncation)	1			
B3 + L1 (burin + side-scraper on blade with marginal retouch)	1			
B5 + L1 (burin on break + side-scraper on blade with marginal retouch)	1			
B5 + R1 (burin on break + side-scraper with marginal retouch)	1			
B6 + T2 (burin on retouch + normal truncation)	1			
B7 + T3 + L0 (burin on retouch, single facet déjeté + oblique truncation + blade with use retouch)	2			
B1 + L0 (simple burin + blade with use retouch)	1			
B5 + L0 (burin on break + blade with use retouch)	4			

S = surface.

Burins

Burins (see Table 6.1.6; Figure 6.1.1a–c, e–g) make up the major group of tool types. Blanks are mainly tertiary flakes, while three are secondary blades, two tertiary flakes, and one a primary flake. They are represented by a variety of types, most frequently burins with a single facet (B1). In some cases, there are two or more burin blows on the same piece (multiple, twins, or opposed) (Figure 6.1.1e, f), at times associated with other tools, such as truncations (Figure 6.1.1a, b) or side-scrapers. The type most well represented is the burin on break (B5) (Figure 6.1.1c, g): it is interesting to note the frequent association between this burin and the blank that is often a blade fragment, mainly the proximal half, in some cases with a simple marginal retouch. Burins on retouch (B6 and B7) are also present, although less frequent.

End-scrapers

There are only two end-scrapers, both from area 2: a frontal end-scraper (G1) from excavated level 8, and a carinated-nose end-scraper (G8) from excavated level

Table 6.1.7. Truncations

	Area 2	Area 6	Area 7
T2 (normal truncation)	9	1	
T2 + T2 (normal truncations)	1		
T3 (oblique truncation)	10		2
T3 + L1 (oblique truncation + side-scraper on blade with marginal retouch)	1		
B1 + T2 (simple burin + normal truncation)	1		
B6 + T2 (burin on retouch + normal truncation)	1		
B7 + T3 + L0 (burin on retouch, single facet déjeté + oblique truncation + blade with use-retouch)	2		

Table 6.1.8. Perforators

	Area 2
Bc1 (déjété perforator)	3
Bc2 (straight perforator)	6

Table 6.1.9. Backed pieces

	Area 2	Area 7
Pd1 (marginal backed point)	1	1
Pd4 (total backed point)	1	
Ld2 (backed blade)	2	

Table 6.1.10. Geometrics

	Area 2	Area 4	Area 6	Area 7
Gm1 (segment)	3			
Gm5 (scalene trapezium)	2			
Gm6 (isosceles trapezium)		1		
Gm7 (right-angled trapezium)	7			1
Gm8 (rhomboid)	10	1	1	1
Fragm Gm (fragment of a geometric)	1			

16. G1 is on a blade, while G8 is made up of a pebble segment and is probably older (Epipaleolithic).

Truncations

Only five pieces are intact (Table 6.1.7). Truncations are all on unretouched blades, except for one that has a partial simple retouch on the left edge and another that has a glossy patina along one edge. Truncation retouch is regular, mainly abrupt. One piece has an opposed truncation on the distal and proximal ends.

Perforators

Five perforators are on blades and four are on flakes (Table 6.1.8; Figure 6.1.1o, r). Three are of *déjeté* type, while six are straight perforators (Figure 6.1.1o, r). All feature deep abrupt retouch.

Backed Pieces

Three backed points (Figure 6.1.2g and Table 6.1.9) and two backed bladelets are part of this group; blanks are all blades or bladelets, in three cases unbroken. The retouch is always abrupt, direct, and continuous on the left edge in the two backed bladelets, and direct along both edges of the points, except one, which has a direct abrupt retouch on the right edge and an inverse retouch on the left edge.

Geometrics

Geometrics make up the second most well-represented group, both in quantity and in variety of types (Table 6.1.10). Rhomboids (Gm8) are by far the most numerous (Figure 6.1.1m, n), followed by right-angled trapeziums (Gm7), while there are fewer segments (Gm1) (Figure 6.1.2e, f) and other trapezium types (Gm5, Gm6). These tools come mainly from various excavated levels (1 to 20) of area 2; five others come from areas 4, 6, and 7. The most commonly used blanks are blades, but two trapeziums and one rhomboid are made on flakes. Geometrics often show some use-retouch on the unretouched edges, and one shows a glossy patina along one edge (Figure 6.1.2f). The mean dimensions for these types are 17 mm in length (ranging from 11 to 39 mm), 14 mm in width, and 3 mm in thickness.

Table 6.1.11. Retouched blades

	Area 2	Area 4	Area 5	Area 7	Northern pile	S
L0 (blade with use-retouch)	5	1			1	1
L1 (side-scraper on blade with marginal retouch)	6	2		1	1	
L2 (side-scraper on blade)	1		1		1	
L3 (carinated side-scraper on blade)						
L1 + L1 (side-scrapers on blade with marginal retouch)	1					
B3 + L1 (simple burin, double facets déjeté + side-scraper on blade with marginal retouch)	1					
B5 + L1(burin on break + side-scraper on blade with marginal retouch)	2					
B1 + L0 (simple burin+ blade with use-retouch)	1					
B5 + L0 (burin on break+ blade with use-retouch)	4					
B7 + T3 + L0 (burin on retouch, single facet déjeté + oblique truncation + blade with use-retouch)	2					

S = surface.

Table 6.1.12. Side-scrapers

	Area 2	Area 7
R2 (lateral side-scraper)	8	3
R3 (transversal side-scraper)	1	
R5 (carinated side-scraper)	1	
B5 + R1 (burin on break + side-scraper with marginal retouch)	1	
Fragm R (fragment of side-scraper)	1	

Table 6.1.13. Notches and denticulates *(Outils écaillées)*

	Area 2	Area 5	Area 7	S
D1 (notch)	2			
D2 (denticulated side-scraper)	4			
D5 (carinated notch)				1
D6 (carinated side-scraper)		1		
D8 (carinated end-scraper)	1			
D1+D1 (notches)			1	1
E1 (scaled piece)	1			

S = surface.

Points

Only one point on a bladelet with marginal bilateral retouch is present from area 2.

Foliates

Of the four foliated pieces from area 2, only one could be classified as a type. It is a tanged arrowhead (F7) with abrupt marginal retouch on the right edge and simple invasive partial retouch on the left edge (Figure 6.1.1s). The others are too fragmentary to be defined.

Retouched Blades

In this group, we include blades with infra-marginal use-retouch (L0), simple marginal retouch (L1) (Figure 6.1.2d), and invasive retouch (L2) (Table 6.1.11). Only five pieces are complete, ranging from 50 to 70 mm in length, 18 to 21 mm in width, and 5 to 7 mm in thickness. The retouch is often bilateral and continuous: four pieces show a glossy patina along one edge (Figure 6.1.2a).

Side-scrapers

Side-scrapers are on flakes and are divided into pieces with simple invasive retouch (R2), transversal types (R3), and carinated (R5) types (Table 6.1.12). One piece is heavily patinated and is probably an intrusive, more ancient tool.

Notches and Denticulates

These are all tools on flakes and are divided into flat (D1) or carinated notches (D5), pieces with simple denticulated retouch (D2), carinated side-scrapers (D6), and end-scrapers (D8) with denticulated retouch (Table 6.1.13). Two pieces have one notch on the left and one on the right edge (Figure 6.1.2b). There is only one *outil écaillée* (E1) on a flake with slight invasive scalariform on distal and proximal edges.

Campignian Tools

This group includes tools made with a bifacial flaking technique (Table 6.1.14). There are four small axes: one

Table 6.1.14. Campignian tools outside cave

	Area 2	Area 4	Area 6	PS
Small axes	4			
Small picks	9		1	
Ovaloid	2			
Tranchet			1	1
Fragmentary biface		1		

PS = unknown provenance.

Table 6.1.15. Inside the cave: Lithic material distribution by trench

	Tr1	Tr2	Tr3	Surface	"Tomb 6"	Total
Core		4	1			5
Fragment/residual core	5	5				10
Early-stage core preparation	1					1
Primary flake	6	7				13
II flake	12	19		2		33
III flake	29	98	5	1		133
Laminar flake	2	7	4			13
I blade		1				1
II blade	2	5	2	1		10
III blades/bladelets	31	69	8	1		109
Pebble	3	1	2			6
Pebble segment		5	1			6
Crest		2				2
Core trimming elements	4	1	3			8
Core tablet		1				1
Tools	18	31	8		1	58
Burin spalls		1				1
Microburins						
Chips	3	3	1			7
Chunks		11				11
Total	116	271	35	5	1	428

Tr = trench.

is biconvex and broken; the other three have a plano-convex section and show a covering retouch on the dorsal surface. They measure 54 × 41 × 15 mm, 46 × 33 × 10 mm, and 52 × 37 × 14 mm. The most well-represented tool is the small pick, which has a biconvex section and often a scalariform invasive retouch on dorsal and ventral surfaces. All but two pieces are broken: the complete ones measure 75 × 25 × 20 mm and 69 × 26 × 14 mm.

There are also two ovaloids: one is plano-convex in section, has flat invasive retouch on both dorsal and ventral surfaces, and measures 47 × 32 × 12 mm; the other is biconvex in section, has flat covering retouch on the dorsal surface and flat invasive retouch on the ventral surface, and measures 45 × 24 × 14 mm. Tranchets are represented by two pieces, one from area 6 and the other, broken, is of unknown provenance. The first one features a triangular shape, a biconvex section, a flat covering retouch on the dorsal surface, and scalariform invasive retouch on the ventral surface. It measures 82 × 44 × 14 mm. Finally, there is one small unidentifiable fragment of a bifacial tool.

Inside the Cave

A total of 428 flint artifacts were recovered during the 1978 excavation inside the cave: 355 are debitage elements, 15 are cores/residual cores, and 58 are tools (Table 6.1.15).

As mentioned above, three trenches of 2 × 2 m were explored, each containing "at least one burial" (Winn and Shimabuku 1980:8–12; see also discussion

Table 6.1.16. Inside the cave: tool distribution by trench

	Tr 1	Tr 2	Tr 3	"Tomb 6"	Total
Burins	3	4	1		8
End-scrapers	1				1
Truncations	2	7	1		10
Perforators		2			2
Geometrics	2	4	2		8
Points			1		1
Retouched blades	3	10			
Blades with use-retouch (L0)	5		3	1	
Side-scrapers	2	2			4
Denticulates	2	4			4
Campignian tools	2	4			6
Total	22	37	8	1	58

Tr = trench.

in Chapters 2.1 and 4.4, this volume). The association between burials and lithic elements is never quite clear in the report or from the indications on the bags; therefore, we could not connect any particular piece, such as big blades and/or tools (e.g., Campignian tools), to human remains or other ritual depositions, with a few exceptions (see Chapter 4.4, this volume). As shown in Table 6.1.1, percentage values are more or less equivalent in the two areas, although there are some exceptions: tools, for instance, are more numerous inside than outside the cave. Since the excavation extended less inside the cave and the deposit there was thinner than in the outside trenches, it is likely that the higher number of tools results from the presence of funerary and ritual features. The three trenches differ in the quantity of lithic elements: trench 2 is the richest, followed by trenches 1 and 3, although the various classes of elements show equal percentage values.

Cores

There are 5 cores and 10 residual or fragmented cores. All of them are made out of local flint pebbles and feature a simple debitage pattern, with one unprepared striking platform. The two cores have two opposed striking platforms. The majority of cores and core residues feature multiple flake negatives, while only three core fragments show bladelet negatives.

Debitage

Considering the lithic industry from inside the cave on the whole, we can observe that all debitage elements are represented, tertiary flakes and blades being the most abundant. There are only a few large tertiary flakes of Gargano flint: two of them were found "around the skull" in trench 1 level 8.

Tools

There are 58 tools (Figures 6.1.1–6.1.3, Tables 6.1.16 and 6.1.17): 11 are composed tools, and 69 primary types are represented. Blades are the most common blank (38 over 58 tools).

Burins

All burins are on blades (Table 6.1.18), some of which are retouched (Figure 6.1.1h). Break burins (B5) are the most well represented (Figure 6.1.1d).

End-scrapers

This single piece (G4, short frontal, trench 1) on a thin quadrangular flake features invasive retouch along all the edges (Figure 6.1.1t).

Truncations

Truncations are on blades that are often retouched along one edge (Table 6.1.19). One element shows a glossy patina on the right margin. Truncations are mainly oblique, with an abrupt, continuous retouch (Figure 6.1.1u). It is worth noting a marginal truncation on a big blade with infra-marginal retouch which measures 89 × 25 × 9 mm; this was recovered in trench

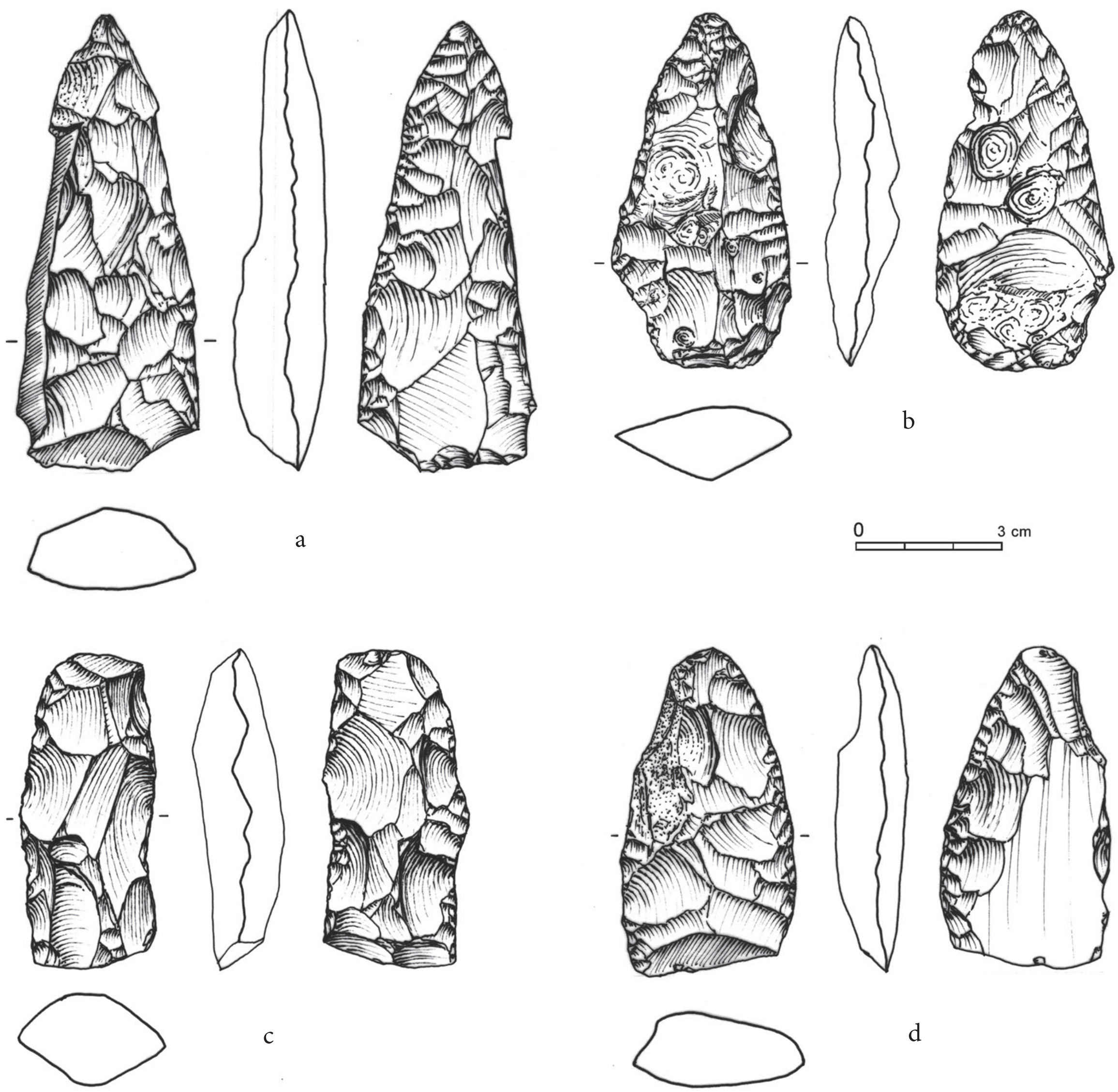


Fig. 6.1.3. Lithic industry: Campignian tools from inside area: a, d, tranchets; b, small ax; c, small pick (drawings by Giovanni Carboni and Vanessa Forte).

Table 6.1.17. Inside the cave: elementary structure of lithic industry

		n	%
Burins		8	11.6
End-scrapers		1	1.4
	Truncations	10	14.5
Differentiated backed pieces	Perforators	2	2.9
	Geometrics	8	11.6
Points		1	1.4
	Retouched blades	13	18.8
Substratum	Side-scrapers	4	5.8
	Denticulates	6	8.7
Diverse	Campignian tools	6	8.7
L0		10	14.5
Total		69	100.0

2 "cleaning underneath the skeleton." Unfortunately, we were unable to identify the pertinent burial, but this probably refers to the articulated skeleton from trench 2 (cf. Chapter 4.4).

Perforators

There is one déjeté perforator and one straight perforator on a blade with denticulated retouch along the right edge (Figure 6.1.1v; Table 6.1.20).

Geometrics

Geometrics are quite well represented in the inside trenches (Table 6.1.21). Right-angled trapezium (Gm7) is the most frequent type, obtained from a middle portion of a blade (Figure 6.1.1j–l); retouch is abrupt on both distal and proximal ends. Two elements show a glossy patina on dorsal and ventral sides (Figure 6.1.1k, q). Segments (Gm1) are made out of bladelets, and one of them has a glossy patina on the proximal edge. Rhomboids (Gm8) are also present (Figure 6.1.1p). Mean dimensions of geometrics are 18.5 mm in length, 14.3 mm in width, and 3.2 mm in thickness.

Points

There is only one point made out of a broken flake with simple, continuous retouch (trench 1).

Retouched Blades

Nine of the retouched blades (L0) (Figure 6.1.2j) feature an infra-marginal use-retouch along the left edge (6 pieces) or along both edges (3 pieces). One of these blades comes from "tomb 6" (without any trench reference), while two blades were recovered "around the skull" in trench 1, level 8. The other six retouched blades (L1) have partial or continuous retouch on one edge (mainly the left) or on both edges. All retouched blades are broken and are mainly preserved in their middle-proximal portions. Some are fragments of big blades made out of Gargano flint (Table 6.1.22).

Table 6.1.18. Burins

	Tr1	Tr2	Tr3
B5 (burin on break)	1	1	
B1+L1 (simple burin, single facet + side-scraper on blade with marginal retouch)	1		
B5 + L1 (burin on break + side-scraper on blade with marginal retouch)		2	
B3 + D1 (simple burin, double facets déjeté + notch)		1	
B5 + L0 (burin on break + blade with use-retouch)	1		1

Tr = trench.

Table 6.1.19. Truncations

	Tr 1	Tr 2	Tr 3
T1 (marginal truncation)	1	1	
T3 (oblique truncation)	1	3	1
T3 + L1 (oblique truncation + side-scraper on blade with marginal retouch)		2	
T3 + L2 (oblique truncation + side-scraper on blade)		1	

Tr = trench.

Table 6.1.20. Perforators

	Tr 2
Bc1 + L1 (déjété perforator + side-scraper on blade with marginal retouch)	1
Bc2 + D2 (straight perforator + denticulated side-scraper)	1

Tr = trench.

Table 6.1.21. Geometrics

	Tr 1	Tr 2	Tr 3
Gm1 (segment)	1	1	
Gm7 (right-angled trapezium)	1	2	1
Gm8 (rhomboid)		1	1

Tr = trench.

Table 6.1.22. Retouched blades

	Tr 1	Tr 2	Tr 3	"Tomb 6"
L1 (side-scraper on blade with marginal retouch)	2	4		
B1+ L1 (simple burin, single facet + side-scraper on blade with marginal retouch)	1			
B5 + L1 (burin on break + side-scraper on blade with marginal retouch)		2		
T3 + L1 (oblique truncation + side-scraper on blade with marginal retouch)		2		
T3 + L2 (oblique truncation + side-scraper on blade)		1		
Bc1 + L1 (déjété perforator + side-scraper on blade with marginal retouch)		1		
L0 (blade with use-retouch)	4		3	1
B5 + L0 (burin on break+ blade with use-retouch)	1		1	

Tr = trench.

Table 6.1.23. Side-scrapers

	Tr 1	Tr 2
R1 (side-scraper with marginal retouch)		1
R2 (lateral side-scraper)	2	1

Tr = trench.

Table 6.1.24. Denticulates

	Tr 2
D1 (notch)	2
D2 (denticulated side-scraper)	1
D1 + D1 (notches)	1
B3 + D1 (simple burin, double facets déjeté + notch)	1
Bc2 + D2 (straight perforator + denticulated side-scraper)	1

Tr = trench.

Table 6.1.25. Campignian tools inside cave

	Tr 1	Tr 2
Small axes		2
Tranchet	2	1
Small picks		1

Tr = trench.

Side-scrapers

All side-scrapers (Table 6.1.23) are on flakes with simple invasive retouch (R2) and, in one piece, with simple marginal retouch (R1). One (R2) shows a heavy patina, probably an older piece.

Denticulates

There are three notches on blades, one direct, one inverse, and the last a double specular notch on left and right edges (Table 6.1.24).

Campignian Tools

Six Campignian tools come from inside the cave (Table 6.1.25). One small ax has a biconvex section and flat invasive retouch on both ventral and dorsal faces; it measures 73 × 38 × 15 mm. The other small ax shows fire alteration, a biconvex section, and flat invasive retouch on ventral and dorsal surfaces (Figure 6.1.3b). The small pick has a biconvex section, invasive stepped retouch on both faces, and is broken at one end (Figure 6.1.3c). This is possibly the only Campignian tool that could be linked with a ritual deposition in a cavity of trench 2, found together with "three animal vertebrae, one big blade and a polished stone axe" (Winn and Shimabuku 1980:10, pl. XI: J; Appendix 2 [online]). One tranchet has a plano-convex section, invasive retouch on the dorsal face, and flat marginal retouch on the ventral face; it measures 65 × 37 × 16 mm (Figure 6.1.3d). One more tranchet from trench 1 has a biconvex section, covering retouch on the dorsal face, invasive retouch on the ventral face, and a burin blow on the left edge; it measures 93 × 37 × 17 mm (Figure 6.1.3a). The other tranchet comes from trench 2; this is a fragment with a plano-convex section, flat covering retouch on the dorsal face, and marginal retouch left on the ventral face.

Materials and Contexts of Area Inside the Cave

We tentatively tried to associate lithic elements with contexts of the three trenches excavated inside the cave. Unfortunately, indications on bags or on the lithic pieces are not always clear. Therefore, it is difficult to ascribe each element to a specific feature. If we divide the materials by trenches, following Winn and Shimabuku, in trench 1 we note inside a "pit" in level 5

the presence of two retouched blades, one with a single-facet burin blow, together with debitage elements. A few other debitage elements were recovered in a pit named "outside pit" in the same level. As previously stated, two retouched blades were found around a skull, which was "undisturbed" (level 8?) according to Winn and Shimabuku (1980:9). The rest of the material is distributed among different levels of the trench without any association to particular features.

With regard to trench 2 (Winn and Shimabuku 1980:10–11), the most remarkable feature is a complete burial, which we suppose to correspond to levels 11–13. "Around the skeleton" there were four tertiary blades, one tertiary flake, six pieces of debris, and two tools (a perforator and a denticulate). Associated "with the skeleton" were eight secondary flakes, seven tertiary flakes, one pebble segment, and four chunks. As "burial goods 40 cm from the skeleton," there was a tertiary blade; from the "cleaning underneath the skeleton" come three tertiary flakes, one laminar flake, two tertiary blades, and one truncation. We cannot consider the blade with infra-marginal retouch as coming from "tomb 6" together with these materials, because it is not clear if this complete burial corresponds with this feature; it is likely that "tomb 6" was an erroneous field identification.

Regarding trench 3 (Winn and Shimabuku 1980:11–12), the main structure is a circular pit that contains multiple secondary burials. Two tertiary flakes and one tertiary blade were recovered "around the skeleton," while one tertiary flake and one blade with infra-marginal retouch come from "cleaning the pit." As already mentioned, it was impossible to trace back the association between Campignian tools and the ritual depositions of animal vertebrae found inside some cavities "bordered by flat stones" (Winn and Shimabuku 1980:10) in trenches 1 and 2, except for the small pick from trench 2.

Tools of Unknown Provenance

Unfortunately, 19 tools have no indication of provenance (Table 6.1.26). These include three single-facet burins (B1)—two on retouched blades and one on a flake side-scraper. Two are break burins; one has a double opposed burin blow (Figure 6.1.1i); the other is associated with a déjeté perforator (Bc1). The truncation (T2) is on the proximal end of a retouched blade. Also among these tools are one backed point (Pd4) with abrupt inverse retouch on the left edge and direct, deep abrupt retouch on the right edge; one rhomboid (Gm8); and one denticulate on flake (D2). Retouched blades are the most numerous, either with infra-marginal (L0) (Figure 6.1.2k), marginal (L1), or deep (L2) retouch. Among these pieces, there is one big crested blade with infra-marginal retouch along the right edge (161 × 19 × 6 mm) (Figure 6.1.2i), and one half-proximal portion of a big blade with infra-marginal retouch (32 mm long, 8 mm thick) (Figure 6.1.2h). The blade with deep retouch (L2) has a glossy patina along the left dorsal edge.

Table 6.1.26. Tools of unknown provenance

Burins	B1 + L0	1
	B1 + L1	1
	B1 + R1 + D1	1
	B5 + B5	1
	B5 + Bc1	1
Truncations	T2 + L1	1
Backed points	PD4	1
Geometrics	Gm8	1
Retouched blades	L0	5
	L1	4
	L2	1
Denticulates	D2	1
Total		19

Materials from the 1967 Excavation

Of the 26 lithic elements marked as "1967 excavation—area A" (Table 6.1.27), 20 are debitage elements, 5 are hammers made out of local pebbles, and 1 is a flint dagger made from a big blade with deep stepped retouch along both edges and inverse partial flat invasive retouch on the tip (Figure 6.1.2:l). The dagger, which measures 130 × 34 × 10 mm, could be dated to the early Copper Age: similar tools are attested at Grotta Trinità di Ruffano (Lecce, southern Italy; Cremonesi 1978).

Concluding Remarks

In spite of the remarkable quantity of materials from the 1978 excavation at Grotta Scaloria, the lack of stratigraphic information prevented us from carrying out an integrated techno-typological and functional analysis. With regard to the trenches outside the cave, we prefer to treat the materials as a surface collection, given the disturbed condition of the deposit, as clearly

Table 6.1.27. Lithic material from 1967 excavation

	1967 area A	1967? Camerone sector C n.1 close to lake	Total
Primary flake	1		1
II flake	2		2
III flake	2	11	13
Laminar flake		1	1
III blade/bladelets		1	1
Core trimming elements		1	1
Tools	1		1
Burin spall		1	1
Hammers	5		5
Total	11	15	26

shown in the Winn and Shimabuku report. Therefore, an exhaustive technological study would not have been productive. Tools have been classified according to Laplace's typological list, to be compared with other coeval Neolithic industries. On the other hand, the amount of material recovered inside the cave is too small to be analyzed from a technological point of view. The presence of many different features, such as burials, pits, and ritual depositions, could have made for a very interesting lithic analysis. However, the lack of exact references between materials and features often made associations impossible to understand. In summary, only general observations could be provided.

The raw material is mainly from non-local sources, though it is not always possible to distinguish local flint of fluvial pebbles from exogenous flint from Gargano mines. Obsidian is very rare. The few cores recovered in both areas are all made out of local pebble flint. This may suggest either that cores of exogenous good-quality flint were exploited until complete depletion (there are only a few core residues of this raw material) or that the Gargano flint reached the site as a semi-finished or finished product (big blades, for example). The high fragmentation of the materials seems to confirm that the deposit, especially outside the cave, has been affected by remarkable postdepositional events.

As already mentioned, the percentage values of the various technological classes (cores, debitage) do not differ between the assemblages outside versus inside the cave, but tools are more numerous inside the cave (Figure 6.1.4). Blades are the preferred blank for tools in both assemblages: over 60 percent of tools are made from blades (Figure 6.1.5).

In order to compare the two areas of the site with other Neolithic industries, we have to consider the stone assemblage of Scaloria Cave on the whole. This means that, at least for the outside collection, we should not consider the chronological factor. As far as typology is concerned (Figure 6.1.6), burins reach high percentages in both areas (17% outside, 12% inside). Geometrics and truncations are well attested in the outside complex (15%): some could be classified as sickle elements, having a glossy patina on one edge (Figures 6.1.1k, q; 6.1.2a, f). In the inner trenches, the most well-represented tools are the retouched blades (19%), followed by truncations and blades with use retouch (14%); burins and geometrics occur with equal frequency (12%). Perforators are present in both areas, whereas backed points and blades are attested only in the outside assemblage. Side-scrapers and denticulates reach high values in both areas. Campignian tools are attested by different types in the outside as well as the inside assemblage (Figure 6.1.6).

We compared the lithic assemblage of Scaloria Cave with those of Masseria Candelaro (Conati Barbaro et al. 2004), Passo di Corvo (Ronchitelli 1983) in the Tavoliere region, and Catignano (Tozzi and Bagnone 2003) in the Abruzzi. These sites are mainly coeval to Scaloria Cave and have considerable stone assemblages both in quantity and quality. On the other hand, these sites are villages, and archaeological materials assume a different meaning in habitation or ritual/burial contexts. Because we believe that lithic industries are strongly influenced by functional and social factors associated with their sites (local tradition, individual skill, etc.), it seems appropriate to compare the assemblages only from a more general perspective.

All assemblages attest that good-quality flint was used for some tool types (e.g., burins, truncations, geometrics, long side-scrapers); these were manufactured

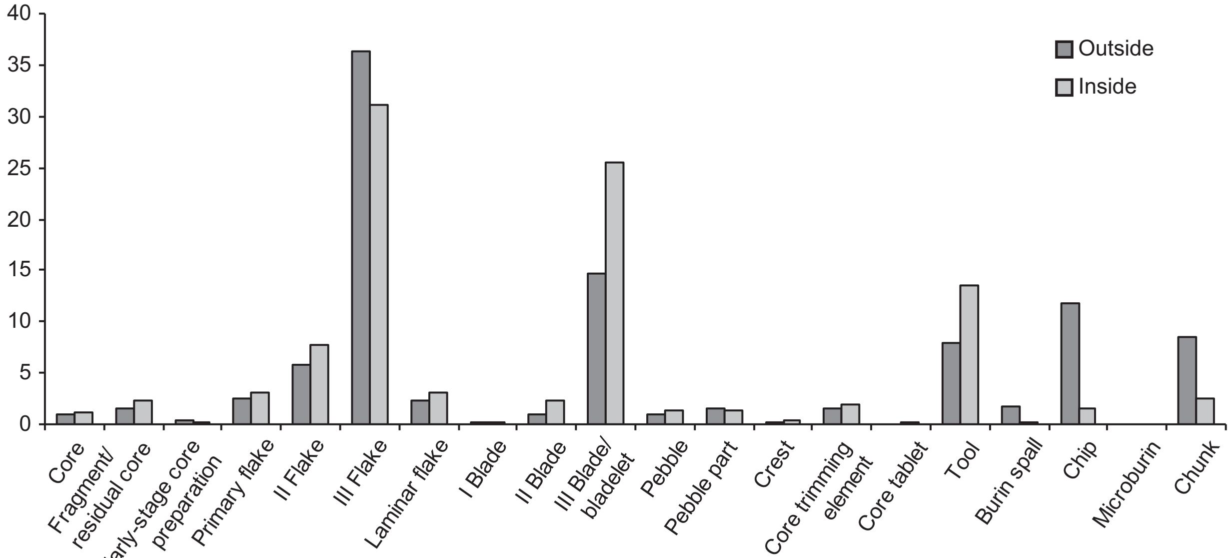


Fig. 6.1.4. Lithic industry composition.
Dark gray, materials from outside the cave; light gray, materials from inside the cave.

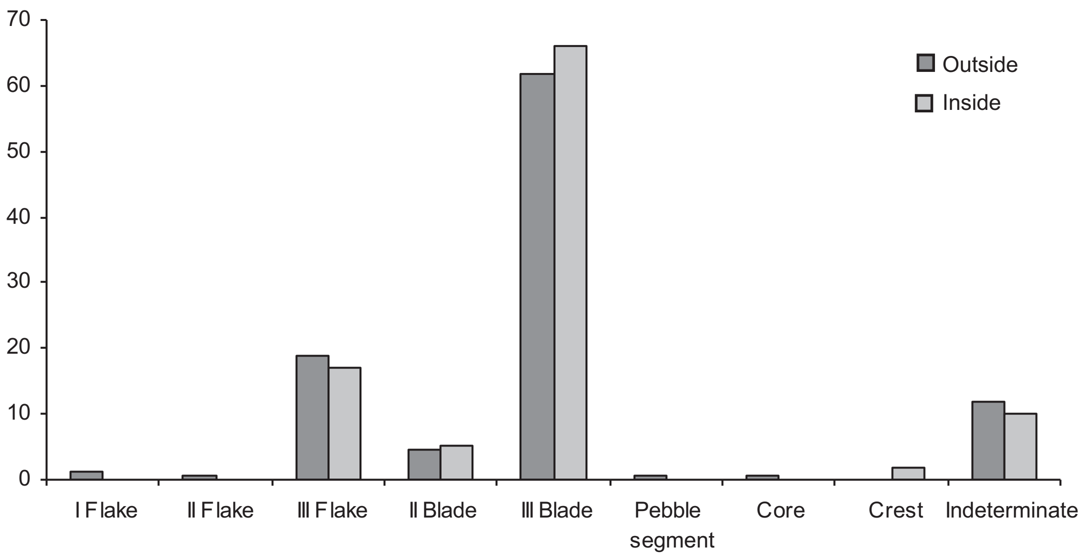


Fig. 6.1.5. Lithic industry: percentage ratio of tool blanks.

mainly on blades. Blades are versatile, all-purpose blanks, easily convertible into different kinds of tools. Local flint, instead, is predominantly employed for the production of flakes, which are sometimes retouched (e.g., denticulates, side-scrapers, and *outils écaillées*).

Blades are often used without retouch or with very marginal retouch. Edges are frequently modified by single or multiple burin blows, often when the blade is already broken (burin on break). This behavior is very common at all sites and may not be connected with the resharpening and maintenance of a blade tool: functional data about Candelaro burins show that traces of use wear are rare on these tools, suggesting that they could possibly be the result of either accidental fractures or of intentional breaks made to extract the blade from its handle (Lemorini 2004:341). Whole or fragmented blades are in evidence. These are hafted as single (e.g., perforators) or serial (e.g., geometrics, most of

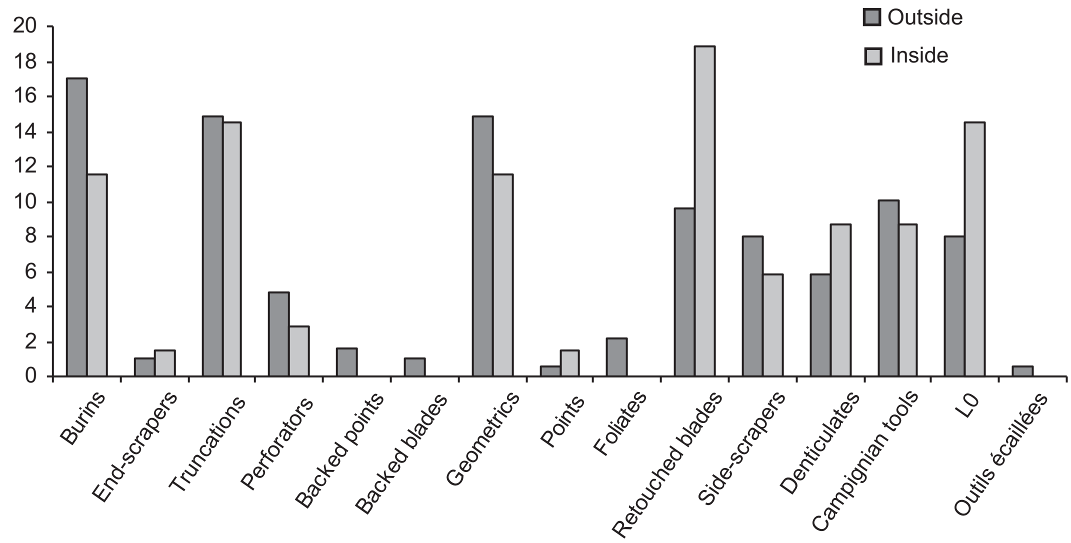


Fig. 6.1.6. Lithic industry: percentage ratio of tool types.

all trapezia) elements. Many tools show a glossy patina and were therefore linked to agricultural activities; but, as assumed for Candelaro, these typical peasants' tools sometimes may bear a non-utilitarian meaning (Conati Barbaro et al. 2004; Lemorini 2004). We believe that the remarkable number of these objects in Scaloria Cave cannot be connected only to the common activities of daily life.

Campignian tools of different types (small axes, tranchets, and small picks) are numerous at Scaloria, but not in the three villages. Our data are insufficient to determine whether this is related to functional reasons (specific activities held on site) or to ritual purposes (as suggested by the pit depositions inside the cave).

Riassunto

L'articolo analizza il complesso di materiali litici rinvenuto nelle trincee esterne ed interne alla Grotta Scaloria aperte nel corso della campagna di scavi del 1978. I fenomeni di alterazione del deposito descritti da Winn e Shimabuku (1980) hanno consentito di effettuare solo alcune limitate osservazioni di carattere tecnologico, mentre i materiali sono stati inquadrati dal punto di vista tipologico secondo il metodo Laplace. In generale si nota un utilizzo preferenziale di selce di buona qualità, verosimilmente di provenienza garganica, testimoniata soprattutto da lame, grandi lame e strumenti su lama (bulini, troncature, geometrici, raschiatoi lunghi). La selce da ciottolo, di probabile origine locale, è presente in misura minore ed è utilizzata per realizzare schegge e strumenti su scheggia (denticolati, raschiatoi).

Per quanto riguarda l'area esterna, il livello superiore è il più ricco, ma la presenza di elementi cronologicamente differenziati (Paleolitico, Neolitico finale) conferma i fenomeni di disturbo del deposito. I nuclei sono rari, spesso residuali o in frammenti e sono prevalentemente di selce da ciottolo. Sono rappresentate tutte le fasi di débitage, ma le fasi di messa in forma e prima lavorazione sono associate a selce da ciottolo. La presenza di alcune creste e ravvivamenti indica l'uso di uno schema di débitage complesso legato alla produzione di lame. I numerosi stacchi di bulino e bulini potrebbero suggerire frequenti attività di manutenzione delle lame o degli strumenti su lama. Le lame prevalgano e alcune mostrano trace di lustro lungo i margini. non ritoccate. Gli strumenti sono 172; i bulini sono i più rappresentati, seguiti dalle troncature e dai geometrici, dai raschiatoi lunghi e corti. Ben rappresentati sono anche gli strumenti campignani (accette, picchi, tranchets).

Per quanto riguarda l'area interna non è stato sempre possibile associare i manufatti a specifici contesti sepolcrali. La composizione del débitage rispecchia quanto osservato per l'area esterna, ma la quantità del complesso è minore. Le troncature sono gli strumenti più numerosi, seguiti dai geometrici e dai bulini.

Analizzando alcuni aspetti, è stato possibile evidenziare le notevoli affinità che il complesso litico di Grotta Scaloria mostra con complessi coevi del Tavoliere.

6.2. In Daily Use: The 1979 Assemblage of Chipped Stone

Ernestine S. Elster

Introduction: The Database and Methodology

The chipped stone collected from the Upper Chamber during the 1979 season was studied in 1980 in the Museo di Manfredonia, and much of that documentation was archived with Marija Gimbutas's Scaloria papers at OPUS, Pacifica Graduate Institute, Montecito, California.[1] I herewith report on that assemblage of 2,066 pieces (Table 6.2.1).[2] Conati Barbaro reports on the assemblage excavated in 1978; debitage was a significant component in both collections (see Chapter 6.1, this volume).[3]

The 1979 assemblage came from trenches 4–10 (plus extensions to trenches 5 and 8) and includes surface finds (cf. Chapter 2.1, Figure 2.1.23, this volume). The distribution of forms as recovered in the trenches (Table 6.2.2) indicates that forms from trench 5 most closely reflect the entire assemblage in terms of percentages. Trenches 5, 8, and 10 (the latter yielded many human skeletal remains; see Chapter 4, this volume) are further discussed below.

In 1980,[4] we used 100× magnification to identify manufacturing traces, retouch, and edge wear based on a coding system of attributes, variables, and values.[5] This methodology was earlier used with Neolithic assemblages from Greece and the Balkans (Elster 1976; Tringham 2003; Voytek 1995). Further analysis with the 30-plus-year-old data was undertaken at UCLA's Cotsen Institute of Archaeology, transferred for use with computer programs (e.g., Excel).[6] A series of cross-tabulations, histograms, and tables illustrate the distribution and covariation of variables, such as form by raw material, by trench, and so on; scattergrams illustrate tool dimensions. How much the Scaloria folk used the tool forms is evaluated by use (light, heavy, or intense)[7] and with raw material covariance. This documentation allowed me to offer inferences about the knappers' behavior with respect to raw materials, forms, and the quotidian use of the tools.

Trench Stratigraphy and Recovery

Excavation was in 10-cm levels (measured from each trench's datum point) adjusted when excavation revealed features (see Appendix 2 [online];[8] Winn and Shimabuku 1980). A master stratigraphy of the Upper Chamber excavation is missing; thus, we cannot correlate excavation levels between and among these trenches, although stratigraphy is described in individual trench daybooks. Conati Barbaro (Chapter 6.1, this volume) and I treat this assemblage as a single Neolithic

[1] My sincere thanks to the directors of the OPUS at Pacifica Graduate Institute, Montecito, California, for gracious assistance in accessing the 1980 Scaloria documentation from the Marija Gimbutas–Joseph Campbell Archive.

[2] Further thanks to Abhishek Goel, whose expertise and talent transformed this manuscript and its figures and tables into this chapter.

[3] Dr. Terisa Green, archaeologist, knapper, and lithic specialist, pointed out that excavation outdoors allows for easier detection of debitage; thus, although knapping likely took place both inside and outside the cave, the debitage collection probably reflects this "sunshine" effect.

[4] Sincere thanks to Nancy Bernard and Joan Schiele of Archaeological Associates, Greenwich, Connecticut, for their participation in the 1980 study season, Manfredonia.

[5] See Addendum, Scaloria Cave Attribute System.

[6] Sincere thanks to Charles Stanish, director, Cotsen Institute of Archaeology at UCLA, for space, equipment, and support during this final study period.

[7] Evaluation of intensity of use is based on microscopic examination of each tool's margins for evidence of edge wear and retouch; edge wear on one or two margins = light; edge wear on two margins and retouch = heavy; edge wear on three margins and/or retouch = intense use.

[8] Appendices are available online at www.dig.ucla.edu.

Table 6.2.1. Chipped stone recovery, 1979

	Upper Chamber	Outside	Debitage	Surface	Total
Quantity (n)	991	26	999	50	2066
% of total	47.97	1.26	48.35	2.42	100

Table 6.2.2. Cross-tabulations of form by trench (entire assemblage)

Form	Missing Information	Trench 4	Trench 5		Trench 6	Trench 8		Trench 9	Trench 10	Sur-face	Form totals	% of grand total
			(n)	(%)		(n)	(%)					
Missing information		—	1	0.15	—	—	—	—	—	1	2	0.19
Core/ microcore	1	—	40	6.11	—	21	7.12	—	—	—	62	5.81
RJ flake*	1	—	8	1.22	—	4	1.36	—	—	—	13	1.22
Blank	—	—	68	10.38	—	4	1.36	—	—	—	72	6.75
Blade	39	1	182	27.79	6	89	30.17	4	5	6	332	31.12
Bladelet	1	—	52	7.94	—	32	10.85	—	—	1	86	8.06
Flake	5	1	281	42.9	1	130	44.07	1	2	8	429	40.21
Trapezoidal Campignian	—	—	4	0.61	3	—	—	1	—	1	9	0.84
Circular Campignian	—	—	6	0.92	1	—	—	—	—	1	8	0.75
Triangular Campignian	2	—	7	1.07	3	—	—	2	1	3	18	1.69
Oval Campignian	2	—	6	0.92	8	2	0.68	—	—	5	23	2.16
Campignian	4	0	23	3.51	15	2	0.68	3	1	10	58	5.44
Burin spall	—	—	—	—	—	7	2.37	—	—	—	7	0.66
Point	—	—	—	—	—	6	2.03	—	—	—	6	0.56
Trench totals	51	2	655	—	22	295	—	8	8	26	1067	100
% of grand total	4.78	0.19	61.39	—	2.06	27.65	—	0.75	0.75	2.44	100	

* RJ flake is a rejuvenated flake—an identifiable piece struck from a flawed core or nucleus.

sample, a decision supported by the tight clustering of radiocarbon dates obtained on both charcoal and human bone collagen (see Robb, Chapter 2.3, Table 2.3.1, this volume). Unitary assessment of Neolithic tools is fairly common; according to Voytek (2014): "[D]uring the [Italian] Neolithic, lithic assemblages remain relatively generic and non-specialized."

Examination of the daybooks indicated variation in number of levels excavated in each trench (Figure 6.2.1), due in part to the sloping floor of the chamber and varying depths at which bedrock or virgin soil was reached. The two deepest trenches were extended: trench 5 was extended by trench 12, and trench 8 was extended by trench 11; and together, recovery from trenches 5 and 8 represent virtually 90 percent of the 1979 assemblage.

The late Shan Winn, field director in 1978–1979, visited the study team in 1980 and outlined his recollection of the stratigraphy,[9] emphasizing trench 5, with

[9] "Trench 4: Four levels, no locus (to Pleistocene soil); Trench 5: Eleven levels (N, NW, NE, E, W, SW + Campignian), level 9 = Guadone; not to bedrock but probably to sterile; Trench 6: Eight levels (N, E, SE, SW, W, and Campignian), "Burial Pit", wall clearing, bedrock; Trench 7: One level, no locus, not to bedrock; Trench 8: Ten levels (5–10 cm N, NW, W, SW, S, CTR, E, HR), surface, backdirt (from grave robbers), debris (earth slide), center fire pit (= locus 7), not to bedrock; Trench 9: Four levels (S) no locus, to bedrock; Trench 10: Four levels (E, Center tomb), no locus, burial sites in eight groups, Scaloria Period mass burial (=A level 2), more to go…" (dated August 1980, Museo di Manfredonia).

its 11 levels. In fact, trench 5 yielded just over 60 percent of the entire assemblage (Table 6.2.2), which may be due to its placement close to the cave's ancient entry. It is likely that rain or flooding carried artifacts from outside, depositing some close to the entry near where trench 5 was located (see Chapter 2.1, Figure 2.1.23, this volume).

Charcoal from levels in trench 8 yielded four Epipaleolithic (ca. 9,000—11,000 BP) dates (the only radiocarbon dates for trench 8 [see Table 2.3.1]). More than half the tools from this trench were recovered from levels 3 and 4, with blades, bladelets, and flakes a significant component, comparable to the recovery from the Neolithic levels (Figure 6.2.2). Epipaleolithic levels 8 and 9 yielded only 21 tools, less than 8 percent of the trench 8 recovery. In my tabulations, albeit now 30-plus years old, the forms do not differ significantly among the three periods, but there is always the

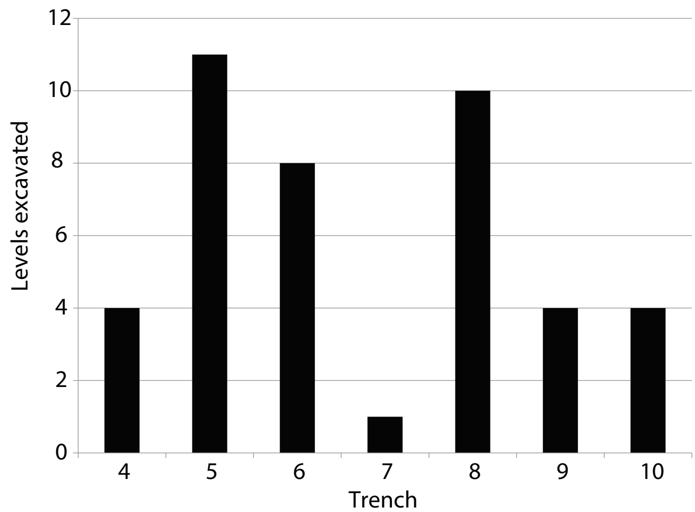


Fig. 6.2.1. Number of levels established in each trench.

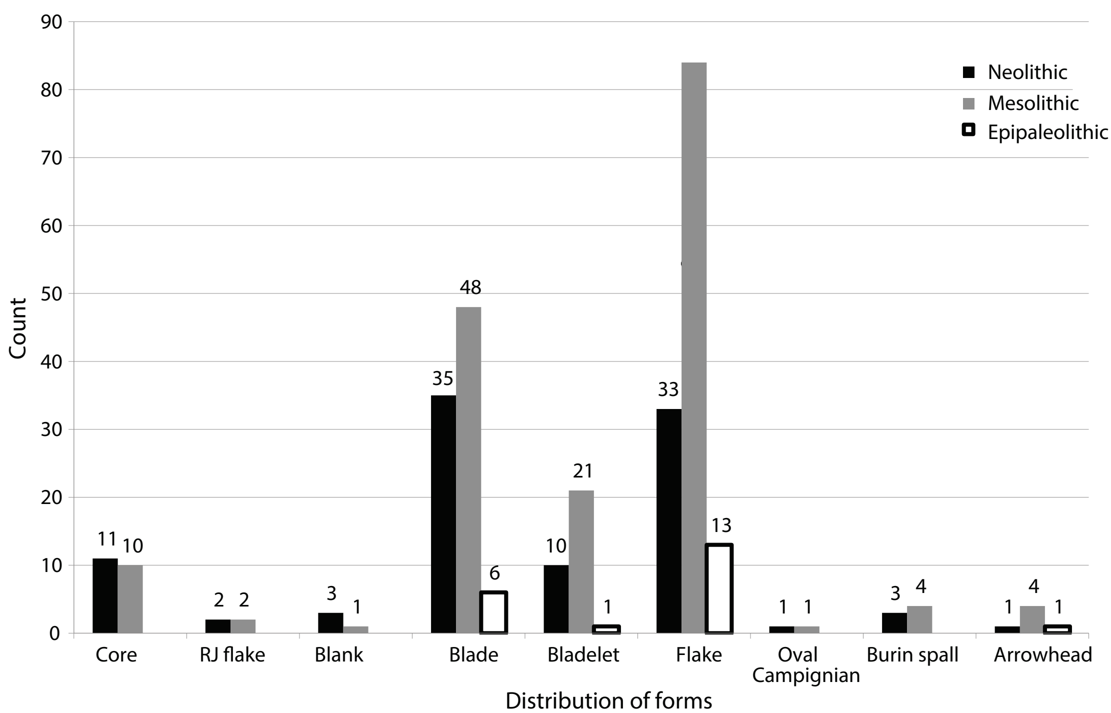


Fig. 6.2.2. Histogram comparing trench 8 Neolithic, Mesolithic, and Epipaleolithic recovery.

possibility of mixing, as the trench 8 daybook indicates "Neolithic 'intrusions' in the Mesolithic." However, the faunal report (see Bartosiewicz and Nyerges, Chapter 3.3, this volume) fully supports these early radiocarbon dates. For example, wild ass inhabited the grasslands of the Adriatic coastal plain and provided the chief meat at the cave before the Neolithic. As the Adriatic Sea encroached (Caldara et al. 2004:fig. 3.1), coastal grasslands diminished, biomass adjusted, and hunting of wild ass was replaced with the domestication of caprovines, the primary meat source of the Neolithic.

Scaloria was not the only cave in the region to offer refuge from danger or the elements prior to the Neolithic. Grotta Paglicci (Mussi 2000:293; Palma de Cesnola 1988) located on the western slope of Mount Gargano, was used for shelter, living, and burial during the Upper and Epipaleolithic; human activity ceased only when rock fall blocked the cave entry ca. 11,000 BP (Mussi 2000:235–238). Two open-air Upper Paleolithic sites are located in the Gargano massif: Vico del Gargano and Foresta Umbra (Mussi 2000:223), but others will eventually be noted.

The number of persons represented by the skeletal remains in trench 10 (see Knüsel et al., Chapter 4.1, this volume) suggests that burial activity/ritual was restaged and replayed, perhaps at specific times, over 10 or so generations (according to radiocarbon dates of 5500–5200 BCE; see Robb, Chapter 2.3, Table 2.3.1). Spring to late summer use of the cave is indicated by the presence of both kid and lamb in the faunal inventory, though year-round human activity at the cave site has not been ruled out (Bartosiewicz and Nygeres, Chapter 3.3, this volume).

The collagen dates on human bone cluster in the mid-sixth millennium (Table 2.3.1), and linking tools to these "burial" contexts is of interest, since small cutmarks have been identified on crania and other parts of the body (see Knüsel et al., Chapter 4.4, Figure 4.4.16, this volume). Humans must have used small blades and/or bladelets of obsidian or sharp-edged flint to make these small cuts, perhaps as part of the preparation of the body for disposal in the cave. Certainly the obsidian blade reported from trench 10, "burial group" 8, is a likely tool for such usage, illustrated with other small obsidian pieces (Figure 6.2.3a:7).

Photos of the Upper Chamber floor (cf. Chapter 2.1, Figure 2.1.25a, this volume; see Portfolio in Appendix 10 [online]) give evidence of a commingling of sherds, stone tools, human, and animal bones,[10] and reveal no laid-out skeletons, although Winn and Shimabuku report "burials."[11] Knüsel et al. (Chapter 4.4, this volume) interpret the preparation of human skeletons for deposition in the Upper Chamber, especially in trench 10, as a ritual of "decommissioning" from life.

The floor of trench 10 (Figure 6.2.4) displays a mix of broken pottery and human and animal bone, but also identifiable are a carved boar's tusk pendant and a blade. The latter two are described in the daybook as "grave gifts" in association with "burial 8." Charcoal from trench 10 "burial 8" was radiocarbon dated (2 sigma range) to 5632–5030 cal BCE. Figure 6.2.4 shows an archaeological miscellany rather than an ordered human burial, with no clear visual association to support these objects as grave gifts.[12] But, again, the association might have been purposeful.

There was a scarcity of bladelets in the trench 10 recovery; however, 86 bladelets were nevertheless tabulated from Upper Chamber trenches in 1979 (see Table 6.2.2). Thus, it is likely that perimortem activity, of whatever type, took place away from trench 10, possibly inside the Upper Chamber but closer to the cave's entry as well as outside the cave. This inference is supported by Conati Barbaro's report (Chapter 6.1, Table 6.1.1, this volume) on the 1978 assemblage, with many more bladelets recovered from outside the cave than from inside the Upper Chamber (323 from outside vs. 109 from Upper Chamber trenches 1–3). But even more telling is the fact that the trench 10 excavation yielded less than 1 percent of the entire 1979 chipped stone assemblage. The fact that a number of groups of mixed human bone were reported from trench 10 supports the impression that this area, deeper into the Upper Chamber, was chosen for deposition of the "decommissioned" (see Knüsel et al., Chapter 4.4, this volume).

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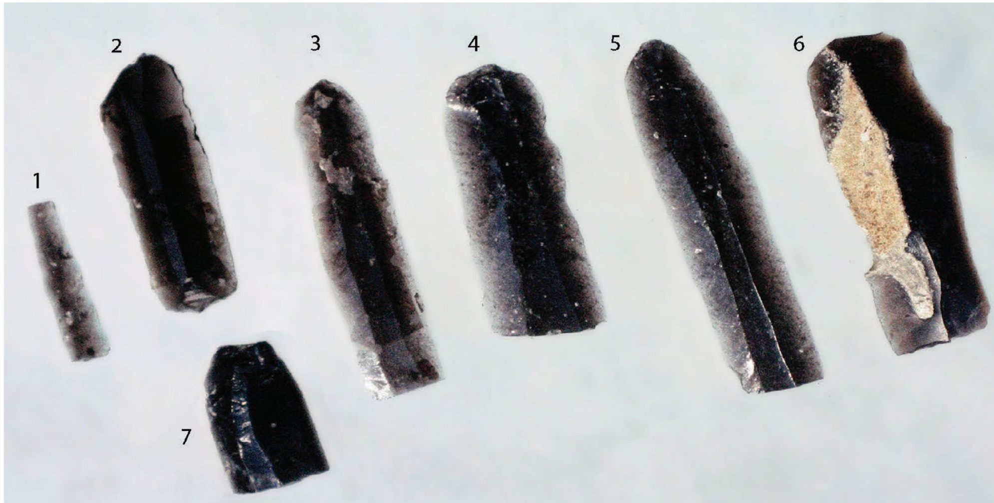
[10] Many thanks to Thomas Wake, director of the Zooarchaeology Laboratory at UCLA's Cotsen Institute of Archaeology, who provided identification of human and animal bone in Shan Winn's 1979 photos of trench scatter in the Upper Chamber.

[11] Winn and Shimabuku 1980; Appendix 2 [online; available at www.dig.ucla.edu].

[12] Documentation is missing that would clearly demonstrate a context linking artifact and find spot, such as numbered drawings of artifacts in the trench daybook and/or unambiguous photos of artifacts in association with a "burial."



a

b

Fig. 6.2.3. **(a)** Obsidian. (1) Catalogue (cat.) # 77, small find (SF) # 22, surface above entrance; (2) cat. # 905, SF # 212 from trench 5, level 7; (3) cat. # 413, SF # 94 from trench 6 N, level 3; (4) cat. # 490, SF # 127 from trench 9, level 3; (5) cat. # 164, SF # 31 from trench 5, level 1; (6) cat. # 945, SF # 219 from trench 5, level 8; (7) cat. # 1275, SF # 280 from trench 10 "burial group 8" (photo: Linda Mount-Williams, 1978).**(b**) Artifacts recovered in context with charcoal. (1) blade, snapped, with marginal edge wear; (2) flake; (3) blade; (4) flake; (5) blank; (6) blade; (7) blade, snapped, with pointed form; (8) blade fragment; (9) blank, end scraper; (10) bladelet, with marginal edge wear (photo: Linda Mount-Williams, 1979).

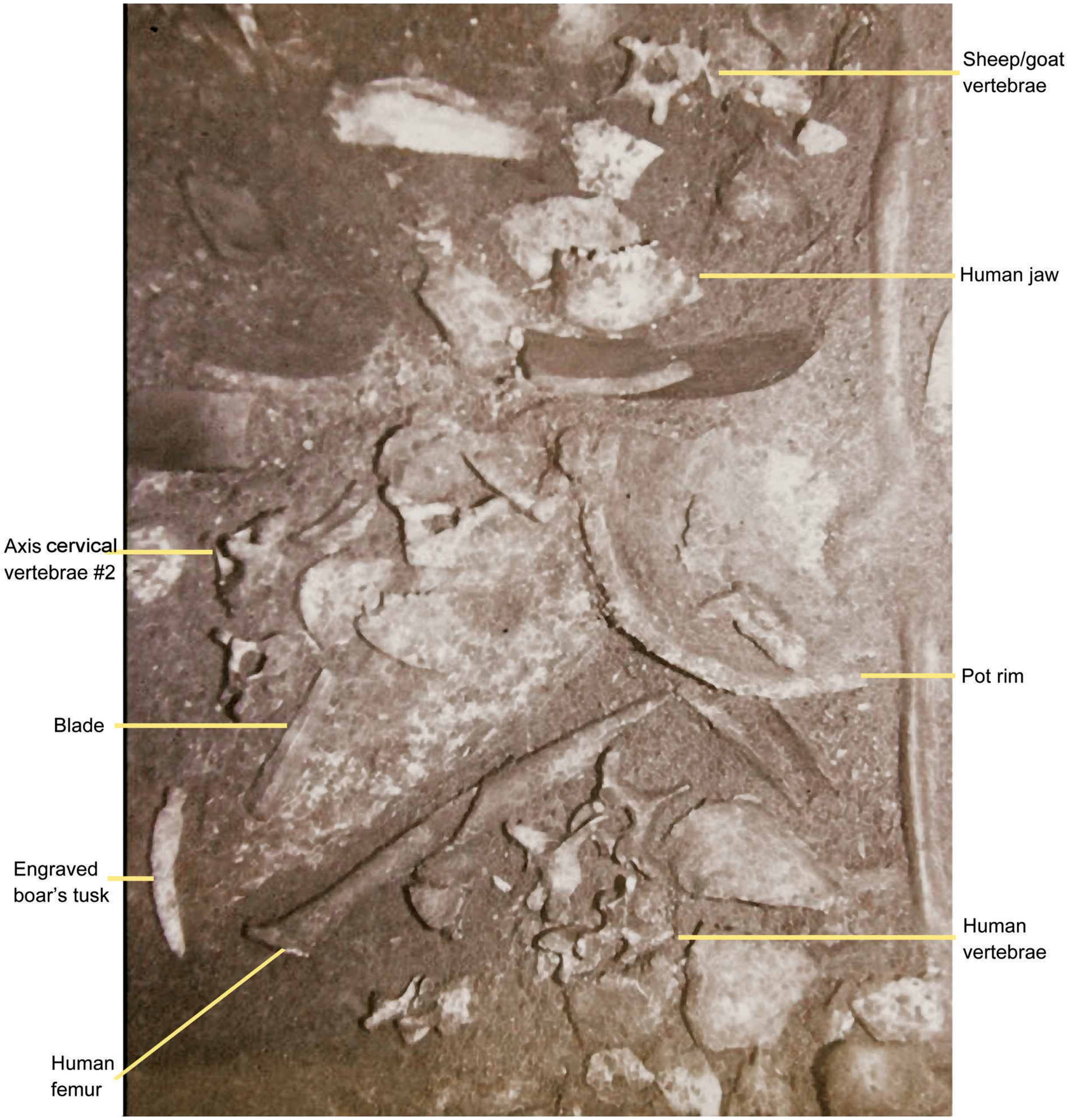


Fig. 6.2.4. Lower Chamber floor, trench 10: mixing of cultural materials. Some elements were identifiable and so labeled. Boar's tusk, engraved: cat. 118, SF 265; blade: cat. 1228, SF 272 (photo: Linda Mount Williams, 1979).

Space, Context, Time, and Form

The size of the Upper Chamber, with its intense and diverse use through time, has resulted in a complex deposit.[13] The daybooks indicate (Appendix 7 [online]) an effort to document space; thus, over 90 percent of the chipped stone tools are linked to trench and level, but the context of the finds in the levels within a given trench is inadequately described. Time, however, is represented by the many calibrated dates from the Upper Chamber (Robb, Chapter 2.3, Table

[13] A deposit that represents but a small percentage of what still remains in the Upper Chamber and/or was removed or moved about over time. Throughout these chapters we use Grotta Scaloria and Scaloria Cave interchangeably, and for the pottery, Scaloria Alta and Scaloria Bassa and Upper Chamber and Lower Chamber.

2.3.1) and confirms the cave's use over some 300 years.

As to form, the chipped stone tools reflect various morphologies, but the forms show little change over time. The most common tool form is the flake (Figure 6.2.2), requiring little if any core preparation (Figure 6.2.3b:2, 4). In fact, although Neolithic assemblages generally include unmodified flakes and few specialized forms (Robb 2007:189), many of the flakes and blades of this and the 1978 assemblage (see Conati Barbaro, Chapter 6.1, Figures 6.1.1 and 6.1.2, this volume) were modified into end, side, and disk scrapers (Figures 6.2.5:4 and 6.2.3b:9). For example, tools reported from levels in association with charcoal, such as trench 6, levels 6 and 7 (see Table 6.2.3), include blade, scraper, flake, and bladelet (see Figure 6.2.3b); their use perhaps was in food preparation. Grinding tools from trench 6 are catalogued in Chapter 6.3 (Garibaldi et al., this volume) and several are illustrated from other trenches as well (e.g., Figures 6.3.5 and 6.3.6).

The lithic technology reflects the work of skillful knappers, competent in the preparation of cores, blades

Fig. 6.2.5. Scaloria artifacts from 1979 excavation. (1a, b) Campignian; (2) rejuvenation flake; (3) side scraper; (4) snapped blade with burin end; (5a, b) Campignian; (6) top flake; (7) core, pyramidal shape (photo: E. S. Elster, 2013).

(Figure 6.2.3a), and the use of pressure retouch, as the forms illustrate (Figures 6.2.3b:7, 10; 6.2.5:6, 7; and Conati Barbaro, Chapter 6.1: Figures 6.1.1 and 6.1.2). The cortex, the "skin" of a nucleus or core, may be present both on the core and on the first flakes struck off during the reduction process (Figure 6.2.5). Thus, if the tools were brought to the cave by/with Tavoliere villagers or shaped by knappers near the raw material source(s), we should expect to find few artifacts with cortex and only a few cores at Scaloria. In sampling the raw materials (Table 6.2.4), similar numbers were tabulated with cortex (473) and without (529); the number of honey-colored brown flint was 341 with, and 232 without, cortex—not especially significant. However, tools of creamy flint with cortex numbered 38, and without 112; gray flint, 38 with, and 111 without. Thus, we infer that the creamy flint and gray flint were mainly worked by knappers near the source(s), and a majority of finished forms were traded to the Scaloria cavers.

The majority of cores were recovered (Table 6.2.2) from trenches 5 and 8, and the knappers were particularly active with cores of brown flint (Table 6.2.5). Of a total of 62 cores (including broken pieces/residuals), 50 were of brown flint and 6 of gray flint (both colors reported from the Gargano flint mines [Galiberti 2012:

Table 6.2.3. Charcoal recovered from trench, level, and context

Trench	Level	Context
5	3	With Ripoli-style pottery
6	4	Habitation debris
6	6, 7	Near "grave"
7	1	
10	4	Burial group 8

Note: For ^{14}C dates, see Robb, Chapter 2.3, Table 2.3.1, this volume.

Table 6.2.4. Cross-tabulations of form by raw material (n and %)

Form	(1) Brown flint		(2) Creamy		(3) Gray		(4) Dark gray		(5) Red		(6) Brown black		(7) Fire altered		(8) Obsidian		(9) Quartz		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Core/microcore	50	4.70	1	0.09	6	0.56	1	0.09	1	0.09	1	0.09	2	0.19		0.00		0.00	62	5.83
RJ flake	11	1.03	1	0.09		0.00		0.00		0.00		0.00	1	0.09		0.00		0.00	13	1.22
Blank	44	4.14	4	0.38	7	0.66	1	0.09	3	0.28	2	0.19	11	1.03		0.00		0.00	72	6.77
Blade	141	13.26	80	7.53	66	6.21	4	0.38	10	0.94	4	0.38	22	2.07	4	0.38		0.00	331	31.14
Bladelet	42	3.95	10	0.94	18	1.69	2	0.19	3	0.28	1	0.09	7	0.66	3	0.28		0.00	86	8.09
Flake	284	26.72	46	4.33	47	4.42	10	0.94	11	1.03	10	0.94	17	1.60	2	0.19	1	0.09	428	40.26
Campignian	24	2.26	11	1.03	20	1.88		0.00	1	0.09		0.00	2	0.19		0.00		0.00	58	5.46
Burin end/edge	2	0.19	4	0.38	1	0.09		0.00		0.00		0.00		0.00		0.00		0.00	7	0.66
Pointed piece	4	0.38		0.00	2	0.19		0.00		0.00		0.00		0.00		0.00		0.00	6	0.56
Total	602	56.63	157	14.77	167	15.71	18	1.69	29	2.73	18	1.69	62	5.83	9	0.85	1	0.09	1063	100.00

Note: Pieces with missing information are excluded.

Table 6.2.5. Cross-tabulation: cortex observed and not observed by raw materials (n and [%])

Raw materials	(1) Honey-brown flint	(2) Creamy	(3) Gray	(4) Dark gray	(5) Red	(6) Brown / black	(7) Fire altered	(8) Obsidian	(9) Quartz	Total
Observed	341 (34.03)	35 (3.49)	38 (3.79)	10 (1.0)	11 (1.1)	11 (1.1)	23 (2.3)	3 (0.3)	1 (0.1)	473 (47.21)
Not observed	232 (23.15)	112 (11.18)	111 (11.08)	7 (0.7)	17 (1.7)	7 (0.7)	37 (3.69)	6 (0.6)	—	529 (52.79)
Total	573 (57.19)	147 (14.67)	149 (14.87)	17 (1.7)	28 (2.79)	18 (1.8)	60 (5.99)	9 (0.9)	1 (0.1)	1002 100.0)

Note: Pieces with missing information are excluded.

31, figs. 2:35 and 3], discussed below). Conati Barbaro tabulated 53 cores/residual cores from outside and 15 cores/residuals from inside the cave.

Small, bifacially flaked, circular, triangular, or oval "Campignian" artifacts (Figure 6.2.6; and Figure 6.2.5: 5, 6) call for further discussion.[14] Steps in reducing a nucleus or core and then shaping these unique forms require time and skill. The 1978–1979 excavations tabulated a total of 78 Campignian tools (including broken pieces and trimming elements). Trench 5 revealed 23, some of which may have been washed in; 10 were found in the fill at the surface. Preparation outside the cave is supported by Conati Barbaro's (Chapter 6.1) tabulation of trimming elements. All told, Scaloria Cave excavations yielded the largest group of Campignian tools yet reported from sites on the Tavoliere (though the number does include trimming elements and broken pieces).

The tools published from the mines (Di Lernia et al. 1992:175–199, figs. 6 and 7) are similar in form to the bifacial Campignian but much larger: length, 15–25 cm, and width, 5–10 cm (Di Lernia et al. 1995: 127, fig. 8.1:4, 5). Azzati et al. (1969:145–162, figs. 1–4) reported on the rich assemblage of bifacial Campignian (n = 581) and blades and scrapers (n = 265) recovered from an open-air station on the banks of the Macchia River in the eastern part of Gargano. Other Gargano coastal Campignian sites are referred to as holding comparable Campignian industries (Palma di Cesnola 1954:149–172). There must have

[14] Quagliati (1936) compared these small artifacts to early Neolithic tools from the French site, Campigny (Seine-Inferieure); thus the name "Campignian."

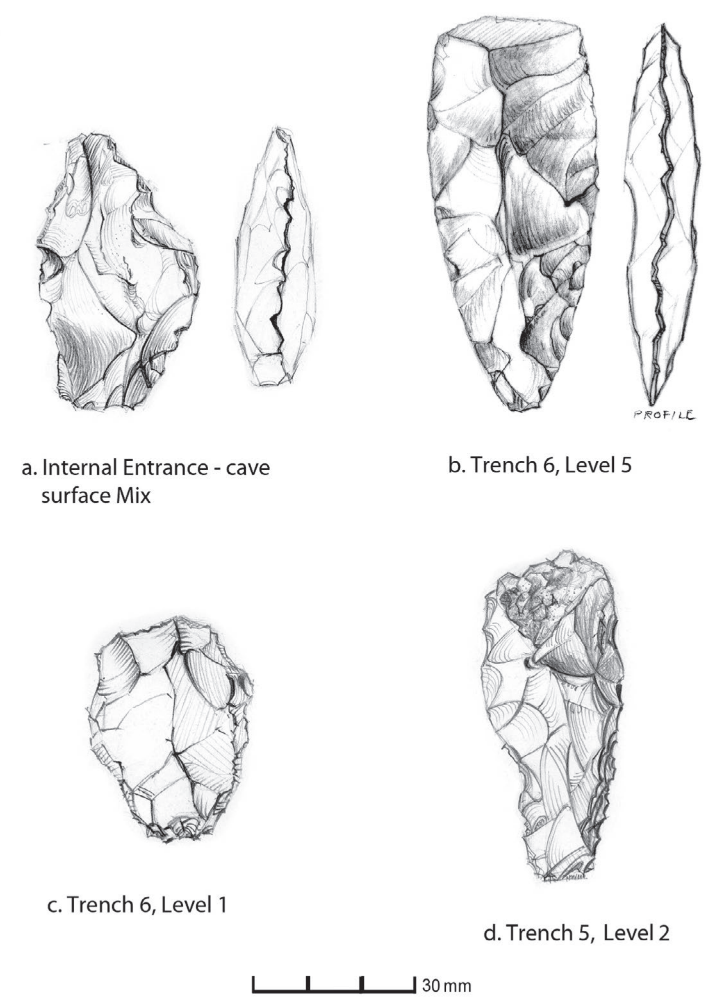


Fig. 6.2.6. Campignian tool forms (drawing by Dan Shimabuku).

been a specific demand for these tools. Whitehouse (2005:552) noted that they have been "assumed to be the main products of the mines" but are found only in small numbers from the Tavoliere ditched villages. The Campignian were early reported from Scaloria (Quagliati 1936:83, fig. 20; 84, fig. 21; 86, fig. 23), and Conati Barbaro (Chapter 6.1, this volume) reports "a few" from Candelaro; Ronchitelli (1983:115–116, 122, Tav. 143–145 and Tab. XVI:4) reported 44 from Passo di Corvo, and Palma di Cesnola (1967:349–391, figs. 1, 2) reported 25 from burials and settlements on San Domino Island. In the survey of 1963–1964, G. D. B. Jones commented on "heavier tools of flaked flint[,] . . . small axes of rough form, a kind found only in the Gargano" (1987:167). Ten have been reported from Catignano, Abruzzi (Tozzi and Bagnone 2003:145, 163, 164, figs. 87, 88). The scattergrams (Figure 6.2.7a–d) illustrate size ranges for the Scaloria grouping.

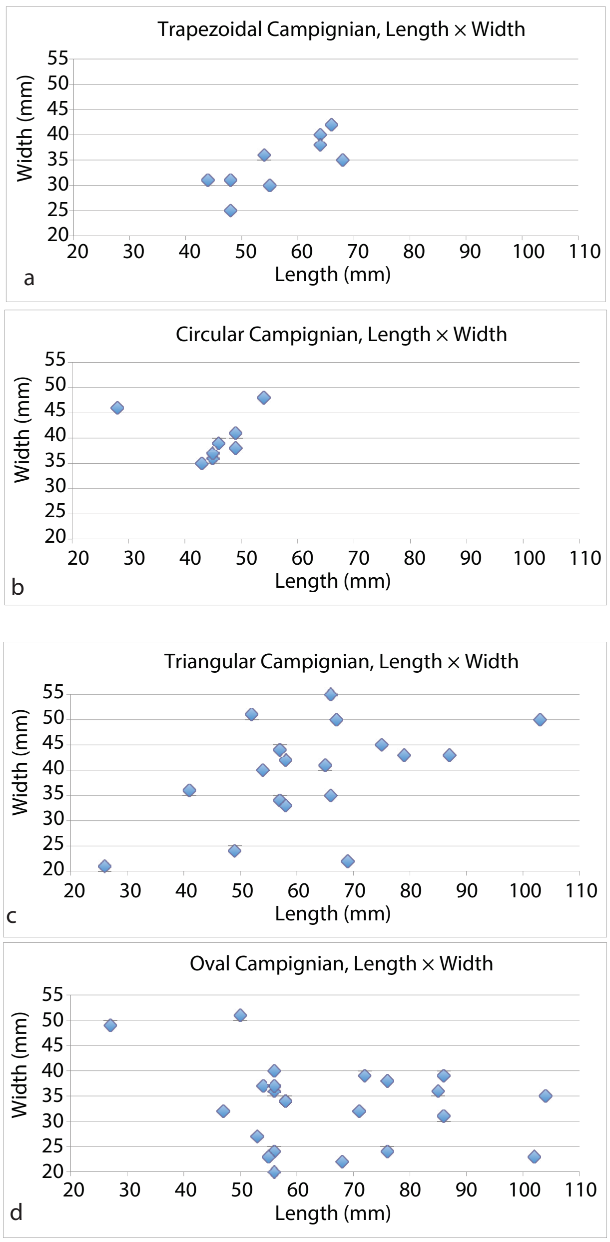


Fig. 6.2.7. (a–d) Scattergrams of Campignian measurements (length × width).

Judging from Conati Barbaro's report of trimming debris from outside the *grotta*, some of the Campignian were worked locally and possibly also at other sites of Tavoliere, Tremiti, or Abruzzi. Though the tabulations of 1980 do not indicate that the Campignian were examined for evidence of use, the edges suggest action against wood rather than in any part of the "decommissioning" activity. Whitehouse (2005:553) questions whether there was a ritual link with Gargano mining. However, to evaluate whether Grotta Scaloria acted as a "hot spot" for agents exchanging Campignian forms requires much more manufacturing data from Scaloria and sites in the Tavoliere, Abruzzi, and especially the Gargano. Without additional data, we are left to speculate on the use of the Campignian tools and their possible associations with the agents and the activities that took place at/in the cave.

Manufacture

A cross-tabulation (Table 6.2.6) isolated the presence or absence of platform preparation, a bulb of percussion, and the nature of the distal end versus the form; this table excluded cores and the Campignian forms. Platform preparation and the bulb of percussion (the result of the striking action) were observable on the proximal end of a blade or flake, but such traces could have been subsequently obliterated by edge wear or retouch. Almost three times as many flakes were observed with evidence of platform preparation (and with evidence of the bulb) than without (300/103), but we found no such correlation for either blades or bladelets. Since blades and bladelets were produced from a prepared core, we must presume that the knapper had considerable control over his or her craft. It is also possible that the proximal ends were obliterated through usage or that the piece was purposefully snapped to achieve a specific size (Conati Barbaro, Chapter 6.1, Figure 6.1.1: k–n, p). Bulbs were observed on close to half of blades (180/323) and of bladelets (48/78) and on less than one-fourth of blanks (15/70), which would have been less purposely produced.

Table 6.2.6. Cross-tabulation of form by presence/absence of platform preparation, bulb, and distal end

		Platform preparation			Bulb			Distal end			
	ID #	Observable	Not observable	Total	Observable	Not observable	Total	Feathered	Hinged	Not observed	Total
RJ flake	2	5	6	11	6	6	12	2	1	5	8
Blank	3	13	54	67	15	55	70	12	7	47	66
Blade	4	144	160	304	180	143	323	81	42	207	330
Bladelet	5	37	43	80	48	30	78	34	10	42	86
Flake	6	300	103	403	322	92	414	168	73	182	423
Burin end/ edge	11	0	7	7	0	7	7	1		6	7
Pointed piece	12	1	2	3	5	1	6	2	2	2	6
Grand total		500	375	875	576	334	910	300	135	491	926

The distal end, especially of a blade or flake, may demonstrate the work of a skillful knapper since, if the core is carefully selected and well prepared, the distal end of a blade will be feathered; otherwise the end might hinge as the piece detaches from the core. Frequently, however, the distal end will have been retouched or show edge wear, and thus the feathered edge is "not observable." Out of a sample of 926 artifacts (more with feathered than hinged ends), the majority (491) were tabulated as "ends not observed."

Measurements of artifacts (excluding cores, blades, bladelets, and the Campignian tools) are presented in a scattergram (Figure 6.2.8); size clustering is between 20 and 40 mm in length by 10 to 35 mm in width.

Raw Materials

Researchers have assumed that knappers purposefully choose raw materials based on availability, custom, and/or knowledge of flaking qualities. Thus, the relative percentages of raw materials (local or not) suggest the Scaloria knappers' preferences as well as their access to the sources. I infer that the cave was used at some periods as a living site but also as a destination for those who observed, or participated in, the uncommon burial ritual of decommissioning bodies and/or the cult of waters in the Lower Chamber (see Appendix 3 [online]). In any event, the cave knappers either collected the raw materials themselves or received these via trade or exchange. Variability of forms was reported by Conati Barbaro (Chapter 6.1) and herein, but the raw materials are undifferentiated from 1978 and 1979. Two are discussed below: flint and obsidian.

Flint, although "available in surface outcrops" (Robb 2007:189), was mined on the northeast coast of the Gargano Peninsula (Figure 6.2.9). Conati Barbaro (Chapter 6.1) reported, as do I, that flint was the "most commonly used raw material" for Scaloria chipped stone tools, as had been noted earlier at the Tavoliere settlements (Delano Smith 1987:24 and 115; Jarman et al. 2009:217; Robb 2007). The assemblage at Scaloria (Table 6.2.4) was composed of variously colored flint from the Gargano mines and also from sources close by, such as outcrops or river cobbles. In 1980,[15] I described the very common "brown flint" as the "most popular colored flint: light honey-brown." A very few pieces of obsidian were also identified.

Lithic scatter was early reported all along the northern Gargano coast (Delano Smith 1987:114), and an intensive investigation of mining began in 1981 with the Gargano Prehistoric Mining Project (Di Lernia et al. 1992, 1995). As a result, several mining sites near the coastal city of Vieste, including the earliest in Europe, have been extensively studied (Galiberti 2012:19–38; Di Lernia, Fiorentino, and Galiberti 1992; Di Lernia and Galiberti 1993:55 ff.; Tarantini et al. 2011:253). The radiocarbon dates (Di Lernia et al.

[15] Notes archived with Marija Gimbutas's materials in OPUS Archives, Pacifica Graduate Institute, Montecito, CA.

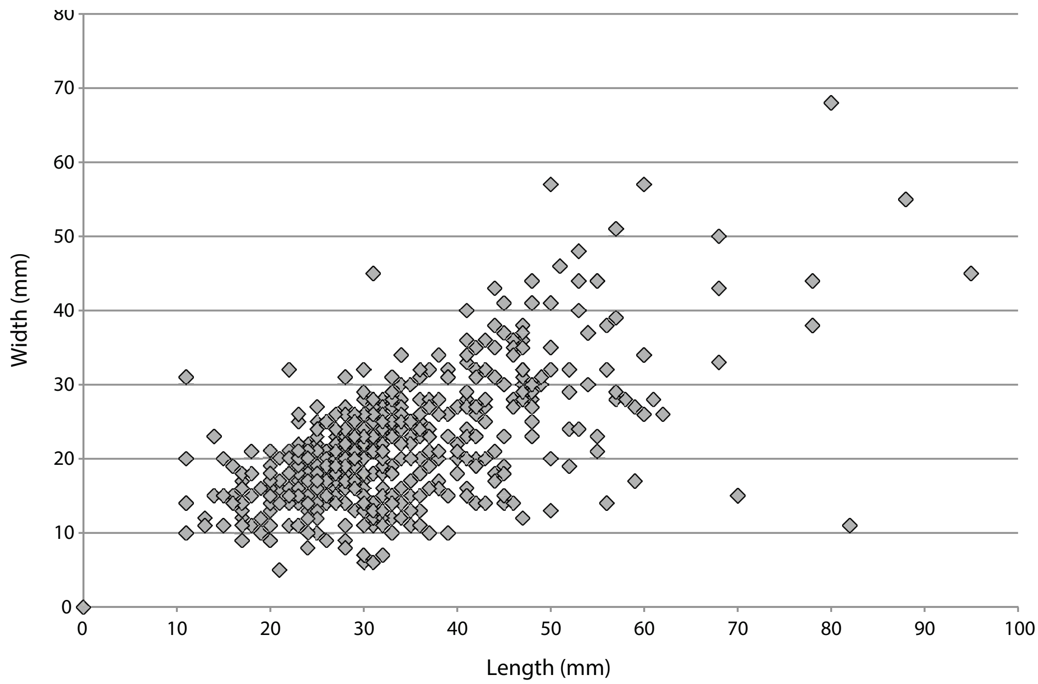


Fig. 6.2.8. Scattergram of dimensions (excluding cores, blades, bladelets, Campignian).

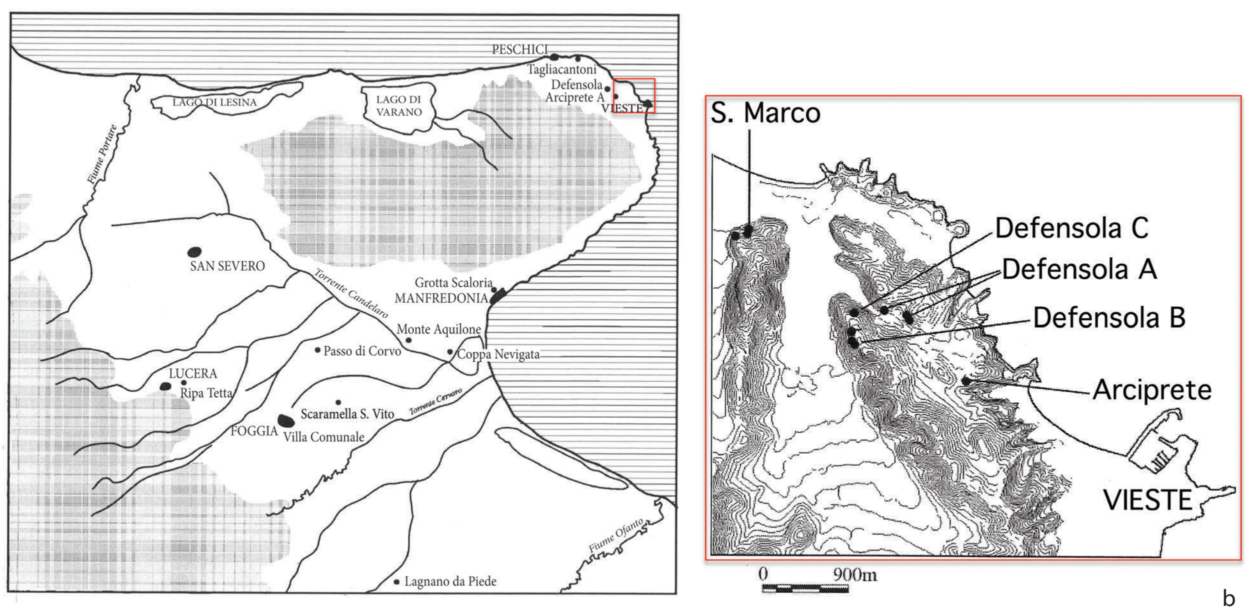


Fig. 6.2.9. (a) Map of Gargano and Tavoliere, showing main sites mentioned in text. (b) Location of coastal flint mines (after Di Lernia et al. 1992).

1995:130) confirm that mining at Defensola A took place as early as post-Paleolithic Europe (Di Lernia et al. 1992:195–196; Whitehouse 2005:549) and continued during the period of activity at Scaloria. The flint from the several mines varies in color; that from Arciprete and Defensola A is maroon-gray; the flint from Defensola B is gray-clear and beige-maroon (D'Ottavio 2001:116; Galiberti 2012:32–37). Furthermore, the Gargano mines are far enough away that the question arises as to the mechanism of and the agents

for the transfer of flint to the grotta and to the Tavoliere. As the map illustrates (Figure 6.2.9), Scaloria is located as the plain climbs to meet the Gargano massif, and the mines are directly east on Gargano's Adriatic coast.

The collection of samples from several of the prehistoric mines and subsequent characterization studies indicate that Gargano flint was widely circulated among prehistoric Tavoliere settlements (D'Ottavio 2001:111). For example, Mallory (1989:254–256) reported that Gargano flint represented 13 percent of the chipped stone assemblage from Lagnano da Piede, a *trincerati* site on the Tavoliere that he describes as 60–70 km distant from Gargano; and Ronchitelli (1983: 101, 102) and others (Robb 2007:187, fig. 35b) report flint from Passo di Corvo, closer to Gargano; D'Ottavio (2001) wrote of a 50-km range; Savino Di Lernia[16] wrote that Defensola/Coppa di Rischio flint has been identified more than 100 km away.

Good-quality flint is known from many surface outcrops on the Gargano, some within relatively easy walking distance of Scaloria Cave. However, if the people at Scaloria did indeed use flint from the mines or outcrops on the north and eastern coast of the Gargano, this would imply journeying over some distance. Two explanations are proposed to identify the agents moving flint from Defensola A to Scaloria: a seasonal relationship between Tavoliere herders and Gargano miners,[17] and a watery connection, the Adriatic, linking miners, seamen, and Tavoliere consumers.

The Tavoliere herders of Classical times have been described as following a system of transhumance (Jarman et al. 2009:167), and although the Gargano offered few arable resources and no evidence to indicate it was used for grazing before the Early Bronze Age (ibid.: 216–217), recent research of historical transhumance in Apulia noted an ancient trail leading into and around the south coast of the Gargano (Avram 2009: fig. 1). Surface scatters in the interior are also evidence (though undated) of transient summer camps used for grazing animals kept in the Tavoliere during the winter (Jarman et al. 2009:217).

The second explanation for the trading of Gargano flint involves miners and seamen, with evidence for the latter sailing east across the Adriatic, since this flint was found on the nearby Tremiti Island of San Domino (Palma di Cesnola 1967) and the island of Hvar, close to the Dalmatian coast. In turn, coarse impressed wares characteristic of the Greek Early Neolithic have been recovered in Italian sites (Robb 2007:163) and at Scaloria (see Traverso and Isetti, Chapters 5.1–5.4, this volume). Clearly, Adriatic crossing (Bass 1998:165; Spataro 2002:11) was a fact in the sixth millennium and earlier. Certainly, voyages hugging the coast from Gargano's Vieste to the Tavoliere coast were possible. The seamen had to be familiar with the winds, tides, swell patterns, celestial navigation, seasonal weather, and harbors (Broodbank 2000:96–101). Since crossing the Adriatic and Mediterranean had long been accomplished (Broodbank 2000), we can infer the transfer of raw material by seamen sailing around the Gargano to land on Apulia's coast, at least in summer or autumn when the sea is calmer (Robb 2007:284).

Obsidian, a rare raw material at Puglian sites, was found "in very small quantities on the Tavoliere" and at the cave (Robb 2007:190). Conati Barbaro (Chapter 6.1) reported "one residual core and a blade" from outside the cave. However, a few obsidian blades were identified in the 1979 assemblage (Table 6.2.4). There were few clear associations of obsidian or flint blades with "burial groups"; several of the nine obsidian pieces identified in the catalogue are illustrated (Figure 6.2.3a). The scattergram in Figure 6.2.10 demonstrates size clustering by comparing the length × width of bladelets and blades of all materials.

At Catignano (Abruzzi), obsidian sourced to Lipari is described as abundant, whereas the Palmarola obsidian is less so (DeFrancesco and Crisci 2003: 239; Tozzi and Zamagni 2003:244). More generally, sites along the middle Adriatic show a mixture of Lipari and Palmarola obsidian, with Lipari generally predominating. The Lipari obsidian, found all along the Adriatic coast, and up into Croatia, provides evidence not only for seamen and seacraft but for a complex of social and trading agents (Robb 2007:192–204): miners, knappers, traders, sailors, shipwrights, travelers/explorers, middlemen/women, and the roads, transportation, markets, ports, way stations, and harbors they must have used.

Island forays into and across the Mediterranean in the course of early obsidian trade (Broodbank 2000)

[16] My sincere thanks to Savino Di Lernia (April 25, 2012) and Massimo Tarantini (August 17, 2012), who responded most graciously, by email, to my questions concerning Scaloria flint and the Gargano mines.

[17] Regarding the miner–herder connection, see Di Lernia, op. cit; regarding miners and seamen: Tarantini, op. cit.

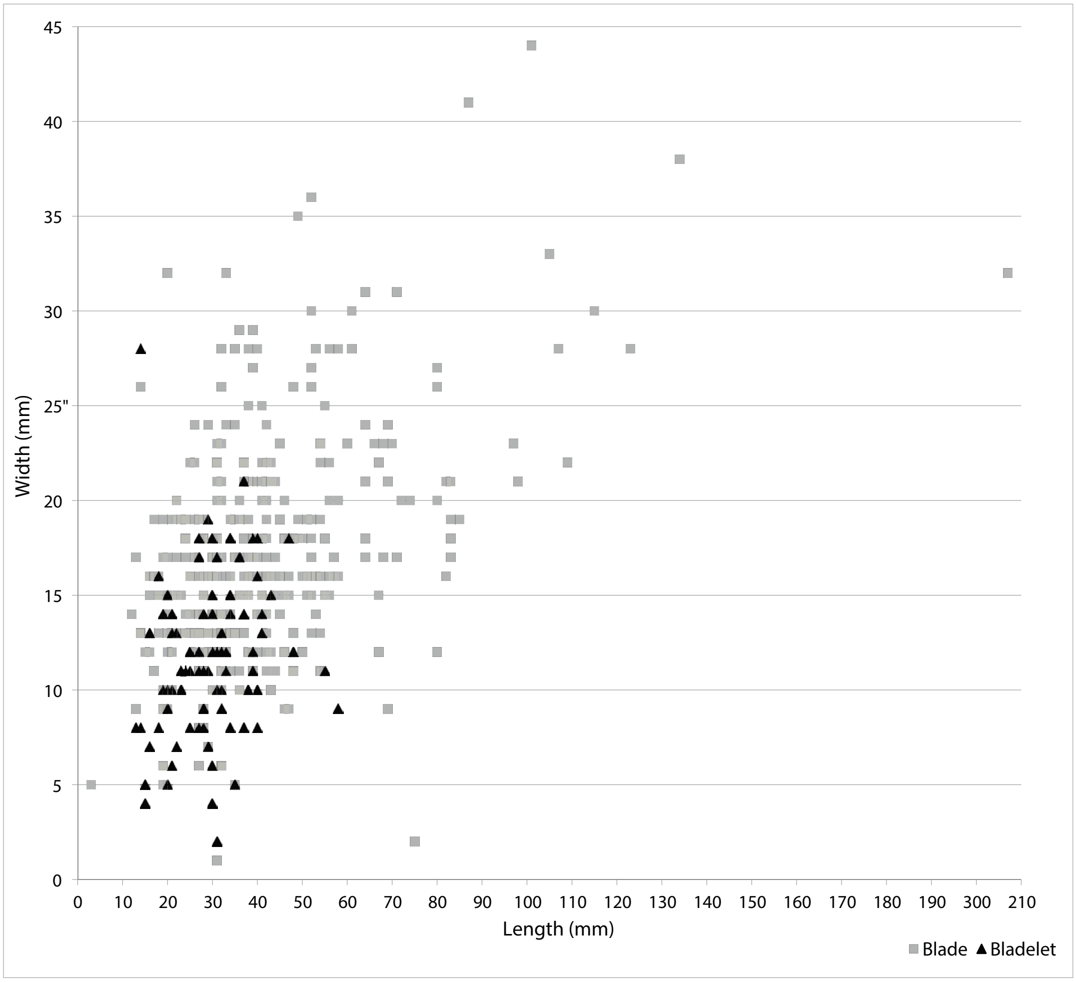


Fig. 6.2.10. Scattergram of blades and bladelets of all materials.

and trading forays across the Adriatic have been well documented (Forenbaher and Miracle 2005:523; Palma di Cesnola 1967; Tarantini et al. 2011). In fact, an early Neolithic dugout canoe, roughly 10 m long (with radiocarbon dates ca. the early sixth millennium) was found at La Marmotta, an underwater site in a lake north of Rome; it was described as "substantial . . . gives us a good idea of ocean-going craft at this time as well" (Robb 2007:255, 267).

Intensity of Use

A cross-tabulation (Table 6.2.7) compares the intensity of use for each raw material. Results indicate that close to a fourth of the tools from 1979 showed heavy use (26.14%), meaning that two to three margins showed evidence of wear, followed by (17.01%) for light usage, and a majority (56.85%) for intensively used pieces. Thus, more than three-fourths of the tools from the Upper Chamber were much used.

Another cross-tabulation (Table 6.2.8) compares the forms with intensity of use. Thus, flakes and blades most clearly illustrate light, heavy, and intense use.

Summary

The ample material culture left by the cavers in terms of tools provides us with some insight into their social, productive, and ritual lives. The artifacts link agents in a trade network drawn by both the location of a choice raw material as well as the location of a unique ritual setting. To consider the people who selected, collected, worked, and/or exchanged raw materials with others in their social network, we used simple statistics to describe the assemblage and its forms and raw materials, to consider how and where the knappers manufac-

Table 6.2.7. Cross-tabulation: use by raw material (n and [%])

Use	Flint brown	Creamy	Gray	Dark gray	Red	Brown/ black	Fire altered	Obsidian	Quartz	Total
Light	98 (11.19)	21 (2.4)	13 (1.48)	4 (0.46)	3 (0.34)	2 (0.23)	7 (0.8)	1 (0.11)	(0)	149 (17.01)
Heavy	127 (14.5)	35 (4)	44 (5.02)	2 (0.23)	8 (0.91)	3 (0.34)	9 (1.03)	1 (0.11)	(0)	229 (26.14)
Intense	310 (35.39)	52 (5.94)	81 (9.25)	11 (1.26)	13 (1.48)	7 (0.8)	23 (2.63)	(0)	1 (0.11)	498 (56.85)
Total	535 (61.07)	108 (12.33)	138 (15.75)	17 (1.94)	24 (2.74)	12 (1.37)	39 (4.45)	2 (0.23)	1 (0.11)	876 (100)

Table 6.2.8. Cross-tabulation: use by form (n and [%])

Use	Core	RJ flake	Blank	Blade	Blade-let	Flake	Trapezoidal Campignian	Circular Campignian	Triangular Campignian	Oval Campignian	Burin	Pointed form	Total
Light	8 (0.91)	2 (0.23)	10 (1.14)	25 (2.85)	12 (1.37)	90 (10.27)	—	—	—	—	1 (0.11)	1 (0.11)	149 (17.01)
Heavy	4 (0.46)	1 (0.11)	13 (1.48)	81 (9.25)	25 (2.85)	100 (11.42)	—	—	—	—	2 (0.23)	3 (0.34)	229 (26.14)
Intense	6 (0.68)	8 (0.91)	37 (4.22)	155 (17.69)	39 (4.45)	207 (23.63)	9 (1.03)	7 (0.8)	14 (1.6)	13 (1.48)	1 (0.11)	2 (0.23)	498 (56.85)
Total	18 (2.05)	11 (1.26)	60 (6.85)	261 (29.79)	76 (8.68)	397 (45.32)	9 (1.03)	7 (0.8)	14 (1.6)	13 (1.48)	4 (0.46)	6 (0.68)	876 (100)

tured the tools, and how intensively the tools were used in daily or ritual activities. The comments below are based on the analyses of various cross-tabulations and tables.

Evidence of knapping activity from outside the cave (Table 6.2.1) was likely more easily detected than from inside because of the light, since bright sun allows for easier recognition of waste flakes.[18] Trench 5 is especially interesting in terms of 1979 recovery, holding over 60 percent of tools (Table 6.2.2). Note similarity in the percentage of three forms from trench 5 as compared to overall percentage in the assemblage, summarized in Table 6.2.9.

Eleven levels were established in trench 5, more than in any of the other trenches (Figure 6.2.1). Eugenia Isetti and Antonella Traverso, recently returned to Scaloria, describe the ancient entry to the cave (and thus entry to the Upper Chamber) as more open than we had previously understood.[19] The larger opening and ambient light will have affected knapping activity, artifact deposition, and subsequent trench 5 recovery.

Early human activity in the cave is reflected in the dating of charcoal from trench 8 in Epipaleolithic and

Table 6.2.9. Percentage of three forms from trench 5 compared to overall percentage in assemblage

Form	% of Trench 5	% of Total
Blade	0.27	0.31
Bladelet	0.08	0.08
Flake	0.42	0.4

Neolithic levels (Figure 6.2.2), although there seems to be little difference among the tool forms. In fact, at present, the Mesolithic is little known on the Tavoliere (Mussi 2000:373; Robb 2007:26). Settlers started farming before the seventh millennium, and these trench 8 radiocarbon dates, ca. 8000–9000 BP (charcoal), may represent the transitional hunter. However, the faunal report clearly underscores human activity in the Upper Chamber during the Epipaleolithic period (Bartosiewicz and Nygeres, Chapter 3.3, Tables 3.3.2 and 3.3.3, this volume) and concomitant changes in the percentages of wild versus domesticated animals through time (see Table 3.3.1). For example, during the Neolithic, over 80 percent of taxa were from domesticated species; in contrast, during the Epipaleolithic, wild taxa reached over 90 percent.

Remains of caprovines inside the cave support animal keeping (Bartosiewicz and Nyerges, Chapter 3.3); recovery of charcoal indicates fires (Table 6.2.3), perhaps set to purify the space or to prepare food for a meal and/or a rite; and recovery of wattle and daub

[18] See n. 3 regarding the "sunshine" effect.

[19] Isetti and Traverso returned to Scaloria in September of 2013 and informed us that the entry to the grotta was much larger in the Neolithic than we had previously understood (e-mail, September 20, 2013).

from several trenches, probably washed in from outside, indicates purposeful building. These materials all support the use of the cave as a living site. But ritual, inevitably paired with treatment of the dead, is also supported by (1) reports in the daybooks of "burial groups," (2) the few skeletons in anatomical order (Chapter 4.4, Figure 4.4.5a), (3) the commingling of hundreds of human bone taxa on the Upper Chamber's floor, and (4) identification of small perimortem cut-marks on skeletal parts (Knüsel et al., Chapter 4.4), and the use of the small bladelets and blades (Figure 6.2.3a). I consider the cave as a place for considerable prehistoric activity both quotidian and ritual.

The Campignian forms (Figures 6.2.5:1, 5, and 6.2.6) were not examined for traces of edge wear; in fact, Robb (2007) considers them central Adriatic small axes and adzes but manufactured from raw materials that do not allow for polishing. But the Campignian exhibit no effort on the knapper's part to disguise flake removal and, except for size, are not comparable to polished small axes and adzes. Furthermore, many of the Scaloria Campignian tools are manufactured of Gargano flint, and are not polished, whereas the producers of the polished stone tools recovered from the *grotta* (Garibaldi et al., Chapter 6.3, this volume) use other raw materials.

Comparing the knappers' choices in raw material with form (Table 6.2.4), we can conclude that knappers mainly produced flakes and blades of honey-brown flint. This flint is the most commonly used raw material in the assemblage, noted in all forms. Thus, comparing the production of flakes versus blades reveals that the two other Gargano flint colors, creamy and gray, are more purposefully produced as blades than as flakes; an explanation may be that honey-brown flint nodules were more easily obtained, and thus knapping was less purposeful (Table 6.2.10).

Concerning cortex (Table 6.2.5), more than one-third of honey-brown flint pieces indicate reduction near Grotta Scaloria. I infer that the balance, from available outcrops or the Gargano mines, reached the cave with the cortex already removed by knappers or the cavers themselves at the source. The creamy and gray flint tools indicate that the cortex was mainly removed at the raw material source—that is, before the tools came to the cave—and thus the inference that trading agents and other knappers were both involved.

Table 6.2.10. Comparison of flint colors

	Honey-brown %	Gray %	Creamy %
Flake	26.72	4.42	4.33
Blade	13.26	6.21	7.53

The presence or absence of platform preparation, a bulb of percussion, and the treatment of the distal end of a flake, blade, or blank provide clues to the skill of the knapper (see Table 6.2.6). It is curious that the flake form, requiring the least skill on the part of the knapper, tabulates with platform preparation at over 50 percent. Observation (or not) of the bulb of percussion indicated nothing significant for blades and bladelets, but slightly over 21 percent of blanks were observed with bulbs, and 79 percent without. This statistic was reversed for flakes: 79 percent observed with bulb, versus 21 percent without. The covariation of raw material and bulb as present, absent, or modified indicates that bulbs were a natural characteristic of tool production irrespective of the raw material. Over half of the tools exhibited feathered ends, close to one-fourth were equally hinged and modified; the latter includes retouch and/or edge wear.

Evaluation of use was a goal in this study (Tables 6.2.7 and 6.2.8). More than half the assemblage was heavily used. A caution regarding these summaries: the numbers we are dealing with are not especially strong for the hundreds of years during which the Upper Chamber was in use. The only exception might be the (honey) brown flint and the forms of flake and blade.

From the use of Gargano flint we can infer a social and economic network of trade and exchange conducted by agents from the mines with seamen or herders in contact with villagers on the Tavoliere, including the Scaloria cavers during the several hundred years of the *grotta*'s intense use by humans. Knowing that flint was traded or brought in, we searched for possibilities of exchange. The original faunal tabulation by the late Sándor Bökönyi, which has been analyzed anew by László Bartosewicz and Éva Nygeres (Chapter 3.3, this volume), provides some ideas about the exchange of live animals or possibly smoked parts of animals for food. Other possible products for exchange include boar tusks, antlers, feathers, honey, nuts, fat, ocher, and skins (Robb 2007:227–228), and new pottery ideas such as painted designs to add to the varied impresso ware (Isetti and Traverso et al., Chapters 5.1–5.4, this volume). To these we must add the likely prized opportunity of ritual participation that only those agents controlling access to Grotta Scaloria could provide.

Addendum: Scaloria Cave Attribute System

The attribute system was designed with the lithics in hand in Manfredonia in 1980 to specifically isolate characteristics of that assemblage—its form, petrology, use, and use life. Each value of the 25 variables was coded numerically to be compatible then with the use of SPSS and, for this report, Excel. Not all the variables (and values) were applied in this chapter, the final report, because there was no way to re-check the 1980 documentation. Nevertheless, the entire system is here included as an example of that earlier work; Appendix 9 (online at www.dig.ucla.edu) presents the resulting numerical print-out.

A. ID#

B. Provenience

Trench: Refers to excavation units
1–7, 8, 9, 10
11=Extension of trench 8
12=NE extension of trench 5
13=Fill at entrance
0=Missing information
01=Surface

Level: Vertical location numbered logically
1–9, 10
11=Trench 10, group 1 burial
0=Missing information
01=Surface
02=Mixed
03=Bedrock

Locus: Refers to smaller locus within trench numbered logically
1=N
2=S
3=E
4=W
5=NW
6=SW
7=Center
8=NE
0=Missing information
01=Surface
02=Baulk

C. SC#

D. Form

(1) Core/microcore: negative relief of flaking
(2) Rejuvenation flake (RJ flake): a piece that was struck from a core to renew striking surface or platform
(3) Blank: broken and/or amorphous form, identified as product of flaking
(4) Blade: symmetrical piece, idealized measurement ratio generally twice as long as wide
(5) Bladelet: a symmetrical piece, idealized measurement generally less than 4 cm long
(6) Flake: asymmetrical piece
(7–10) Campignian forms
 (7) Trapezoidal Campignian
 (8) Circular Campignian
 (9) Triangular Campignian
 (10) Oval Campignian
(11) Burin spall
(12) Point
(0) Missing information

E. Typology

(1) Backed blade: a blade (or fragment thereof) with wear along one or both lateral margins opposite utilized edge
(2) Discoid: ovoid or round piece (or fragment thereof) with retouch and/or edge wear along the perimeter
(3) Point: a piece with converging margins that resembles an arrowhead
(4) Perforator: similar to 3, but the shape and functional portion may be untraditional
(5) End scraper: generally a blade form (also a flake) with retouch and/or use wear at distal or proximal edge
(6) Plain scraper: piece of any asymmetrical shape with retouch and/or edge wear along margin or end
(7) Out of series
(8) Core or fragment utilized
(9) Non-utilized core or fragment
(10) Campignian

F. Petrology

(1) Flint brown
(2) Creamy
(3) Gray
(4) Dark gray
(5) Red
(6) Brown/black
(7) Fire altered
(8) Obsidian

(9) Quartz
(0) Missing information

G. Cortex: outer "skin" of original core

Note: If cortex is observable for a large percentage of the assemblage, it may mean that flaking has been taking place on the site rather than at the raw material source, or that the raw material source is within or close by the site.

(Obs) Observable
(NO) Not observable
(MI) Missing information

H. Bulb

Note: Result of applied force in detaching blanks appears on ventral side or proximal end.

(Obs) Observable
(MOD) Observable and modified (often deliberately struck off).
(NO) Not observable (piece broken; no bulb)
(CORE) Core (negative bulb observation)
(Campignian) Does not apply (DNA)
(MI) Missing information

I. Proximal end

Note: The area struck to detach a blank may or may not be prepared by grinding, roughing, and so on.

(Obs) Platform observable, no preparation
(1) Platform observable, with preparation
(NO) No platform, broken
(MOD) No platform but end modified by use or retouch
(UseRET) Platform observable and end modified by use or retouch
(Core Campignian) Core (DNA)
(MI) Missing information

J. Distal end

(Feathered) Present, feathered
(Hinged) Hinged
(Use ret) Modified (use or retouch)
(NO) Not present=truncated, broken
(CORECAMPIGNIAN) Does not apply=core or fragment or Campignian
(MI) Missing Information
Measurements taken at maximum (in mm)

K. Length in mm (taken at maximum)

(0) Missing information

L. Width in mm (taken at maximum)

(0) Missing information

M. Thickness in mm (taken at maximum)

(0) Missing information

Spine plane angle formed at edge where ventral and dorsal sides meet

N. Spine plane angle L margin (SP LM)

O. Spine plane angle R margin (RM SP)

P. Spine plane angle discoid edge (Disc SP)

Q. Spine plane angle working edge—proximal end

(1) Not worked
(0) Missing information

R. Spine plane angle working edge—left margin

(1) Not worked
(0) Missing information

S. Spine plane angle working edge—distal end

(1) Not worked
(0) Missing information

T. Spine plane angle working edge—right margin

(1) Not worked
(0) Missing information

U. Spine plane angle working edge—discoid

(1) Not worked
(0) Missing information

Location and definition of edge wear: based on observable scars, polish, etc.

Dorsal edge wear, ventral edge wear
(02) Proximal end use
(04) Right margin use
(06) End and marginal use
(20) Distal end use
(24) Distal end use plus right margin

(40) Left margin
(44) Both margins
(46) Both margins and one end
(60) Distal end and left margin
(64) Distal end, left and right margins
(66) Used all edges

Retouch

X. Retouch dorsal

Y. Retouch ventral

Condition

Z. Single, multiple, heavy use; unused

(1) Single end use
(2) Double end use
(3) Triple end use
(4) All end use

Riassunto

Oltre 2000 frammenti di industria litica vennero studiati nel 1980 presso il Museo di Manfredonia. Questo gruppo di manufatti, recuperati durante la campagna del 1979 a Scaloria, è datato al periodo compreso tra il 5600 e il 5300 cal BCE (vd. Robb in questo volume cap. 2.3). Entrambe le raccolte del 1978 e 1979 sono qui considerate unitamente, poiché i frammenti del 1978 provengono dal quadrato 1-3 all´interno della grotta e dalle operazioni di pulizia dell´area adiacente all'entrata (vd. Conati Barbaro in questo volume cap. 6.1).

Durante la campagna del 1979 i quadrati 4–10 furono scavati nella camera superiore della grotta e i quadrati 5 e 8 furono ulteriormente allargati. Il primo, situato presso l´entrata della grotta, è il più ricco in termini di frammenti di industria litica e la percentuale delle forme ivi ritrovate riflette il corpus nella sua interezza.

La selce è la materia prima maggiormente utilizzata per la produzione di nuclei, di lame, di schegge e di raschiatoi. Ciottoli e affioramenti naturali offrirono occasionali opportunità di approvvigionamento, ma la maggior parte della selce proviene dalle miniere della penisola garganica. Queste ultime, situate lungo la costa orientale della penisola stessa presso la città di Vieste, sono considerate le più antiche miniere di selce d´Europa. Sebbene la grotta si trovi nella zona di raccordo tra il Tavoliere e il massiccio del Gargano, per raggiungere le miniere è necessario stabilire e seguire i pochi e stretti passi montani. Due sistemi di commercio o scambio sono suggeriti: i pastori che utilizzavano le risorse del Gargano durante i caldi mesi estivi possono aver scambiato prodotti animali (o anche miele o piume) con selce; in alternativa, minatori coinvolti nel commercio o scambio possono essere entrati in contatto con i navigatori che veleggiavano attorno alla penisola garganica per approdare sulla costa pugliese. La navigazione era una conoscenza già acquisita durante il VI Millennio.

Un sistema di schedatura dell´industria litica (vd. Catalogo) fu elaborato nel 1980. Esso comprende dati inerenti la variabilità formale, le misure, le tracce di manifattura e d´uso, il ritocco e la vita d´uso dei frammenti litici. Queste informazioni sono state consultate circa 30 anni dopo presso UCLA per la preparazione di questo volume. Gran parte di questa documentazione si è conservata in ottime condizioni, ma, come naturale, essa contiene delle deduzioni datate in riferimento alle decisioni dello scheggiatore, quali la scelta delle materie prime, le forme, e l´uso quotidiano degli strumenti. I risultati indicano che circa i tre quarti del corpus presentano pesanti tracce di ritocco e di use-wear sui diversi lati.

Sebbene le date radiocarboniche di campioni raccolti presso il quadrato 8 stabiliscano una frequentazione della grotta durante il Mesolitico e l´Epipaleolitico, strumenti attribuibili a questi periodi non vennero rinvenuti durante lo scavo. È però altrettanto vero che lo studio dei resti animali (vd. Bartocewicz e Nygeres in questo volume cap. 3.3) indica che l´allevamento di caprovini addomesticati sostituì la caccia di specie animali selvatiche durante il periodo Neolitico.

Lo studio dei resti umani ritrovati nella grotta indica pratiche perimortali. Queste includono piccoli tagli, specialmente attorno all´area cranica (vd. Robb et al. in questo volume cap. 4). Piccole lame di affilata ossidiana o selce furono usate per completare questo tipo di azioni. In un caso, i resti di uno scheletro umano (quadrato 10) vennero rinvenuti in associazione con piccole lame di ossidiana. Sebbene il numero di ossidiane recuperate a Scaloria sia nettamente inferiore rispetto al numero dei frammenti in selce, il sito di Catignano, situato a nord est di Scaloria e molto simile in termini cronologici e di cultura materiale, ha fornito una grande quantità di frammenti in ossidiana.

Un numero rilevante (78) di piccole asce "campignane" bifacciali di forma circolare, triangolare o ovale è documentato. In particolare, residui di riduzione furono rinvenuti nella zona esterna alla grotta (vd. Conati Barbaro in questo volume cap. 6.1). L´uso di questo strumento non è stato ancora assodato; numerosi esempi

sono riportati da altri siti della regione del Gargano e dai siti trincerati del Tavoliere.

Così come la luce intensa offre ai ricercatori la possibilità di identificare con maggiore facilità residui di attività di scheggiatura, non è stata sorpresa individuare che la gran parte di tali attività era completata all´esterno dalla grotta. In aggiunta, è proprio il quadrato 5 (ovvero quello con il più alto numero di frammenti litici) a ricevere la maggior quantità di luce essendo situato in prossimità dell´apertura della grotta. Una recente visita a Scaloria compiuta da E. Isetti e A. Traverso (e-mail 20 Set. 2013) ha peraltro permesso di stabilire che l´entrata sia più larga di quanto in precedenza ritenuto.

Lo studio dell´onnipresente strumentario litico può pertanto rivelare comportamenti delle popolazioni neolitiche, quali le scelte di approvvigionamento di materie prime, le capacità nella tecnica della scheggiatura, il coinvolgimento in reti di scambi o commerci e in ultima analisi anche l´uso e le attività rituali condotte all´interno della Grotta Scaloria.

6.3. The Ground and Polished Stone Assemblage

Patrizia Garibaldi, Eugenia Isetti, Irene Molinari, and Guido Rossi

Introduction

This assemblage of 71 pieces of ground and polished stone is listed in numerical and typological sequence in the catalogue. It includes finds from the Quagliati-Drago 1930s excavations (22), either checked directly or through reference to O'Hare (1990), artifacts collected by S. Tiné in the 1960s (2), and materials from 1978–1979 excavations of Gimbutas-Tiné (47).[1] All of these were recovered from deposits in the "Camerone Quagliati," the Upper Chamber of the cave. Each illustrated artifact has a cross-reference to the figures and plates herein.[2]

Ground Stone Tool Typology

Artifacts included are ground-edge tools (23; Figures 6.3.1–6.3.4), many of which show signs of reuse (11; Figures 6.3.5–6.3.7). Other important categories include hammer/handstones and other objects made from pebbles or flint and calcite nodules (16; Figures 6.3.8–6.3.10), and grinding stones (16; Figures 6.3.8 and 6.3.11–6.3.13). There are also three other tools that cannot be assigned to these categories (Table 6.3.1), and four axes which are described on the basis of previous publications as they are no longer found in collections (Figure 6.3.14). The raw materials identified through macroscopic[3] examination include limestone and biocalcarenite (30), sandstone (9), quartzite (1), flint (5), basalt (1), calcite (1), diorite (1), slate (2), and greenstones (16, including 7 of jadeites). Five tools are of unidentified raw material (Table 6.3.2).

Table 6.3.1. Typology of Scaloria assemblage

Ground-edge tools	25
Grindstones/handstones	16
Reuse of butts and ax bodies	11
Pebbles/nodules	16
Other tools	3

Table 6.3.2. Petrology of Scaloria assemblage

Greenstone	9
Jadeite	7
Slate	2
Diorite	1
Indeterminate	5
Limestones	22
Sandstone	9
Calcite	1
Flint	5
Quarzites	1
Biocalcarenite	8
Basalt	1

Lithic Types Used

Lithic types such as greenstones, diorite, and slate come from outside Puglia; in particular the greenstones probably refer to ophiolithic outcrops in Calabria with the exception of Alpine jadeites and eclogites. The other lithic types are found locally (Table 6.3.3). Greenstones refer to a range of tough, fine-grained metamorphic rocks including jade, jadeites,

[1] Four complete axes from the excavations in 1978–1979 have been taken into consideration by means of photos or drawings made at the moment of their discovery, even if it has not been possible to re-examine them directly (cat. nos. 22–25, Figure 6.3.14).

[2] Note that the numbers used to label each tool in Figures 6.3.1 through 6.3.14 are the same ones used to represent each tool in the catalogue of stone tools below.

[3] The lithic types are those recognized by O'Hare (1990) for objects derived from the Quagliati-Drago 1930s excavations (no longer available for study); those found in the Gimbutas-Tiné 1978–1979 excavations were examined by M. Firpo and I. Rellini during their analysis of Scaloria Cave.

Table 6.3.3. Distribution of assemblage

Local	46
Imported	18
Indeterminate	7

eclogites, serpentinites, and amphibolites. To date, no sources of jadeite and eclogite are known in Calabria. Thus, the greenstone axes from Scaloria must be considered all of an exotic origin, whether Calabrian or Alpine.

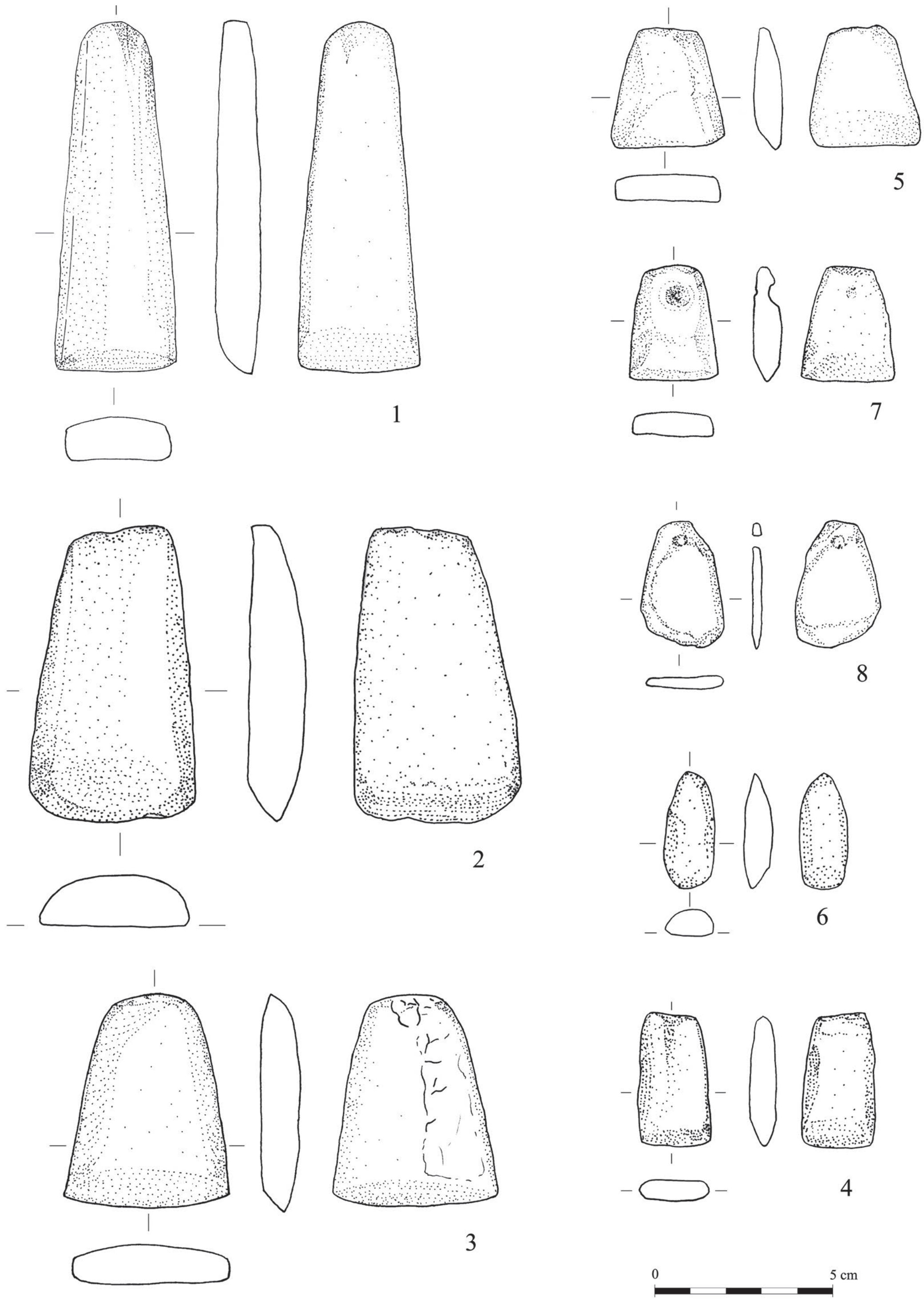


Fig. 6.3.1. Ground-edge tools (drawings), cat. nos. 1–8 (redrawn from E. Florido).

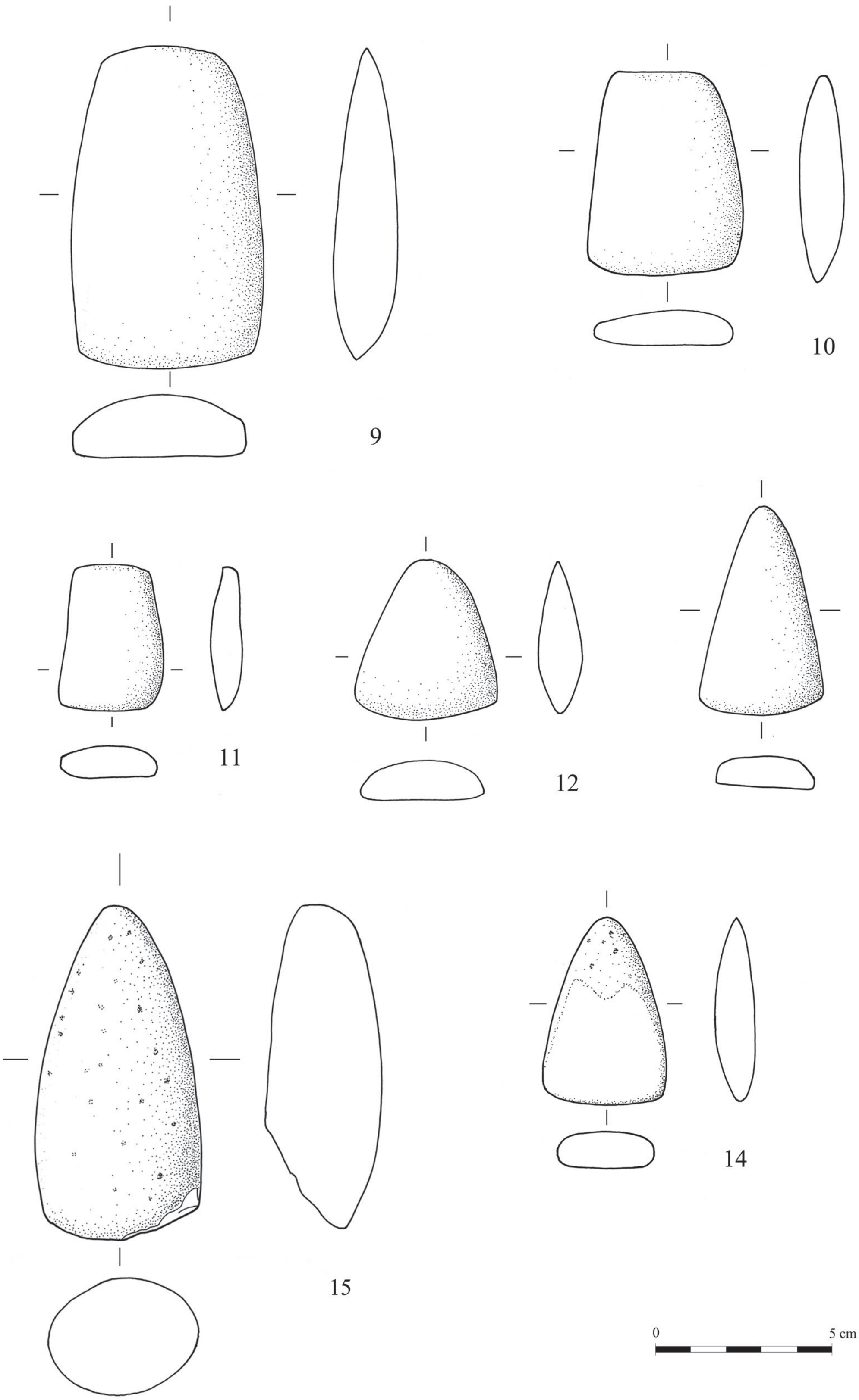


Fig. 6.3.2. Ground-edge tools (drawings), cat. nos. 9–15.

Fig. 6.3.3. Ground-edge tools (photos), cat. nos. 9–14, 18.

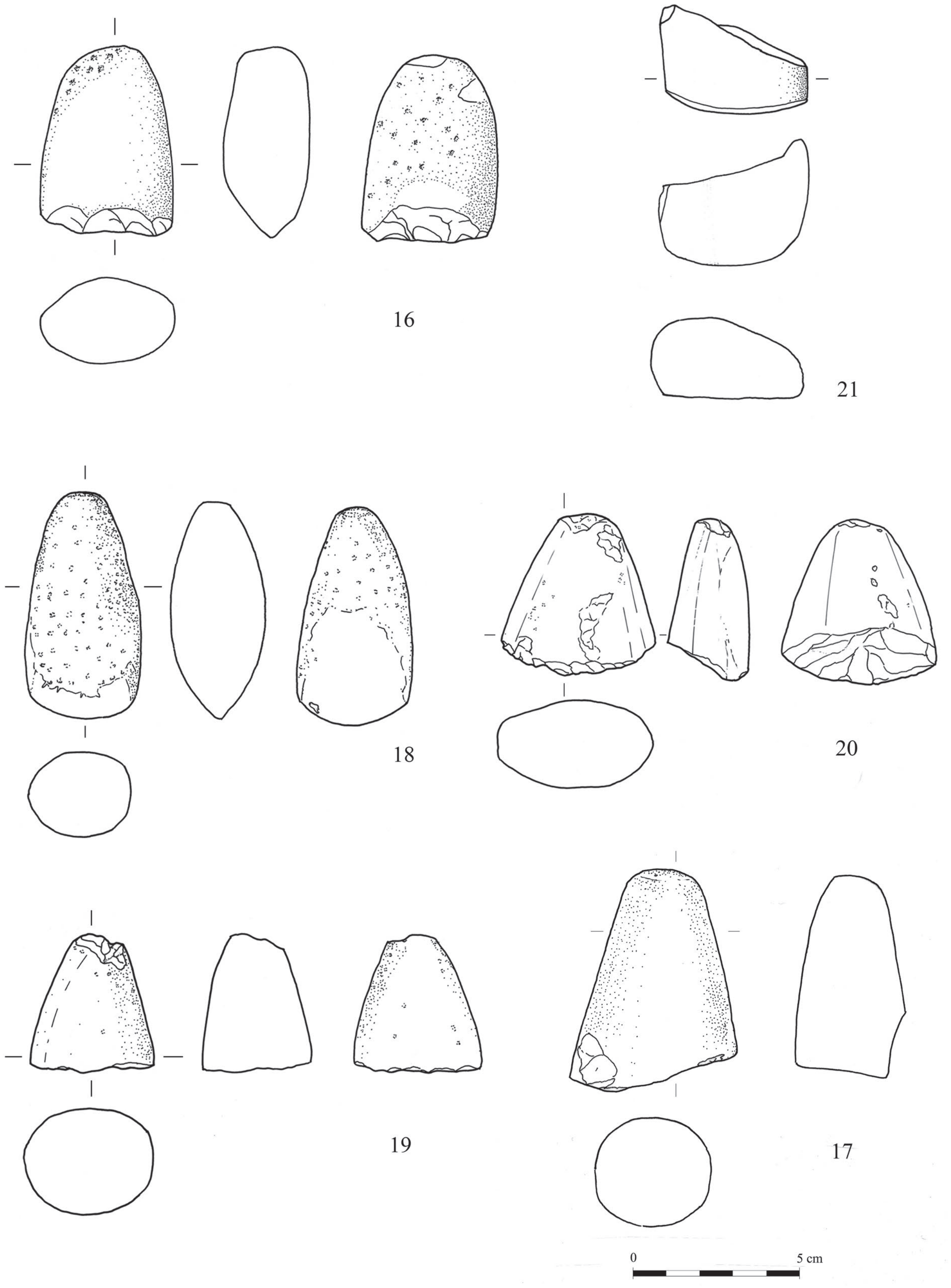


Fig. 6.3.4. Ground-edge tools (drawings), cat. nos. 16–21.

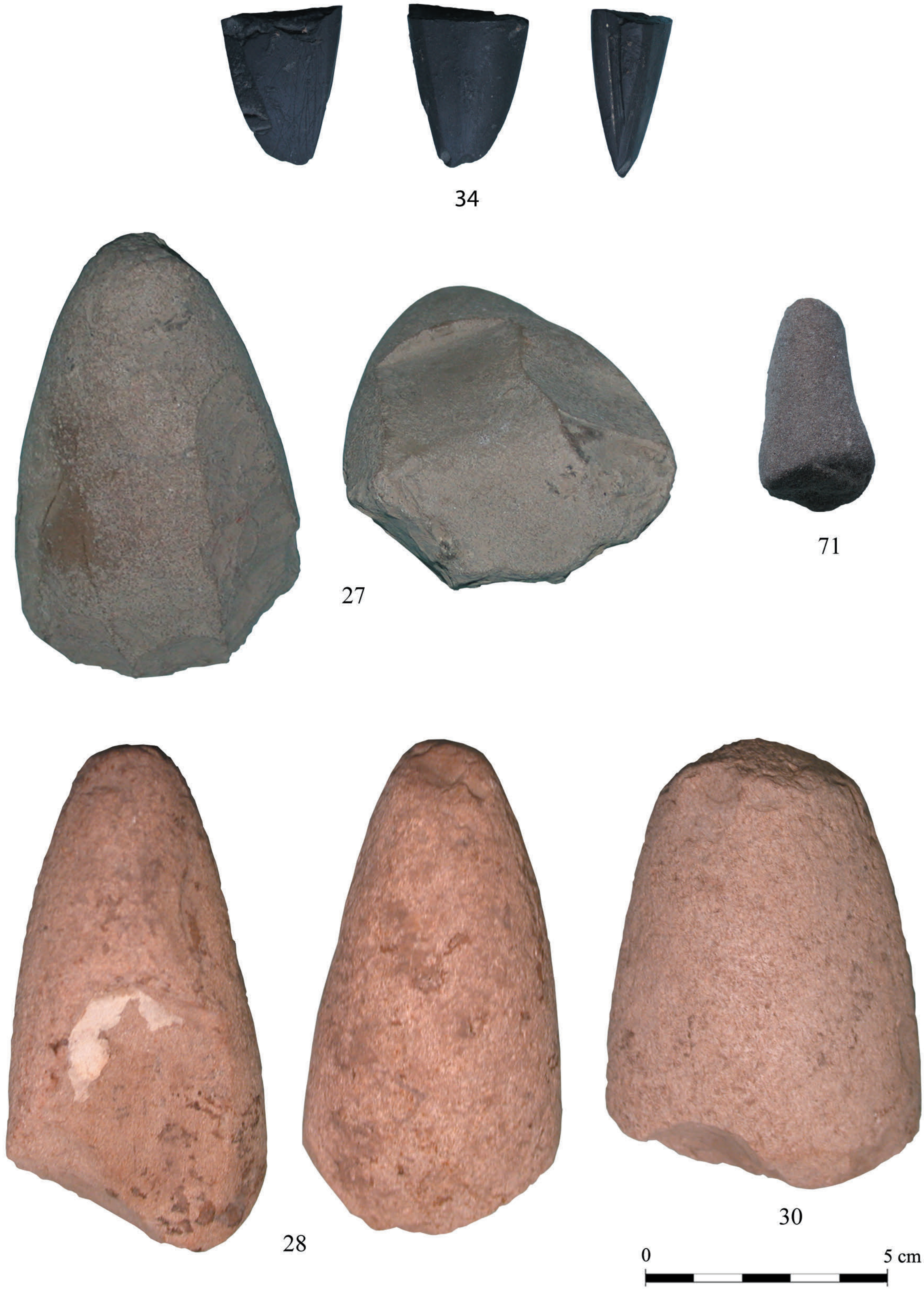


Fig. 6.3.5. Reuse of butts or ax bodies (photos), cat. nos. 27, 28, 30, ellipsoidal cross-section tool fragment with diffuse wear traces (cat. no. 71), cutting-edge tool fragment showing very deep wear traces (cat. no. 34).

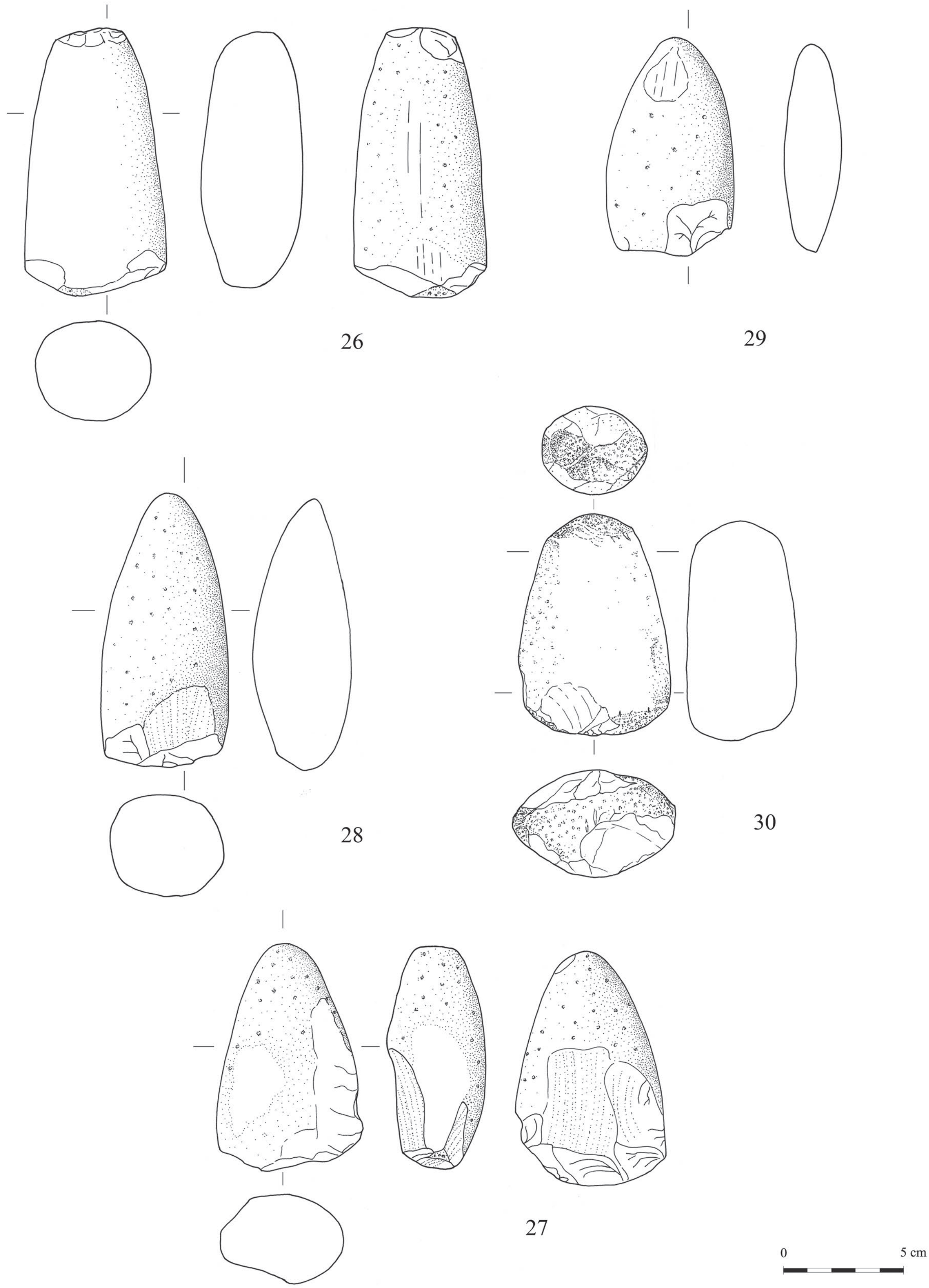


Fig. 6.3.6. Reuse of butts or ax bodies (drawings), cat. nos. 26–30.

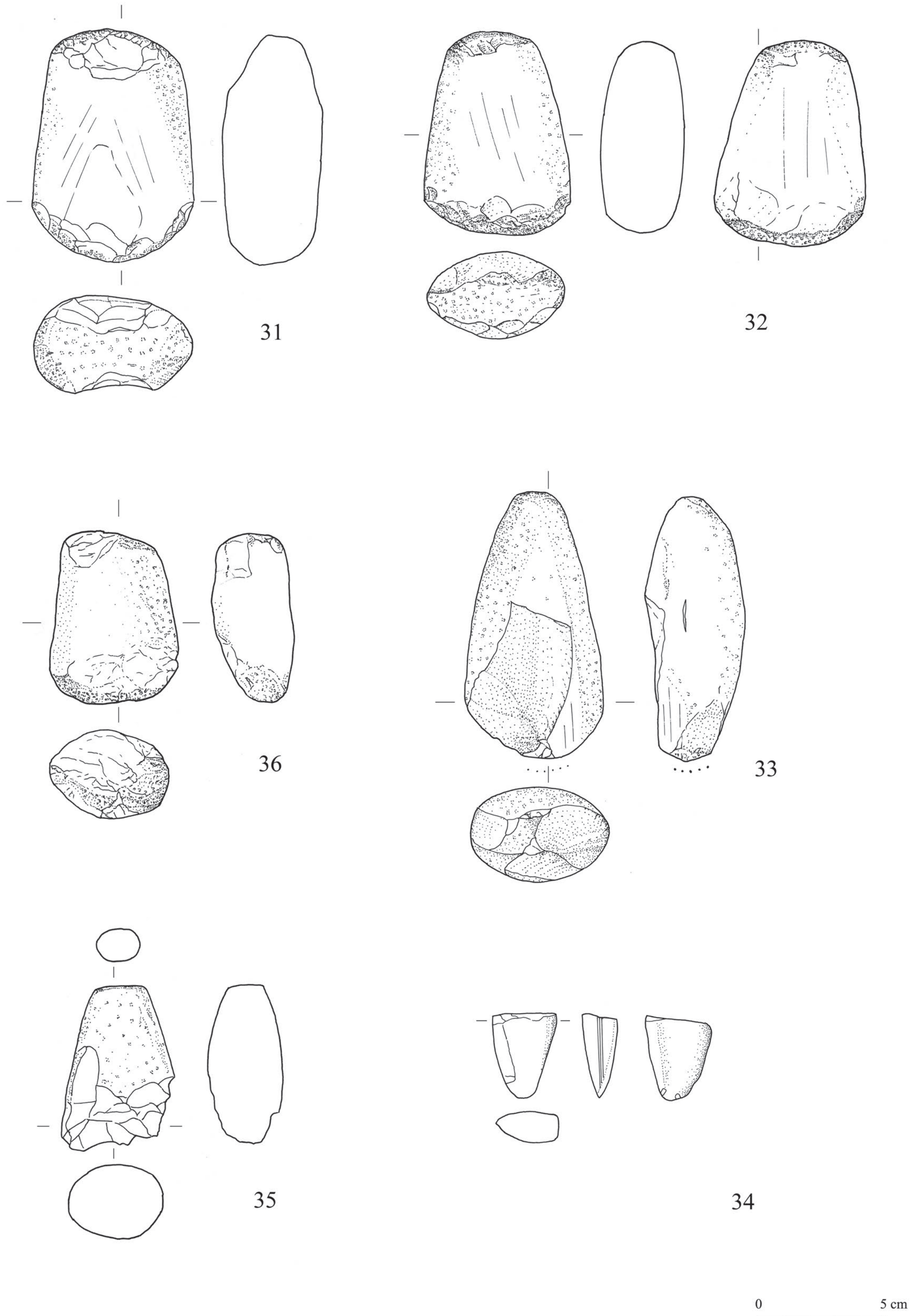


Fig. 6.3.7. Reuse of butts or ax bodies (drawings), cat. nos. 31–36.

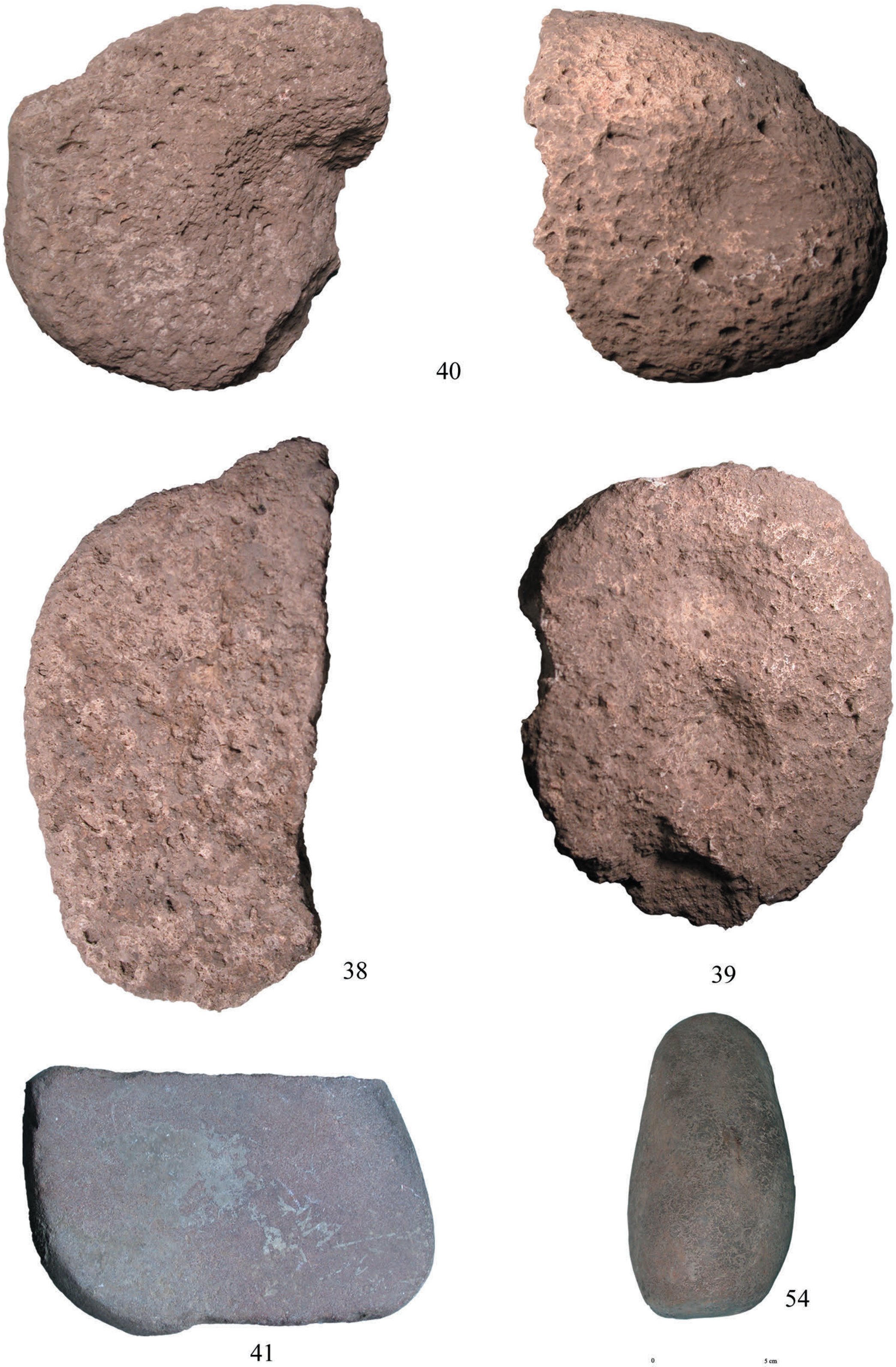


Fig. 6.3.8. Grindstones (photos), cat. nos. 38–41, and hammer handstone (cat. no. 54).

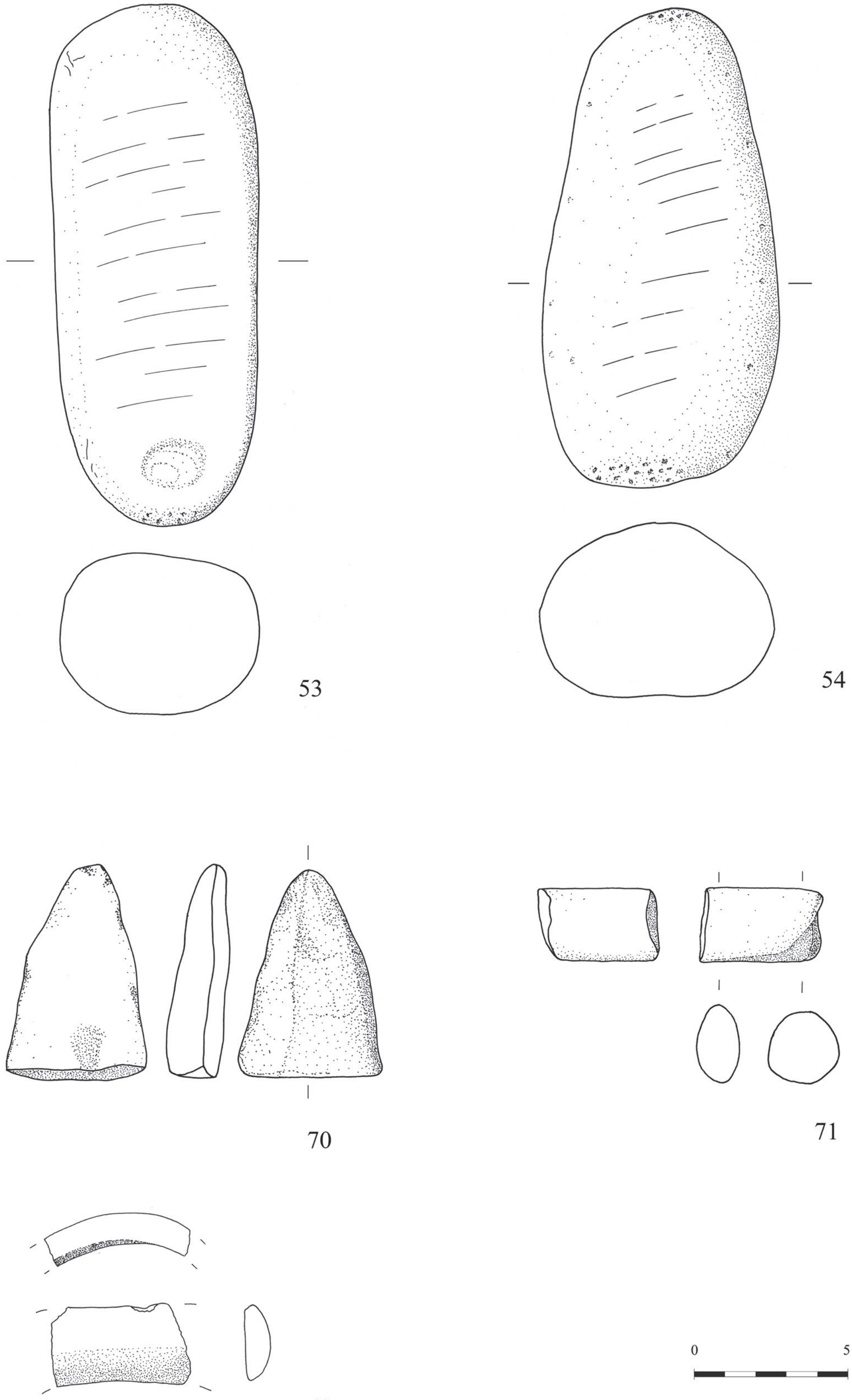


Fig. 6.3.9. Hammer/handstones (drawings), cat. nos. 53–54, limestone ring-stone fragment (cat. no. 69), and other stone objects with use-wear traces (cat. nos. 70, 71).

Fig. 6.3.10. (a) Pebbles (photos) not included in catalogue. (b) Pebbles with use-wear traces (photos), cat. nos. 59, 60, 62–64, and with ocher traces (cat. no. 68).

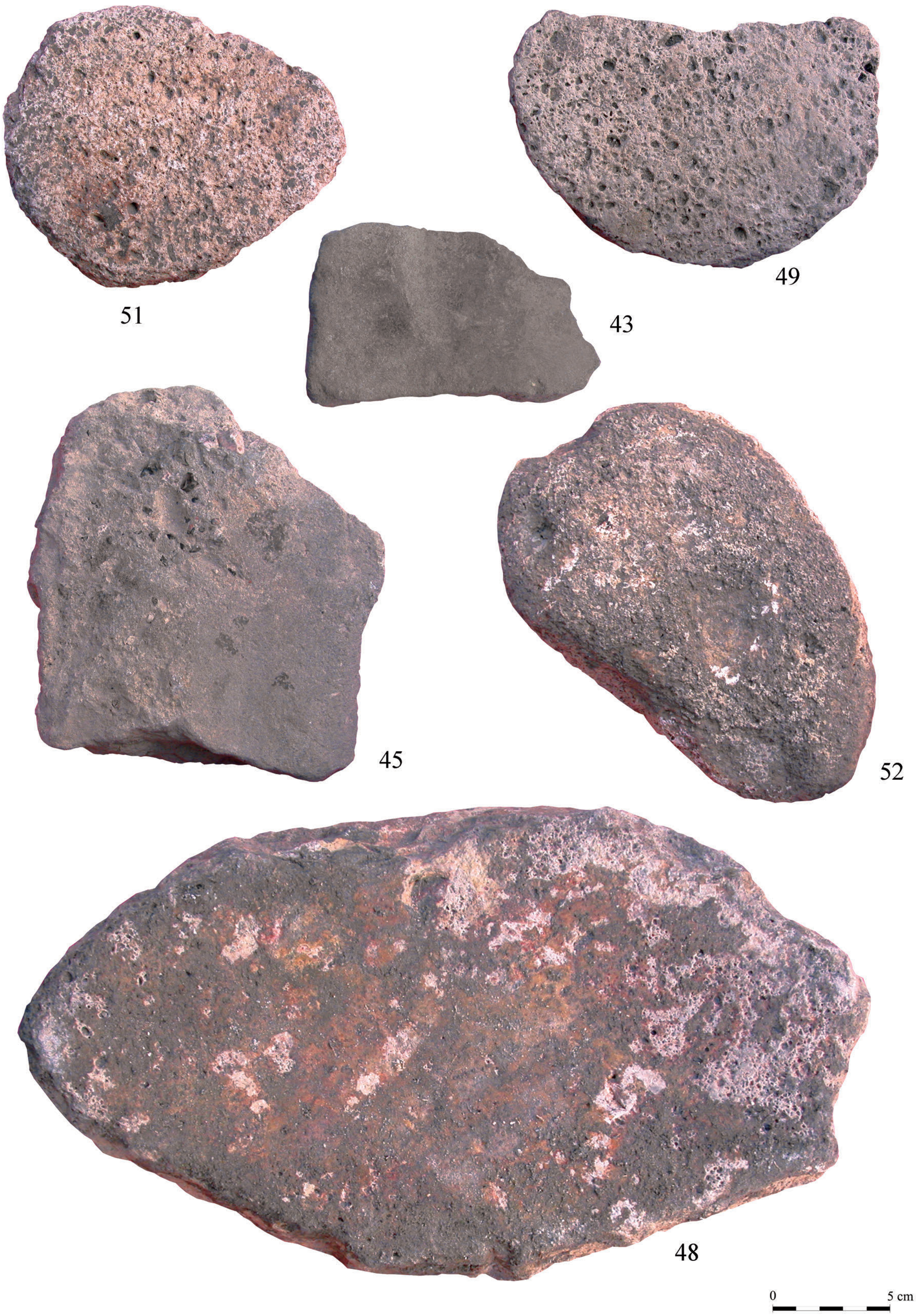


Fig. 6.3.11. Grindstones (photos), cat. nos. 43, 45, 48, 49, 51, 52.

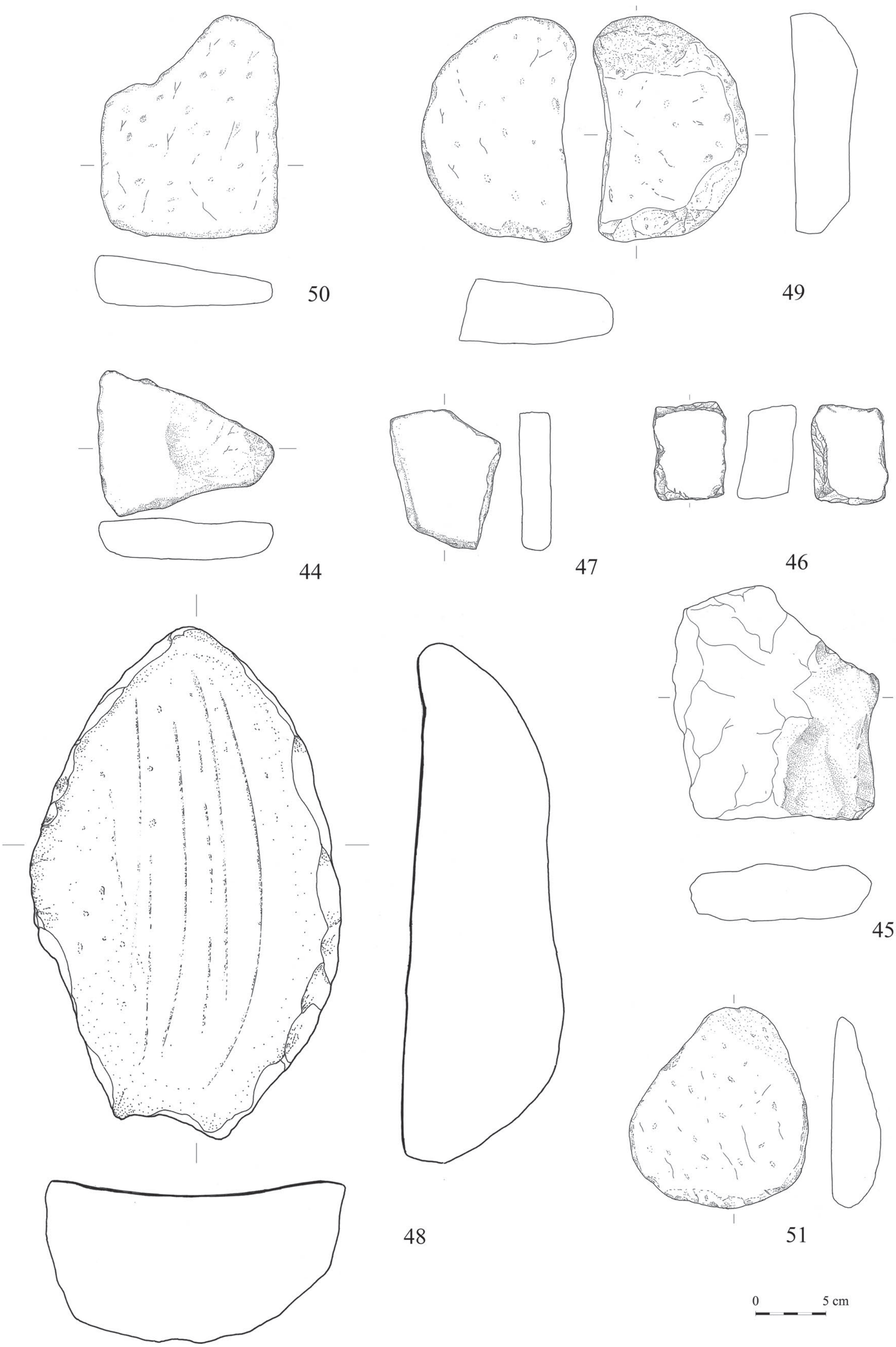


Fig. 6.3.12. Grindstones (drawings), cat. nos. 44–51.

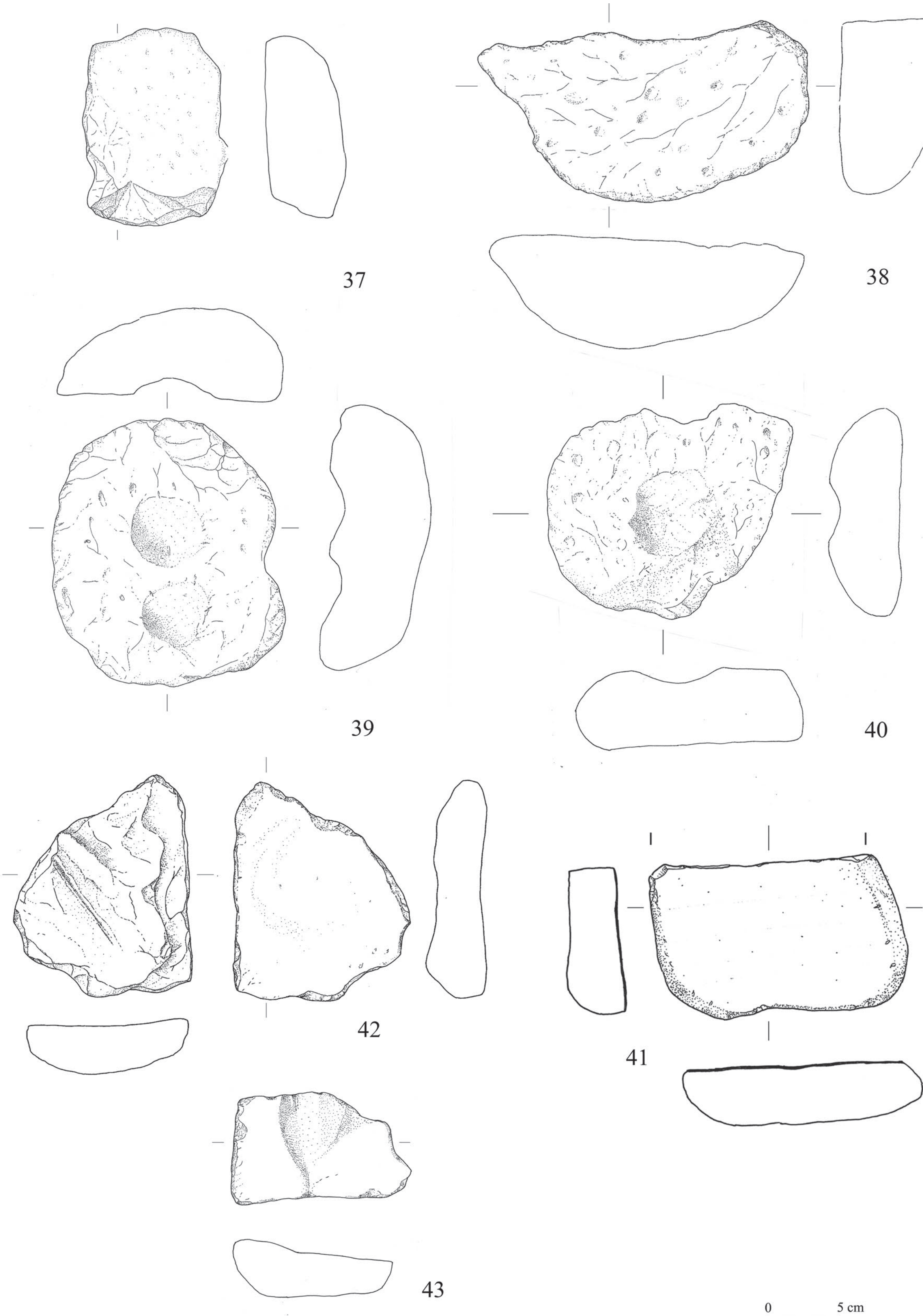


Fig. 6.3.13. Grindstones (drawings), cat. nos. 37–43.

Fig. 6.3.14. Ground-edge tools no longer found, cat. nos. 22–25, and ring stone fragment (cat. no. 69).

Ground-edge Tools (Figures 6.3.1–6.3.4 and 6.3.14)

Examination of the artifacts from the different excavation campaigns in the Upper Chamber of Scaloria Cave revealed an abundance of ground-edge tools, including 25 whole or fragmentary artifacts, particularly from the Quagliati excavations. Eleven examples of the reuse of axes or ax fragments show characteristics completely different from those of other ground-edge tools: a greater thickness (more than 30 mm and sometimes up to 40 mm) and round cross-sections. They are made of local limestone or greenstone, probably of Calabrian origin. Among ground-edge tools, there are 15 small- or medium-sized axes of greenish stone. All of these are polished, in one case showing a perforated suspension hole (Figure 6.3.1:8). Raw materials for these include Alpine jadeite (n = 7; cat. nos. 1–5, 7, 11) and other greenstone (n = 8; 10, 12–14, 18–20, 24). There are also axes of slate (n = 1; cat. no. 8); and basalt (n = 1; cat. no. 9). Generally, these small axes present quadrangular to plano-convex cross-sections, thicknesses from 0.7 to 1.5 mm, symmetrical as well as asymmetrical cutting edges; in six cases, they appear to be complete with thin, square butts (Figures 6.3.1:1–5 and 6.3.14:24).

The remaining objects are ax fragments made of local petrology less resistant than greenstones, showing a circular or oval cross-section, pointed butts, and remaining pecked surfaces, with infrequent traces of polishing (Figures 6.3.2:15, 6.3.4:17, 6.3.4:21, and 6.3.14:25). These tools are quite remarkable in the archaeological record of southern Italy (Garibaldi et al. 2014). Mid-size axes, with biconvex cross-section and shape and made from locally available raw materials, are documented from, among others, surface finds in Calabria (Salerno and Pessina 2004), in Puglia, at Passo di Corvo (Rossi 1983), in Abruzzo, at Catignano (Zamagni 2003), at Ripoli (Cremonesi 1965), and at Grotta dei Piccioni of Bolognano (Cremonesi 1976). Small greenstone axes are very well represented elsewhere in southern Italy, especially in caves used for ritual purposes (O'Hare 1990) such as (besides Scaloria) Caverna dell'Erba (Avetrana, Taranto), Grotta dei Cervi (Porto Badisco, Otranto, Lecce), Grotta Sant'Angelo (Ostuni, Brindisi), and Grotta Funeraria (Matera). They are also present in various sites in Puglia and Calabria (Garibaldi et al. 2014:229).

The excavations of 1978–1979 uncovered a good sample of thicker, squat, ground edge tools made of local raw materials (quartzite, limestone) which present slightly pecked or unpolished surfaces; they were also fragmentary and reused (Figure 6.3.7:31–33, 35, 36). Other axes are small to medium in size and squat-shaped (Figures 6.3.3:18 and 6.3.4:18), whereas two butt fragments with ellipsoidal to circular cross-sections may belong to larger axes (Figures 6.3.4:16 and 6.3.6:29. A diorite trapezoidal ax can be added to this category as well (Figure 6.3.14:22).[4]

The same 1978–1979 excavations provided some information about the deposition contexts of some polished stone tools. Two axes, in particular, shared a similar context; Winn and Shimabuku (1980: 10) described one as "an ax of dark stone" (Figures 6.3.3:18 and 6.3.4:18); it comes from Trench 1, from a small cavity bordered by flat stones, containing three animal vertebrae and a Campignian tool. A similar discovery comes from Trench 2, where a "polished stone ax" (Winn-Shimabuku 1980:10, fig. XIV:B) was found in a cavity bordered by small, flat, slab-like stones, containing three animal vertebrae and Campignian tools, including a pick-ax and broad blade; a bone awl was also associated with this group.

Reuse of Butt and Ax Bodies (Figures 6.3.5–6.3.7)

The minimal hardness of local raw material (limestone, quartzites) suggests that many fragmentary axes must have had other uses, based on smooth or pecked wear traces (handstones, pestles?). There are 11 axes or fragments thereof with precise characteristics: medium to long in size, made of local limestone, displaying a circular cross-section, and with pecked or partially polished surfaces. A fragment of a cutting tool seems to have been obtained by reuse of the ax cutting-edge, sawed in half lengthwise, exhibiting deep wear traces (Figures 6.3.5:34 and 6.3.7:34).

Pebbles (Figure 6.3.10)

Some pebbles—of quartzite, limestone, sandstone, and calcite—also show pecked or polished wear surfaces. As also documented at Grotta dei Piccioni (Abruzzo) (Cremonesi 1976:209–210), the coexistence and overlap of different wear traces suggest both unspecialized

[4] This piece is no longer available for study.

functions as well as design for multiple use. The pebbles (Figure 6.3.10a) show smoothed faces, or no clear traces of use, or a few signs of pecking. One fragmentary flint pebble displays remains of ocher on both smoothed faces (Figure 6.3.10b:68). Working faces were noted on the utilized pebbles with variously shaped forms and cross-sections (Figure 6.3.10b:62, 64).

Grinding Stones (Figures 6.3.8 and 6.3.11–6.3.14)

Objects belonging to this category are usually referred to as grindstones and handstones. Several different kinds can be distinguished. The first type (n = 7) is mid-sized, mostly of biocalcarenite with a vacuolar grain, coarsely flaked, approximately circular in shape, and plano-convex in cross-section. The working surface is flat and mostly rough, with rare smooth wear traces. In one case (Figures 6.3.11:49 and 6.3.12:49), both faces present a working surface with polished traces. Another grindstone (Figures 6.3.8:40 and 6.3.13:40) shows circular hollows on both faces. Two other grindstones have two hollows on the same face (Figures 6.3.8:39, 6.3.13:39, and 6.3.11:52). Studies in progress (Annabelle Milleville, personal communication 2015) indicate that naturally rough and vacuolar surfaces, such as those of biocalcarenite artifacts, offer good results in grinding cereals, even if the reduced dimensions in the Scaloria samples make this interpretation uncertain. The biocalcarenite blocks look coarsely flaked, and in many cases show evidence (through shape, size, and surface) of pebbles being used as available raw material.

The second group (n = 6) includes small-sized stone pieces, of fine- or medium-grained sandstone slabs or fragments; they present smooth, inclined, worn surfaces or hollows. The fragmentary state of these finds does not allow an exact reconstruction of the tools' shape. In one case (Figures 6.3.8:41 and 6.3.13: 41), the use of a pebble created a flattened working surface. Two handstones (Figures 6.3.9:53, 6.3.8:54, and 6.3.9:54) show smooth surfaces and plano-convex cross-sections; one has a partially pecked surface. The third type includes a whole, concave, "saddle-backed" grindstone (Figures 6.3.11:48 and 6.3.12:48), and one flat fragment (Figures 6.3.8:41 and 6.3.13:41). Both are large-sized and could have been used for grinding cereals.

Miscellaneous Worked Stone (Figure 6.3.9)

Among the miscellany is a fragment of a limestone circlet type E (Tanda 1980), plano-convex in cross-section, entirely polished, with a diameter of approximately 10 cm (Figures 6.3.9:69 and 6.3.14:69), recovered from the external deposit levels related to the Lower Scaloria facies (Winn and Shimabuku 1980:27). Also included is an unidentified stone tool fragment (Figures 6.3.5:71 and 6.3.9:71) with sub-ellipsoidal cross-section and evidence of abrasive action observable on several working faces.

General Characteristics

Comparable to similar Neolithic industries—for example, Grotta dei Piccioni (Cremonesi 1976:208–209)—the grindstones, tools obtained from pebbles, and limestone axes and their alterations show little specialization. This polyfunctionality could have occurred over time (cf. also Catignano: Zamagni 2003).

The site's industry includes evidence of the following activities: the manufacture of pottery (polishers and burnishers), grinding and food processing (grindstones and other working tools), bone alteration (stone tools with cavities or grooves), wood processing (cutting edge tools), lithic tool manufacture (pestles), and ocher utilization. The last hypothesis is suggested by the presence of ocher on the site and by a tool showing ocher traces (Figure 6.3.10b:68).

Some comments can be made regarding the manufacture techniques of polished stone tools found in the cave. Rough-outs and manufacture discards of every lithic type are absent in the assemblage. The tools made of local materials document the use of different manufacturing techniques: roughening up, pecking, polishing, and sawing.

Contexts of Finds

Some observations can be made about contexts. A big grindstone, suitable for cereals (Figures 6.3.11:48 and 6.3.12:48), was found upside down on the floor of level 5, trench 5, at the foot of the landslide cone. It was probably related to the cave's use as a dwelling.[5]

[5] It seems improbable, even if we cannot exclude it, that there was a cultural/ritual relationship between this grinding stone and the use of the cave as at Grotta Patrizi, Sasso di Furbara (Patrizi et al.1954), Grotta della Tartaruga (Coppola 1988), Grotta S. Angelo (Di Fraia and Grifoni; Cremonesi 1996), and Grotta delle Felci, Capri (Rellini 1923). For further information on the stone artifact deposition in cult caves, see Whitehouse 1992.

Two axes, discussed earlier, come from stone-defined cavities together with animal vertebrae, Campignian tools, and, in one case, a bone awl. One of them (Figures 6.3.3:18 and 6.3.4:18) comes from Trench 1, level 4 (Winn and Shimabuku 1980:10) and has been dated to 5640–5310 BCE/5480–5067 BCE. Deposition in such cavities can be compared with evidence in ritual caves in central and southern Italy: Grotta Continenza (Grifoni Cremonesi 2002), Grotta Piccioni (Cremonesi 1976), and Grotta S. Croce (Radina-Ronchitelli 2002).[6]

The concentration of thinner greenstone axes was observed in Quagliati's excavations. Except for one from the 1978 excavation (Figure 6.3.14:24), these axes seem to be absent in the later campaign. In the 1978–1979 excavation, there seems to be limited pottery dated to the late Neolithic, Eneolithic, and Bronze Age. On the other hand, these materials are much better represented in Quagliati's collections; the chronological context of the greenstone axes from Quagliati's work needs further investigation.

Raw Material Supply and Circulation

Scaloria Cave and Neolithic Apulian and Materano entrenched villages are quite far from the possible supply sources of greenstones used for polished stone axes. However, it is easy to find greenstones in various Calabrian areas (Garibaldi et al. 2014: 228; Leighton 1992; O'Hare 1990) in the shape of cobble deposits and in larger outcrops. Circulation of this raw material in Neolithic southern Italy is currently under study (Garibaldi et al. 2014).

At Scaloria, greenstone axes, either from Calabria or the Alps, are small to medium in size. Long axes of polished stone and greenstone are documented in Puglia from finds at Laterza, Statte, Masseria Barbuzzi (Monteparano, Taranto), and Ceglie Messapica (Coppola 2003; O'Hare 1990). At Scaloria, complete, long greenstone axes are absent; however, reused quartz-limestone long axes were reported from the 1930s Quagliati excavations.

We still do not understand the relationship between polished stone ground edge tools and Garganian flint Campignian tools; this high-quality flint had been exploited since the Early Neolithic at the mines of Miniera and Defensola.[7] In the Quagliati-Drago excavations, at least seven particularly fine greenstone axes were found. They are quite thin and fully polished; measuring 2 to 10 cm long, almost all of them present flattened sides and no signs of wear. This raw material only comes from the western alpine deposits (Liguria and Piedmont), about 650–700 km away as the crow flies (Pétrequin et al. 2005).

O'Hare (1990) had already noticed that jades (*sensu latu*) represented only 0.4 percent of the polished stone artifacts he examined in southern Italy. Twenty-seven percent of these samples came from ritual caves. Like many other caves in southern Italy, particularly along the Apulian coast and in Sicily, Scaloria was extensively used as a cult place and cemetery, for the most part in the Neolithic. A cult association probably exists, in particular with the paved cavities where greenstone axes and Campignian tools have been found.

The recent reexamination of polished-stone, ground-edge tool collections in Calabria, Puglia, and Campania is summarized in Table 6.3.4. Jade axes from Scaloria and from neighboring regions can be compared. Jade axes from Calabria and Puglia seem to be homogeneous in size, all measuring between 2.3 and 10 cm long. In comparison, Scaloria axes, unlike those from Calabria, look thin and well polished; six out of seven present flattened sides, and four out of seven show no traces of wear.

In many of the caves used as cult places, there are small, fully polished axes, sometimes of local material but mostly of greenstones (Whitehouse 1992:76–77).[8]

[6] For a more complete review of this phenomenon, see Di Fraia and Grifoni Cremonesi 1996.

[7] In the Tavoliere and Materano villages, the presence of Campignian tools appears reduced (M. Calattini, personal communication 2015; Tarantini 1999–2000).

[8] With reference to Puglia Grotta S. Angelo di Ostuni, Grotta dei Cervi di Badisco, Caverna dell'Erba di Avetrana (O'Hare 1990), Grotta di S. Maria di Agnano (Coppola 1988), Grotta delle Prazziche di Novaglie (Borzatti von Lowenstern 1969), Grotta della Trinità di Rufano (Cremonesi 1978), Grotta Zinzulusa di Castro (Cavalier 1960), and Pulo di Molfetta (Radina 2002); to Calabria la Grotta di S. Angelo III di Cassano Ionio (Tiné 1964) and Grotta della Madonna di Praia a Mare (Cardini 1970); to Basilicata la Grotta Funeraria (AA.VV. 1976:44), Grotta dei Pipistrelli di Matera (Quagliati 1896), and Grotta 3 di Latronico (Cremonesi 1978a); to Abruzzo Grotta Continenza di Trasacco (Grifoni Cremonesi 2002), Grotta Cola II (Radmilli 1977), Grotta Beatrice Cenci dell'Aquila (Zamagni 2003), Grotta dei Piccioni di Bolognano (Cremonesi 1976), and Grotta S. Angelo

The network of trade and exchange of rocks suitable for polished-implement manufacture in central-southern Italy seems to have been active in the Early Neolithic for Calabrian greenstone (Table 6.3.5). This has been already noted by Zamagni (2003:243) for the "impresso ware" site of Santo Stefano in Abruzzo, where an abundance of obsidian documents substantial southern influences (Radi et al. 2001). The greenstone axes, likely from Calabrian sources, present either a thicker and sub-circular section or a thinner one with right sides. Axes of probable Calabrian rock generically belong to the Neolithic.

The circulation of probable Alpine rocks in southern Italy seems to refer to a period later than the "impresso ware" Neolithic (Tables 6.3.6 and 6.3.7), according to Zamagni (2003), who hypothesized that the diffusion of Alpine green rocks has been documented only from "linear ware" in Tuscany and the Catignano facies in Abruzzo. Nevertheless, rocks that seem likely to originate in Alpine sources are present in Scaloria Cave, as early as the Scaloria Bassa-Catignano facies itself.

The elevated presence of Alpine greenstone tools inside "cult" caves such as Scaloria must be related to the "non-functional use" ascribed to jadeite axes in the European Neolithic (Pétrequin et al. 2006; Robb 2007). The small Scaloria greenstone axes, which appear very finely finished, slightly used, or definitely unused, are

Table 6.3.4. Alpine rock axes identified in southern Italy

Region	Quantity	%
Calabria	11/1192	0.92
Puglia	28/346	8.09
Campania (Paestum)	15/59	4.76

Table 6.3.5. Presence of greenstone axes in Italian Early Neolithic sites

Region	Number
Toscana	14
Marche	2
Umbria	0
Sardegna	1
Corsica	0
Lazio	6
Abruzzo	5
Molise	0
Campania	0
Puglia	11
Calabria	7
Basilicata	4
Sicilia	0

Table 6.3.6. Alpine jade axes in Early Neolithic Italian sites

Region	Number
Toscana	1
Marche	0
Umbria	0
Sardegna	0
Corsica	0
Lazio	0
Abruzzo	4
Molise	0
Campania	0
Puglia	8
Calabria	0
Basilicata	0
Sicilia	0

Table 6.3.7. Alpine rock axes in Middle Neolithic Italian sites

Region	Axes
Toscana	8
Marche	1
Umbria	0
Sardegna	0
Corsica	0
Lazio	2
Abruzzo	0
Molise	0
Campania	0
Puglia	0
Calabria	0
Basilicata	1
Sicilia	0

di Civitella del Tronto (Di Fraia and Grifoni Cremonesi 1996:45–48); to Campania Grotta delle Felci a Capri (Pigorini 1876:229), Grotta delle Noglie-Piano di Sorrento (Albore Livadie 1990:28), and Grotta Pertosa, Salerno (Carucci 1907:105–106); to Lazio Grotta Il Faicchio di Orte (Eroli 1881), and Grotta Patrizi di Cerveteri (Radmilli 1953); to Sicily Grotta Due Paperi, Siracusa (Colini 1900), Stufe di S. Calogero-Monte Kronio (Tiné 1971), Grotta di S. Francesco di Monte S. Giuliano, Trapani (Pigorini 1883:30), and Grotta "Crollata" alle Egadi (Marconi Bovio 1952:188).

not resharpened at all. However, we must remember that in the "biography" of southern Italian axes (Robb 2007:214), many more elements and events other than tool typology can contribute to evaluating functional or symbolic context or content. Such elements can determine different turning points in an artifact's "history" after it has been manufactured. Among other factors, the morphological features of Alpine rocks that stand out in these cultural southern Italian contexts[9] include the above-average finish, the "greenness" (a bright green color), the translucency, and the extraordinary hardness that allowed Neolithic crafters to make these stones much thinner than all other polished stone artifacts. Therefore, we can recognize in southern Italy the typical mechanisms—the path—of the alpine stone ax trade, exchange, and exploitation; they are quite different from those that characterized the circulation of raw materials from the western Alps to central Northern Europe (Pétrequin et al. 2006). If very long alpine jade axes can represent "social status" in a wide area of the European continent, they are nevertheless absent in southern Italy. However, at Scaloria, long axes made of other materials are present, whereas jade possibly from Alpine sources is represented by carefully made axes of small dimensions.

[9] On this subject, we must also consider the discovery of a peculiar jade figurine dating from the Neolithic levels of Monte Kronio, Sicily, shaped in the form of a bird's head (Tiné 1971).

Catalogue of Ground and Polished Stone Artifacts

The catalogue numbers (column 1, below) include various pieces of information. Those with an asterisk (*) were published by O'Hare (1990). Those with a section sign (§) (i.e., nos. 24 and 25) were taken from the excavation catalogue; however, this chapter catalogue includes all the available data. All available objective data are described herein, except for the cutting edge related to contingent use wear. Production techniques are approached as a discussion and documented through photos and drawings.

Ground-Edge Tools									
Cat. no.	**Illustrations**	**Excavation data**	**Artifact number**	**Description**	**Raw material**	**Length (cm)**	**Breadth (cm)**	**Thickness (cm)**	**Weight (g)**
1*	Fig. 6.3.1	Quagliati	TA 21963	Chisel, flattened sides, rounded butt, square cross-section	Jadeite (O'Hare)	98	35	12	85
2*	Fig. 6.3.1	Quagliati	TA 21966	Trapezoidal-shaped ax, square butt, plano-convex cross-section	Jadeite ('O'Hare)	84	44	15	100
3*	Fig. 6.3.1	Quagliati	TA 21967	Trapezoidal-shaped ax, flattened sides, square butt, square cross-section	Jadeite (O'Hare)	61	46	11	60
4*	Fig. 6.3.1	Quagliati	TA 23079	Chisel, square butt, square cross-section	Jadeite (O'Hare)	38	19	7	15
5*	Fig. 6.3.1	Quagliati	TA 23080	Trapezoidal-shaped ax, flattened sides, square butt, square cross-section	Jadeite (O'Hare)	33	32	8	20
6*	Fig. 6.3.1	Quagliati	TA 23083	Chisel, flattened/pointed butt, plano-convex cross-section	Pyroxenite (O'Hare)	33	14	7	10
7*	Fig. 6.3.1	Quagliati	TA 23085	Trapezoidal-shaped ax, unfinished perforation, flattened sides, rounded/square butt, square cross-section	Jadeite (O'Hare)	33	24	7	15
8*	Fig. 6.3.1	Quagliati	TA 23086	Trapezoidal-shaped ax, perforated, flattened sides, square butt, square cross-section	Slate (O'Hare)	35	23	3	5
9	Fig. 6.3.2 Fig. 6.3.3	Quagliati	TA 21970	Trapezoidal-shaped ax, straight sides, rounded/square butt, plano-convex cross-section	Basalt?	87	55	17	133
10	Fig. 6.3.2, Fig. 6.3.3	Quagliati	TA 21964	Trapezoidal-shaped ax, square butt, one straight side and one curved side, irregular plano-convex cross-section	Greenstone	57	42	12	51
11	Fig. 6.3.2 Fig. 6.3.3	Quagliati	TA 23084	Trapezoidal-shaped ax, straight sides, square butt, plano-convex cross-section	Jadeite	42	29	8	-

Ground-Edge Tools, continued									
Cat. no.	**Illustrations**	**Excavation data**	**Artifact number**	**Description**	**Raw material**	**Length (cm)**	**Breadth (cm)**	**Thickness (cm)**	**Weight (g)**
12	Fig. 6.3.2 Fig. 6.3.3	Quagliati	TA 23078	Triangular-shaped ax, rounded butt, plano-convex cross-section, reshaped cutting edge	Greenstone	44	38	11	24
13	Fig. 6.3.2 Fig. 6.3.3	Quagliati	TA 23077	Triangular-shaped ax, flattened/pointed butt, plano-convex cross-section, reshaped cutting edge	Greenstone	60	37	10	30
14	Fig. 6.3.2 Fig. 6.3.3	Quagliati	TA 23081	Triangular-shaped ax, flattened/pointed butt, flattened/oval cross-section	Greenstone	42	32	11	33
15	Fig. 6.3.2	Quagliati	—	Ax flattened/pointed butt, oval cross-section	Limestone	(94)	45	33	185
16	Fig. 6.3.4	Quagliati	—	Ax, rounded butt, oval cross-section	Limestone	55	40	25	78
17	Fig. 6.3.4	Tiné zona A	—	Ax, rounded butt, oval cross-section	Limestone?	(60)	50	35	140
18	Fig. 6.3.3, Fig. 6.3.4	1978 Trench 1 level 4	Scaloria 5	Ax, mixed shape, rounded butt, circular cross-section	Greenstone	67	35	27	92
19	Fig. 6.3.4	1978 Trench 3 level 1	Scaloria 12	Ax butt fragment, circular cross-section	Greenstone	(39)	37	31	66
20	Fig. 6.3.4	1978 Trench 2 level 11	Scaloria 32	Ax butt fragment, oval cross-section	Greenstone	(50)	47	29	75
21	Fig. 6.3.4	1979 Fill at entrance	SF 10 Cat. 61	Ax body fragment	Limestone	(30)	43	25	47
22	Fig. 6.3.14	1978	—	Trapezoidal-shaped ax, square butt, subrectangular cross-section	Diorite	78	47	13	-
23	Fig. 6.3.14	1979 Trench 5 level 8	CAT 955 SF 222	Ax, rounded butt	Unidentified	127	46	26	-
24 §	Fig. 6.3.14	1979 Trench 6 north	CAT 299 SF 68	Trapezoidal shaped ax, flattened sides, square butt, square cross-section	Greenstone	35.5	30	6	--
25 §	Fig. 6.3.14	1979 Trench 6 level 3	CAT 201 SF 54	Ax of mixed shape, square butt, circular cross-section	Unidentified	105	50	39	--

Reuse of butts and ax bodies									
Cat. no.	**Illustrations**	**Excavation data**	**Artifact number**	**Description**	**Raw material**	**Length (cm)**	**Breadth (cm)**	**Thickness (cm)**	**Weight (g)**
26	Fig. 6.3.6	Quagliati	—	Reuse of ax butt/body fragment, circular cross-section, use-wear traces on proximal and distal surfaces on one face	Limestone	125	57	40	391
27	Fig. 6.3.5 Fig. 6.3.6	Quagliati	—	Reuse of ax butt/body fragment, oval cross-section, use-wear traces on faces and sides	Quartzy sandstone	94	60	39	301
28	Fig. 6.3.5 Fig. 6.3.6	Quagliati	—	Reuse of ax butt/body fragment or rough-out, flattened/pointed butt, circular cross-section, use-wear traces on one face	Limestone	115	54	40	359
29	Fig. 6.3.6	Quagliati	—	Reuse of ax butt/body fragment, rounded butt, oval cross-section, use-wear traces on one face or profile	Silicified limestone	90	54	23	160
30	Fig. 6.3.5 Fig. 6.3.6	1978 Area H8 (2) level 8	—	Reuse of ax butt/body fragment, oval cross-section, use-wear traces on ends and faces	Limestone	95	65	47	382
31	Fig. 6.3.7	1978	—	Reuse of ax butt/body fragment, sub-oval cross-section, use-wear traces on ends	Limestone	92	64	40	350

Continued on next page

Reuse of butts and ax bodies, continued									
Cat. no.	Illustrations	Excavation data	Artifact number	Description	Raw material	Length (cm)	Breadth (cm)	Thickness (cm)	Weight (g)
32	Fig. 6.3.7	1978 Area H8 (2)	—	Reuse of ax butt/body fragment, ellipsoidal cross-section, various different use-wear traces on ends and faces	Limestone	82	58	32	213
33	Fig. 6.3.7	1978 Trench 2 level 1	—	Reuse of ax butt/body fragment, flattened/rounded butt, oval cross-section, use-wear traces on distal end	Limestone	104	55	37	277
34	Fig. 6.3.5 Fig. 6.3.7	1979 Trench 8 level 1	Scaloria 101	Reuse of ax cutting edge, longitudinally sawed ellipsoidal cross-section, sewing traces on one side, use-wear traces on distal portion and both faces	Slate?	32	25	11	13
35	Fig. 6.3.7	1979 Trench 5 level 7	CAT 947 SF 221	Reuse of ax butt/body fragment, circular cross-section, butt with a flat use-wear surface	Quartzy sandstone	65	42	32	109
36	Fig. 6.3.7	1979 Trench 8 level 1	453 SF 101	Reuse of ax butt/body fragment, oval cross-section, use-wear traces on both the ends and along one side	Limestone	67	52	30	176

Grindstones									
Cat. no.	Illustrations	Excavation data	Artifact number	Description	Raw material	Length (cm)	Breadth (cm)	Thickness (cm)	Weight (g)
37	F. 6.3.13	1978 Area H8 (2) level 3	—	Grindstone fragment, with flat working surface, perhaps revived, plano-convex cross-section	Limestone	126	95	47	1189
38	Fig. 6.3.8 Fig. 6.3.13	1978 Trench 2 level 4	—	Grindstone fragment, with slightly saddled working surface, plano-convex cross-section	Bio-calcarenite	210	110	65	1853
39	Fig .6.3.8 Fig. 6.3.13	1978 Fill at entrance surface	—	Grindstone with a working surface with two equal circular hollows (diameter 35 mm, depth ~12 mm), plano-convex cross-section	Bio-calcarenite	85	53	55	-
40	Fig. 6.3.8 Fig. 6.3.13	1978	—	Grindstone fragment with centrally located worn concave surface on one face, on the other a small, hollow, plano-convex cross-section	Bio-calcarenite	50	45	50	1433
41	Fig. 6.3.8 Fig. 6.3.13	1979	—	Grindstone fragment with flat working surface, plano-convex cross-section	Sandstone	105	175	45	1720
42	Fig. 6.3.13	1979 Trench 6 (east) level 7	1033	Grindstone fragment two working surfaces, one flat and one saddle-shaped, two grooves on the opposite face possibly used for sharpening, irregular cross-section	Sandstone	154	120	45	860
43	Fig. 6.3.11 Fig. 6.3.13	1979 Trench 6 (north) level 3	407	Grindstone fragment, with flat working surface on one face, the inclined other face showing an elongated concave worn area, irregular cross-section	Fine sandstone	127	73	36	495
44	Fig. 6.3.12	1979 Trench 6 level 6	753	Grindstone fragment with two working surfaces on the same face, one flat and smooth, one concave, irregular cross-section	Middle sandstone	127	100	30	460
45	Fig. 6.3.11 Fig. 6.3.12	1979 Trench 9 (south)	846	Grindstone fragment, with elongated concave worn areas on one face, sub-rectangular cross-section	Middle sandstone	170	150	44	1386

Grindstones, continued									
Cat. no.	Illustrations	Excavation data	Artifact number	Description	Raw material	Length (cm)	Breadth (cm)	Thickness (cm)	Weight (g)
46	Fig. 6.3.12	1979 Trench 5 level 8	1018 SF 239	Grindstone fragment with two working surfaces, one flat and one saddled, rectangular cross-section	Fine sandstone	70	52	40	227
47	Fig. 6.3.12	1978 "Tomb 6"	Sc 42	Grindstone fragment with two flat working surfaces on the opposite face, rectangular cross-section	Limestone	90	80	22	258
48	Fig. 6.3.11 Fig. 6.3.12	1979 Trench 5 level 5		Grindstone fragment with a smooth and a saddled working surface on one face, plano-convex cross-section	Limestone/ sandstone?	365	220	110	1210
49	Fig. 6.3.11 Fig. 6.3.12	1979 Trench 6 level 6	—	Grindstone fragment with two working flat, worn areas on the two faces, plano-convex cross-section	Biocalcareni te	164	100	420	1068
50	Fig. 6.3.12	1979	—	Grindstone fragment with inclined flat working surface on one face, trapezoidal cross-section	Biocalcareni te	160	130	40	936
51	Fig. 6.3.11 Fig. 6.3.12	1979	—	Grindstone fragment with flat working surface, rectangular cross-section	Bio-calcarenite	142	127	35	736
52	Fig. 6.3.11	1979 Fill at entrance surface	—	Grindstone with a working surface with two equal circular hollows, plano-convex cross-section	Bio-calcarenite	162	112	40	—

Pebbles									
Cat. no.	Illustrations	Excavation data	Artifact number	Description	Raw material	Length (cm)	Breadth (cm)	Thickness (cm)	Weight (g)
53	Fig. 6.3.9	Quagliati	—	Pebble with use-wear traces, sub-quadrangular cross-section	Unidentified	166	64	50	1005
54	Fig. 6.3.8 Fig. 6.3.9	Quagliati	—	Pebble with use-wear traces, oval cross-section	Unidentified	155	75	64	925
55	24	Tiné zona A	—	Pebble with use-wear traces	Limestone	55	50	40	175
56	33	1978	—	Pebble with use-wear traces, sub-oval cross-section	Limestone	97	52	30	213
57	34	1978 Trench 1 level 5	—	Pebble fragment, with use-wear traces	Flint	40	48	15	46
58	35	1978 Trench 2 level 11	—	Pebble fragment with use-wear traces, oval cross-section	Quartzite	35	55	40	94
59	Fig. 6.3.10b	1979 Fill at entrance levels II–III	—	Pebble with use-wear traces, plano-convex cross-section	Bio-calcarenite	113	74	38	451
60	Fig. 6.3.10b	1979 Trench 6 level 2	—	Pebble with use-wear traces, rectangular cross-section	Limestone?	120	57	30	317
61		1979 Trench 8 surface	SF 151	Pebble with use-wear traces, plano-convex cross-section	Sandstone	53	53	41	156
62	Fig. 6.3.10b	1979 Crevice at cave entrance	—	Pebble fragment with use-wear traces, oval cross-section	Limestone	88	97	55	771
63	Fig. 6.3.10b	1979 Trench 6 bedrock	Cat. gen. 848	Pebble fragment with use-wear traces, irregular cross-section	Quartzy limestone	70	76	37	346
64	Fig. 6.3.10b	1979 Trench 6 level 7	—	Pebble fragment with use-wear traces, oval cross-section	Flint	75	60	37	346
65		1978 "Tomb 6"	—	Pebble fragment with use-wear traces, oval cross-section	Flint	65	44	31	131
66		1979 Fill at entrance	SF19	Concretion fragment with use-wear traces, irregular cross-section	Calcite	39	25	—	55

Pebbles, continued									
Cat. no.	Illustrations	Excavation data	Artifact number	Description	Raw material	Length (cm)	Breadth (cm)	Thickness (cm)	Weight (g)
67		1979	119	Pebble with use-wear traces, oval cross-section	Flint	36	36	27	80
68	Fig. 6.3.10b	1978 "Tomb 6"	—	Pebble fragment with use-wear and ocher traces, oval cross-section	Flint	67	46	32	130

Miscellaneous									
Cat. no.	Illustrations	Excavation data	Artifact number	Description	Raw material	Length (cm)	Breadth (cm)	Thickness (cm)	Weight (g)
69	Fig. 6.3.9 Fig. 6.3.14	1978 Sc (2) level 15	—	Ring stone fragment, plano-convex cross-section	Limestone	47	25	8	20
70	Fig 6.3.9	1979 Trench 6 ext. level 4	1131 SF 256 A	Artifact fragment, with hewing-out traces, irregular flattened cross-section	Limestone	64	43	14	62
71	Fig. 6.3.5 Fig. 6.3.9	1979 Trench 6 level 1	—	Stone tool fragment, with abrasive use-wear traces, sub-ellipsoidal cross-section	Unidentified	37	24	22	30

Riassunto

L'industria esaminata comprende i reperti degli scavi Quagliati-Drago, della raccolta effettuata da Tiné negli anni '60 e degli scavi 1978 e 1979 nel deposito della parte alta della grotta. Si tratta di strumenti da taglio, basi di lavorazione, manufatti su riuso di strumenti da taglio, manufatti su ciottoli o noduli in selce o calcite e strumenti di altro tipo.

Alcuni dei litotipi impiegati come quelli in pietra verde (il termine qui è usato in modo generico per una serie di rocce dure metamorfiche a grana fine, tra cui giada,giadeiti, eclogiti, serpentiniti, e anfiboliti), diorite, e ardesia sono di provenienza esterna alla Puglia e sono stati importati attraverso lo scambio interregionale.

In particolare le pietre verdi sono probabilmente riconducibili agli affioramenti ofiolitici della Calabria settentrionale, ad eccezione delle giadeiti e delle eclogiti che sono di provenienza alpina. Gli strumenti da taglio comprendono 25 strumenti, tra interi e frammentari, e provengono in particolare dagli scavi Quagliati nel Camerone della parte alta della Grotta. Di questi 11 sono riuso o frammenti di asce più grandi di calcare o di pietra verde probabilmente di origine calabrese; 15 sono asce di piccole – medie dimensioni, tutte interamente levigate e in un caso con foro di sospensione e sono fabbricate in pietra verde (13), ardesia (1) e basalto (1). Le asce in pietra verde, in particolare, possono essere state depositate ritualmente. Le 11 asce in calcare locale sono state probabilmente utilizzate per usi non rituali. Ciottoli di quartzite, calcare, pietra arenaria e calcite mostrano superfici di usura, e uno dei ciottoli di selce ha ocra su entrambe le facce levigate. Le macine presentano un tipo di dimensioni medie, forma approssimativamente circolare, sezione piano convessa, superficie d'uso piana (7); un secondo tipo è costituito da lastre di arenaria a grana fine di forma non identificabile con certezza data la frammentarietà dei reperti (6), e un terzo tipo comprende un esemplare integro insellato. Da segnalare un frammento di anellone in calcare.

Alcuni indicatori permettono di ipotizzare per questa industria, anche in assenza di analisi delle usure, lo svolgimento delle seguenti attività: la produzione di ceramica (levigatoi, brunitoi), la macinatura e preparazione di alimenti (macine e altre basi di lavorazione), la lavorazione dell' osso (basi di lavorazione con incavi o scanalature), la lavorazione del legno (strumenti da taglio), la fabbricazione di strumenti litici (percussori), e l'utilizzo e la lavorazione dell'ocra. L'ultima ipotesi è suggerita dalla presenza di ocra sul sito e di strumenti che mostrano tracce di questo materiale (cat. 68, Fig. 6.3.10b).

La presenza di rocce alpine nel complesso dell'industria esaminata conferma la partecipazione di Grotta Scaloria alle reti di ampia portata per lo scambio di materie prime su lunghe distanze. Questa circolazione nel Sud Italia sembra riferirsi ad orizzonti successivi al Neolitico a ceramica impressa, più probabilmente a partire dalla ceramica lineare in Toscana e dalla facies di Catignano in Abruzzo. Alla Grotta Scaloria sembra quindi possibile attribuire la presenza di rocce alpine a partire dalla stessa facies Scaloria Bassa–Catignano. Nel corso del Neolitico, infatti, in molte grotte frequentate a scopo cultuale in Sicilia e nell'Italia centro meridionale e in particolare lungo la costa pugliese, sono documentate piccole asce interamente levigate, talvolta in materiale locale ma per la maggior parte in pietra verde e, in alcuni casi, in giada.

6.4. Bone Tool Industry

Donatella Pian

Introduction

This chapter reports on 50 well-preserved finds (of a total 85; see Table 6.4.1) in the bone tool assemblage. All were recovered from trenches excavated within Scaloria Cave. The typological identification is based on these tools and follows a division into five groups. Three are categories of end morphology: sharpened end, slanted end (biseau), and smoothed end. Handles comprise the fourth group (Camps Fabrer 1979), and a fifth group includes ornaments as well as some miscellaneous types that cannot be assigned to any of the other categories. This last mixed grouping represents about one-quarter of the bone artifacts.

Numerically, the assemblage is distributed as follows:

1. Tools with sharp, pointed ends (mainly awls) (n = 25)
2. Ornaments (n = 13)
3. Handles (n = 4)
4. Tools with slanted ends (biseaux) (n = 5)
5. Tools with smoothed ends (n = 3) (Figure 6.4.1)

The catalogue descriptions below include, in addition to the tool morphology, data from a macroscopic analysis of work traces, which allowed us to distinguish the last stages of tool manufacturing, including final touches, and use wear, which frequently obliterates the original rough form. In objects that are not fragmentary, the descriptions begin with the tool morphology; the manufacturing technology (direct or indirect percussion, abrasion, sawing [sciage], etc.) is not included here.

The handwork applied to these objects is most clearly seen in the finish, visible as smoothing or polishing. The former leaves striations parallel to the object's axis, whereas the latter (polissage) leaves thick, parallel signs that follow a different course from that seen in smoothing. Indeed, polished surfaces, present on most of the finds, are attributable to the continuing use of the tool rather than to a particular processing or manufacturing technology.

General Analysis

Sharp Tools

The sharp tools (cat. nos. 1–25) are represented, for the most part, by awls (20 finds); points (4 finds), and one needle (cat. no. 4; Figure 6.4.2:4) account for the remainder.

The awls are mainly produced from ovicaprine metapodials; one-third of the artifacts cannot be linked to any particular species. But in one case, the attribution of an awl to a fox ulna is rather certain. In 14 cases, the sharp tools seem to have been sectioned lengthwise, whereas more than half preserve, in full or in part (missing a trochlea), the distal or proximal epiphysis.

The exterior surfaces of the awls show considerable polish along the longitudinal cut, especially around the middle and distal ends. The inner surfaces present transverse striations of polissage, along with signs of wear and tear from use and/or from being held or grasped, resulting in visible polish. One awl (cat. no. 5; Figure 6.4.2:5) presents, near the epiphysis and on both sides, engraved notches that would seem to show traces of disjointing.

The single needle found inside the cave appears flattened and squared at the perforation near the base and has traces of polissage on the surface; it also bears a widespread blackening, probably due to the close and continuous exposure to a nearby intense heat source. The needle is comparable to similar specimens from the Bulgarian site of Salmanovo attributable to the Boian Culture (Middle and Recent Neolithic, contemporaneous with phases V–VI of the Apulian Tavoliere) (Müller-Karpe 1968:Taf. 159/B28).

Table 6.4.1. Scaloria bone tool types by provenience

	Sharp tools	Slantwise tools	Smoothed tools	Handles	Ornaments/ various	Engraved fragments	Total
Unknown location	**3**	**1**			**1**		**5**
Trench 1 level 1	1						1
Trench 1 level 2		1					1
Trench 1 level 3	1		1				2
Trench 1 level 4		1					1
Trench 1 level 5	2		1				3
Trench 2 surface				2	1		3
Trench 2 level 4	1						1
Trench 2 level 6	2						2
Trench 2 level 9/10	1				1		2
Trench 2 level 11	1	1					2
Trench 2 level 13		1			1		2
Trench 3 level 1	2				1		3
Trench 3 level 3	2						2
Trench 5 N/E extension	2					1	3
Trench 5 level 3					1		1
Trench 5 level 6				2			2
Trench 5 level 7	1				2	1	4
Trench 5 level 8					1		1
Trench 6 level 1	2					1	3
Trench 6 level 3	1			1	1	4	7
Trench 6 level 4					1		1
Trench 6 level 5	1				1	4	6
Trench 6 level 6	3				1		4
Trench 6 level 7						7	7
Trench 8 surface	1				1	1	3
Trench 8 level 1					1		1
Trench 9 N						1	1
Trench 9 level 1					1	1	2
Trench 9 level 2	1					1	2
Trench 9 level 4			2				2
Trench 10 level 1						1	1
Trench 10 level 4					1		1
Trench 10/burial 8					1 (2)		1 (2)
Upper Paleolithic/ Mesolithic site				1	1		2
Totals	28	5	4	6	19	23	85 (86)

Note: Use of parentheses in columns indicates two boar tusk pendants (Figure 6.4.8:44).

Catalogue numbers 10 (Figure 6.4.3:10) and 21 (Figure 6.4.4:21) have a peculiarity: unlike other objects presumably held by the epiphysis, these two show an adaptation at the base that seems intended to accommodate a handle insertion.

Long points are few in our sample, as they are among the bone tools from Catignano. Comparanda include points from the site near Pescara, a specimen found in the Sant'Angelo Cave near Teramo (within levels attributable to the Catignano Culture), and others from the Ripoli village, although in this case it is difficult to make a precise comparison, as the size data are missing. Similar tools, from French sites, and made with long bones of big mammals, have been interpret-

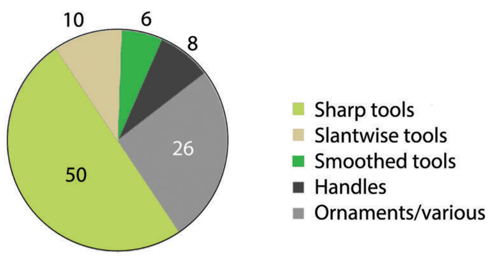


Fig. 6.4.1. Distribution of bone tool types (%).

ed as spindles or objects connected with textile activities, supported by the plain polishing evidence (Zamagni 2003b).

Tools with Slanted Ends

The slantwise tools (biseaux) are represented by five artifacts (cat. nos. 26–30). Four are well-preserved tools made on ovicaprine tibia; one (cat. no. 27; Figure 6.4.5:27), however, is a chisel produced instead from a pig's incisor, a rather rare element that was also found at the Catignano site (Zamagni 2003b:fig. 102/3).

Catalogue numbers 28 and 30 (Figures 6.4.5:28 and 6.4.6:30) show, at the biseau edge, a characteristic widening and a rounding off, which make them look like small spoons.

Smoothed Tools

Three spatulae belong to the smoothed tools category (cat. nos. 31–33); two cannot be traced back to a specific bone or to the species, while the third is identifiable as a spatula on a cattle rib, longitudinally sectioned (cat. no. 33; Figure 6.4.7:33). One of the small spatulae (cat. no. 32; Figure 6.4.8:32) shows, on the integral edge and on a border, traces of use, perhaps as a chisel or for some rubbing activity. This kind of object is usually considered a tool for treating pottery surfaces during different phases of manufacturing, an alternative to tools made of other raw materials (wood, stone, etc.). Other hypotheses posit that these objects could be useful for mixing food and for eating, in addition to mixing paints or cosmetics (Benac 1973).

Handles

The four handles (cat. nos. 34–37) cannot be easily attributed to a specific bone but can be connected generically with ovicaprine long bones. Catalogue number 35 (Figure 6.4.9:35) was produced on a bone diaphysis and is worked at both edges so precisely that it seems it could be an ornament. As for catalogue number 34 (Figure 6.4.9:34), the engraving on the lower surface can be compared with similar marks found at Catignano of a graffito design on a potsherd (Radmilli 1977:fig. 107/6).

Ornaments/Miscellaneous

The Scaloria ornaments (cat. nos. 38–45) can be subdivided into three categories: pendants, pierced plaques, and earrings. The pierced plaques could also represent pendants, but the chosen bone and the technology used differ, so these are examined separately.

Numbers 38 (Figure 6.4.10:38) and 41 (Figure 6.4.8:41) are made of teeth. The first one, from a canine of *Canis L.*, has a well-preserved perforation for suspension and rather polished surfaces. The second one, obtained from a tusk of *Sus scrofa L.*, is highly damaged, and it presents very little surface treatment, since the dentine is present on almost the entire object.

Catalogue number 42 (Figure 6.4.10:42) seems to have been used as a spatula along the edge opposite the holes; signs of wear and tear near the holes may be due to percussion and rubbing. Perhaps this artifact was used first as an ornament and later as a tool, or vice versa.

Thanks to its excellent preservation, arc-shaped pendant number 39 (Figure 6.4.8:39) clearly displays two holes symmetrically placed on the opposite angles of the shorter long side. Number 43 (Figure 6.5.10:43), by contrast, shows two holes on one edge. However, it could have had two other holes on the missing part, which would make it more like a wristlet than a pendant. If that were the case, it could be compared with findings from the Middle Neolithic layers within the Arene Candide Cave, where there are some thin bone laminas pierced on both edges (Bernabò Brea 1956:tav. XXX, 1), and with a plaque from Sitagroi III attributed to the Copper Age. Number 43 may have been sewn on textiles or tied with a multi-strand rope, or used for carding or weaving (Elster 2001:fig. 15).

I have chosen to add to this group three finds that do not appear to be useful tools. Their identification is difficult—in one case, owing to its morphological characteristics, and in the others, on account of their incompleteness. Catalogue number 40 (Figure 6.4.10: 40), a shoulder blade fragment, is rather difficult to understand because it has two holes on the left side, one at the top of the central rib structure and another

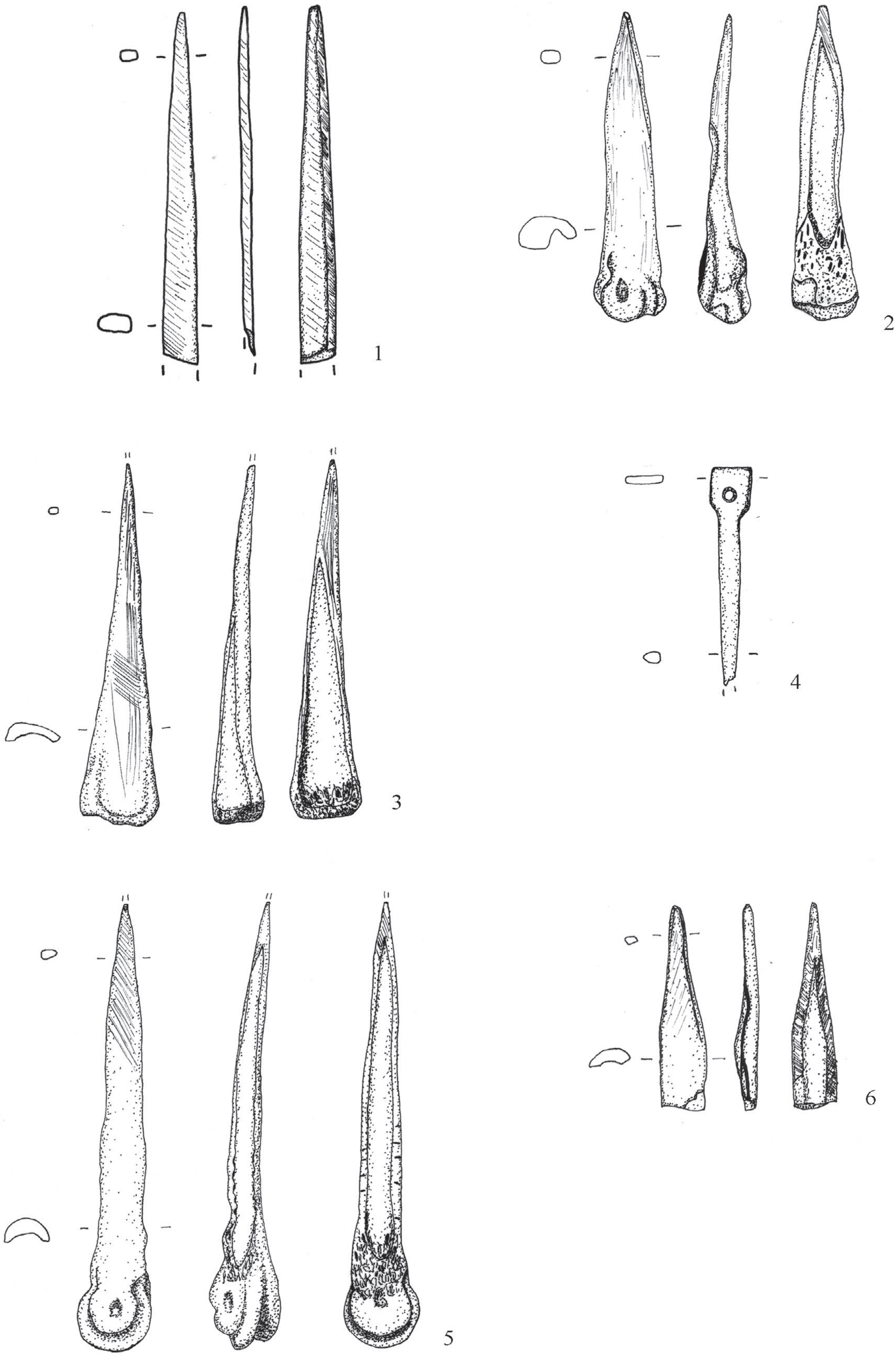


Fig. 6.4.2. Sharp tools, cat. nos. 1–6.

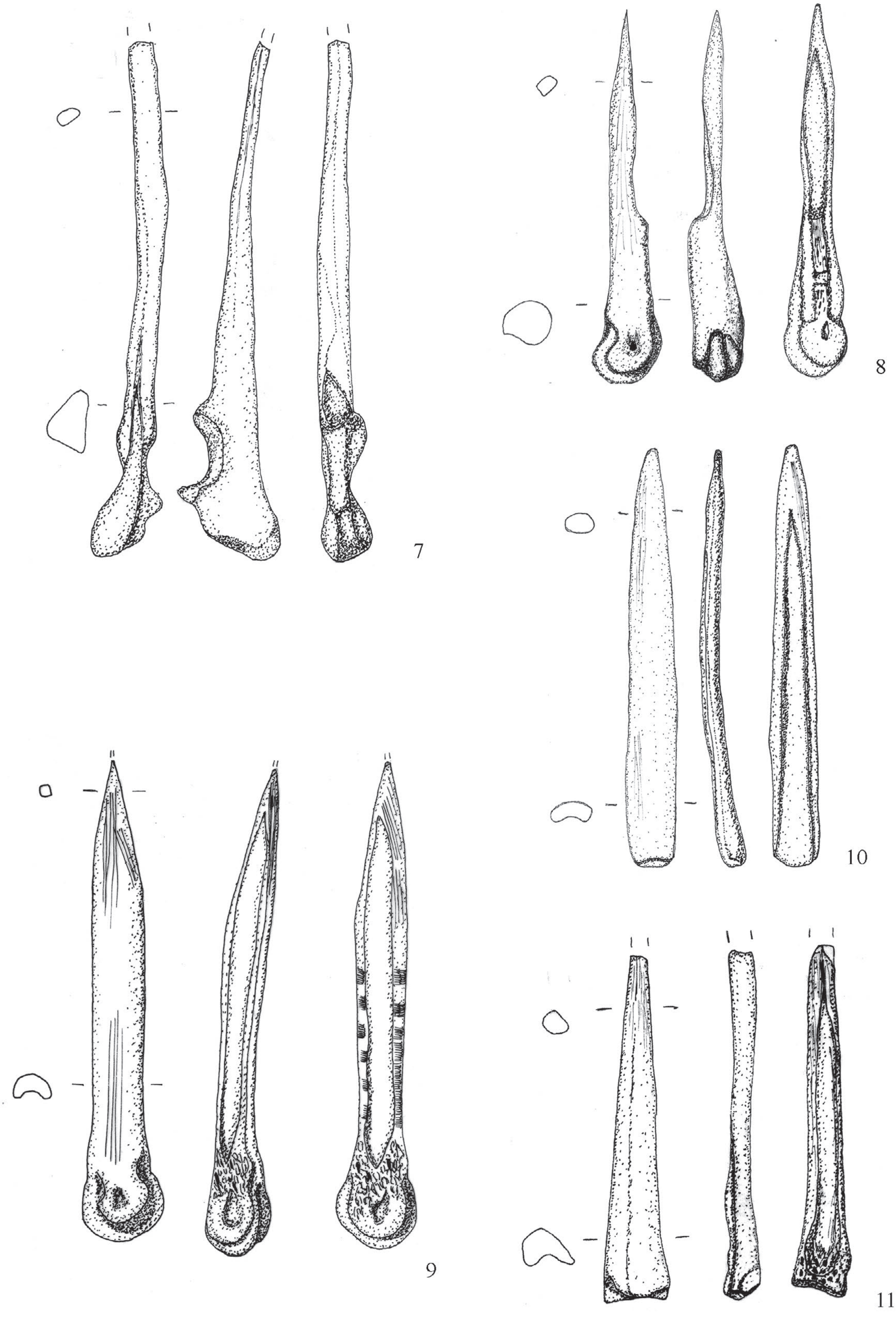


Fig. 6.4.3. Sharp tools, cat. nos. 7–11.

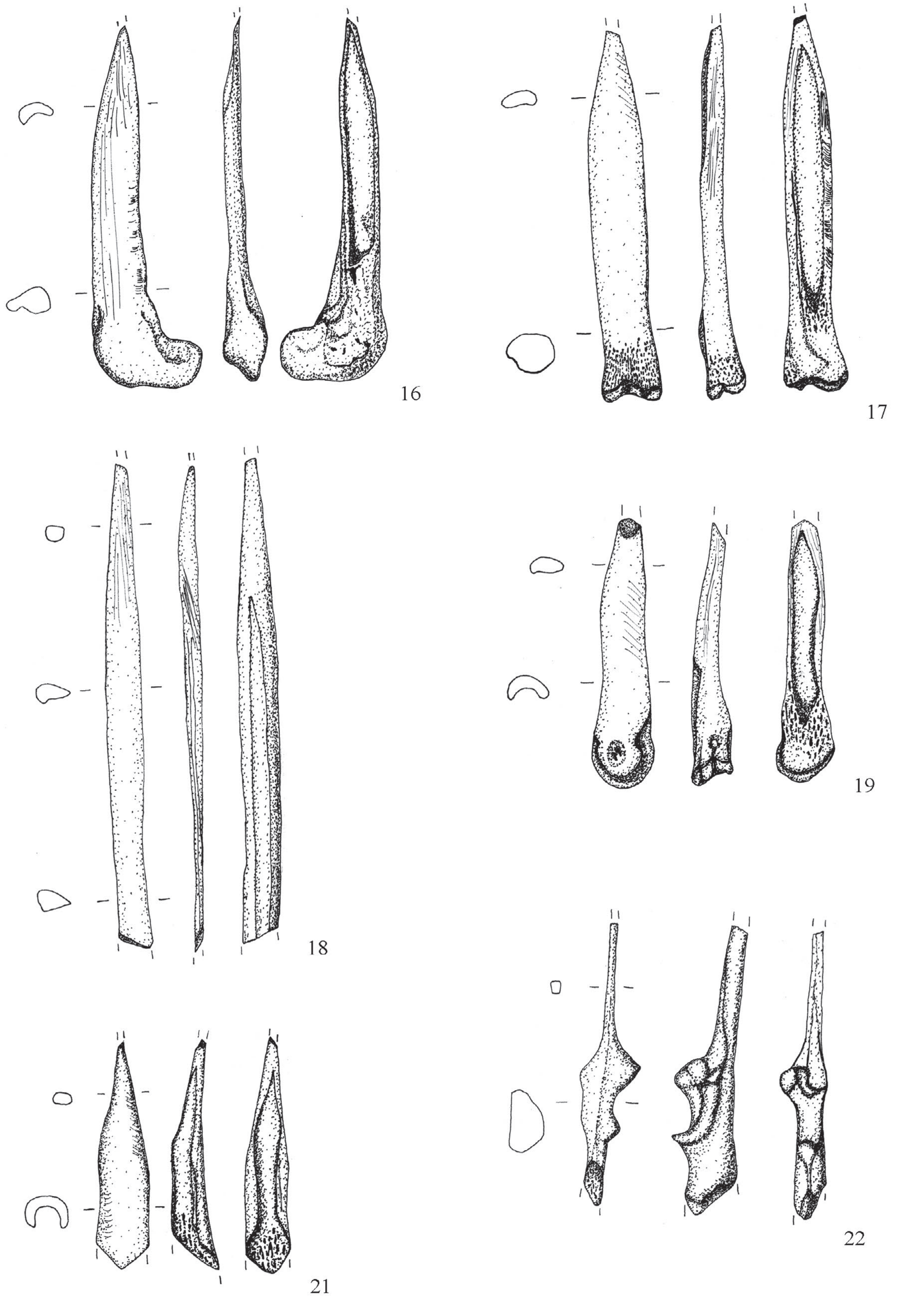


Fig. 6.4.4. Sharp tools, cat. nos. 16–19, 21, 22.

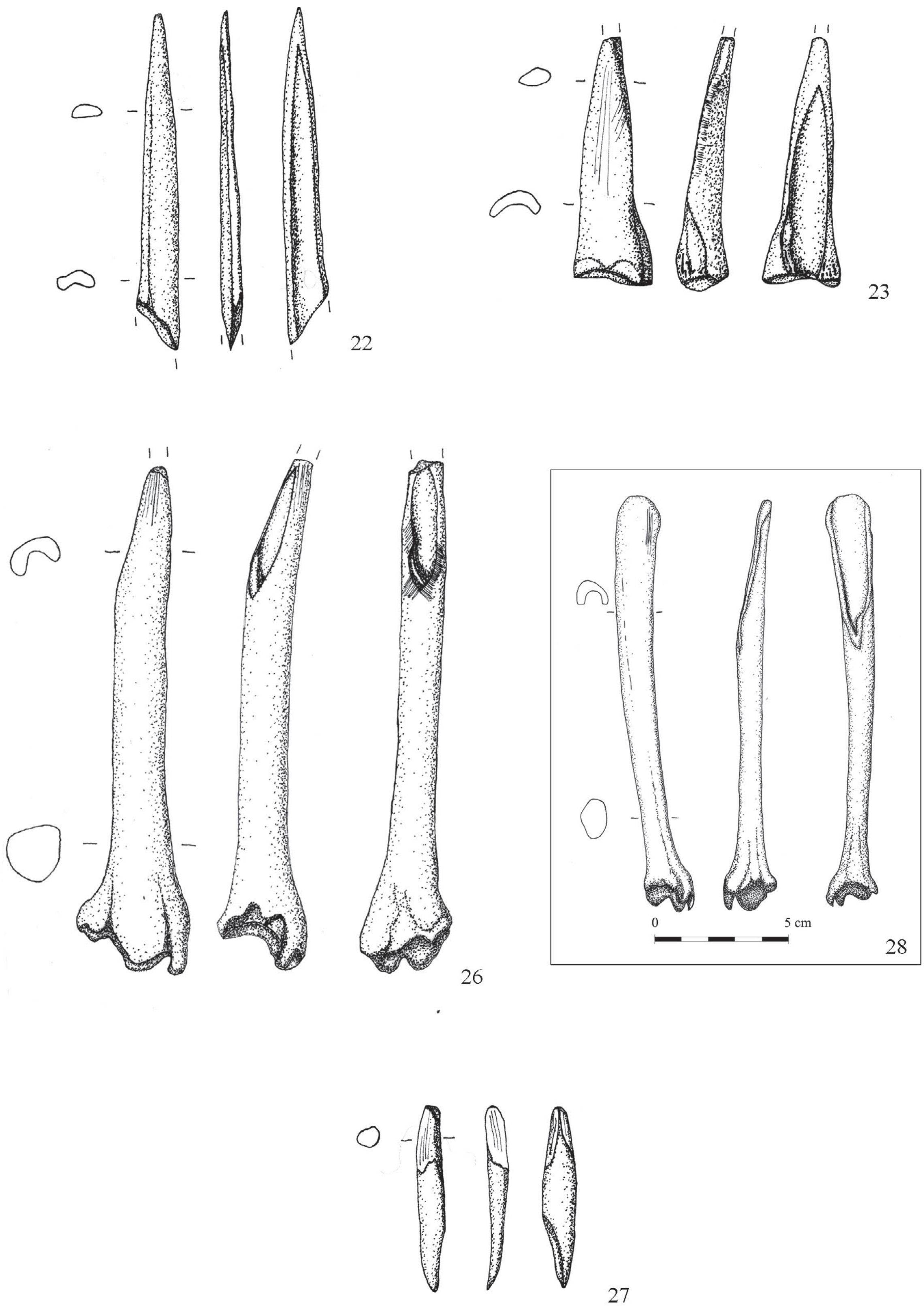


Fig. 6.4.5. Sharp tools, cat. nos. 22, 23; slantwise tools or biseaux, cat. nos. 26–28.

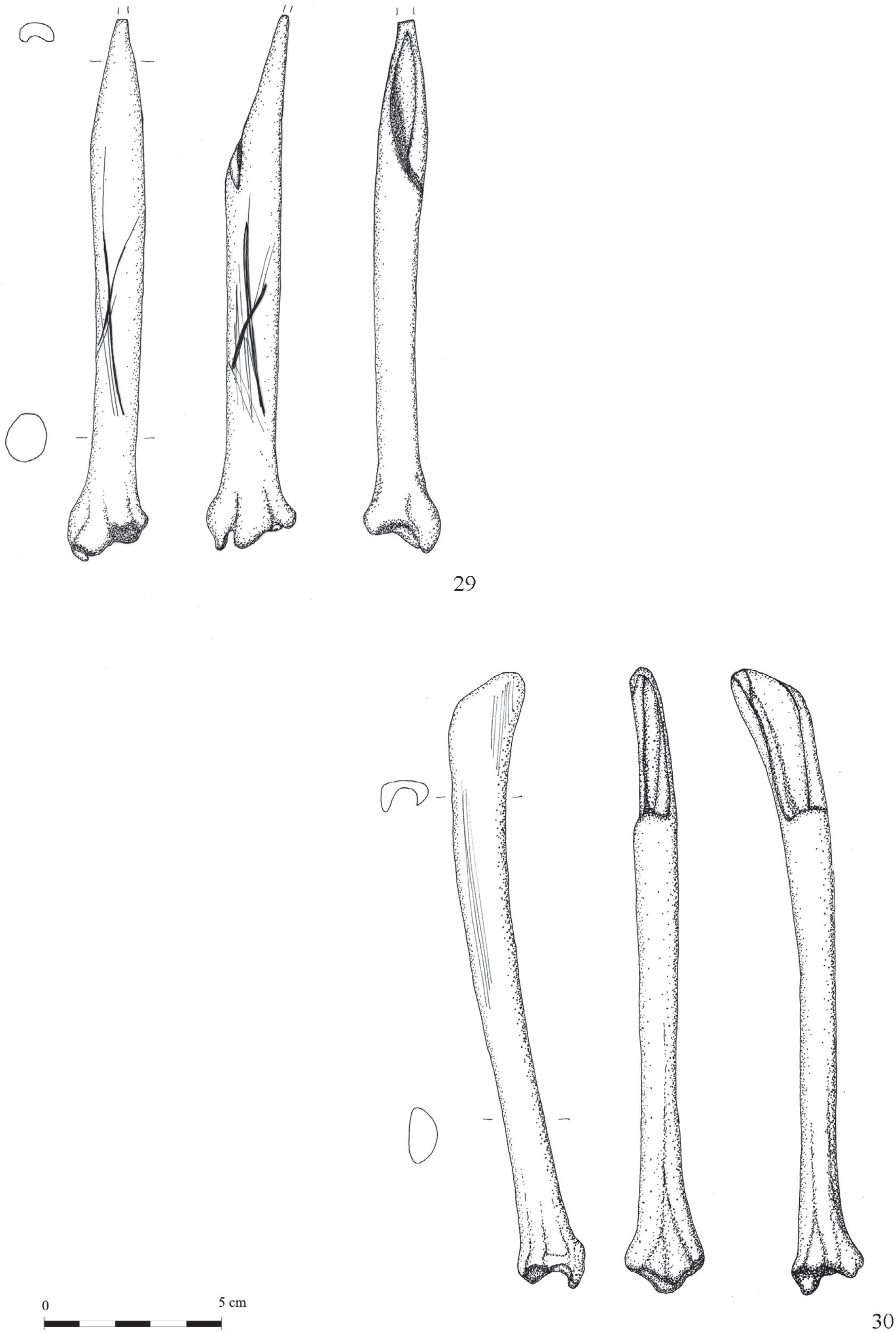


Fig. 6.4.6. Slantwise tools or biseaux, cat. nos. 29, 30.

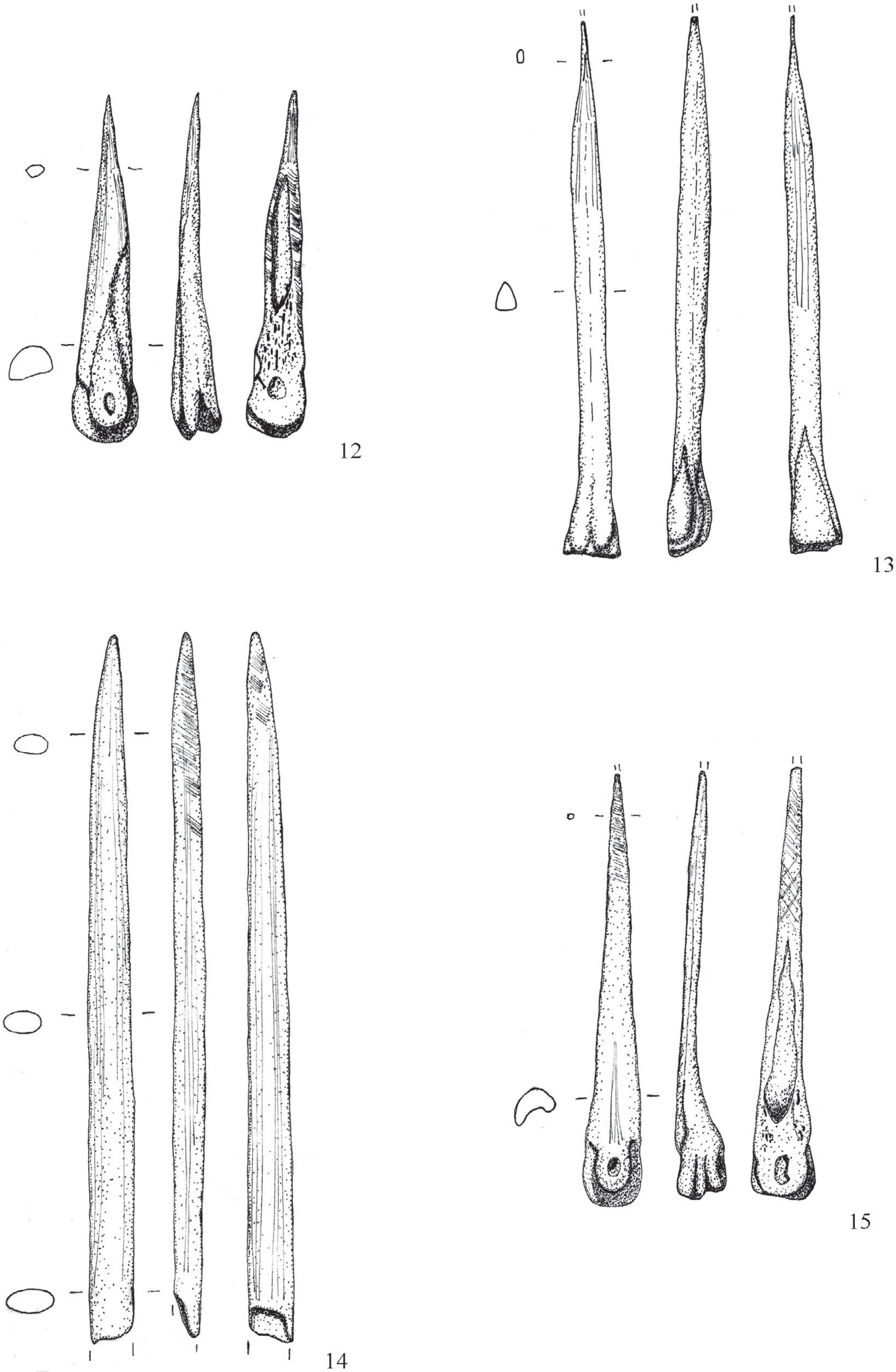


Fig. 6.4.7. Sharp tools, cat. nos. 12–15.

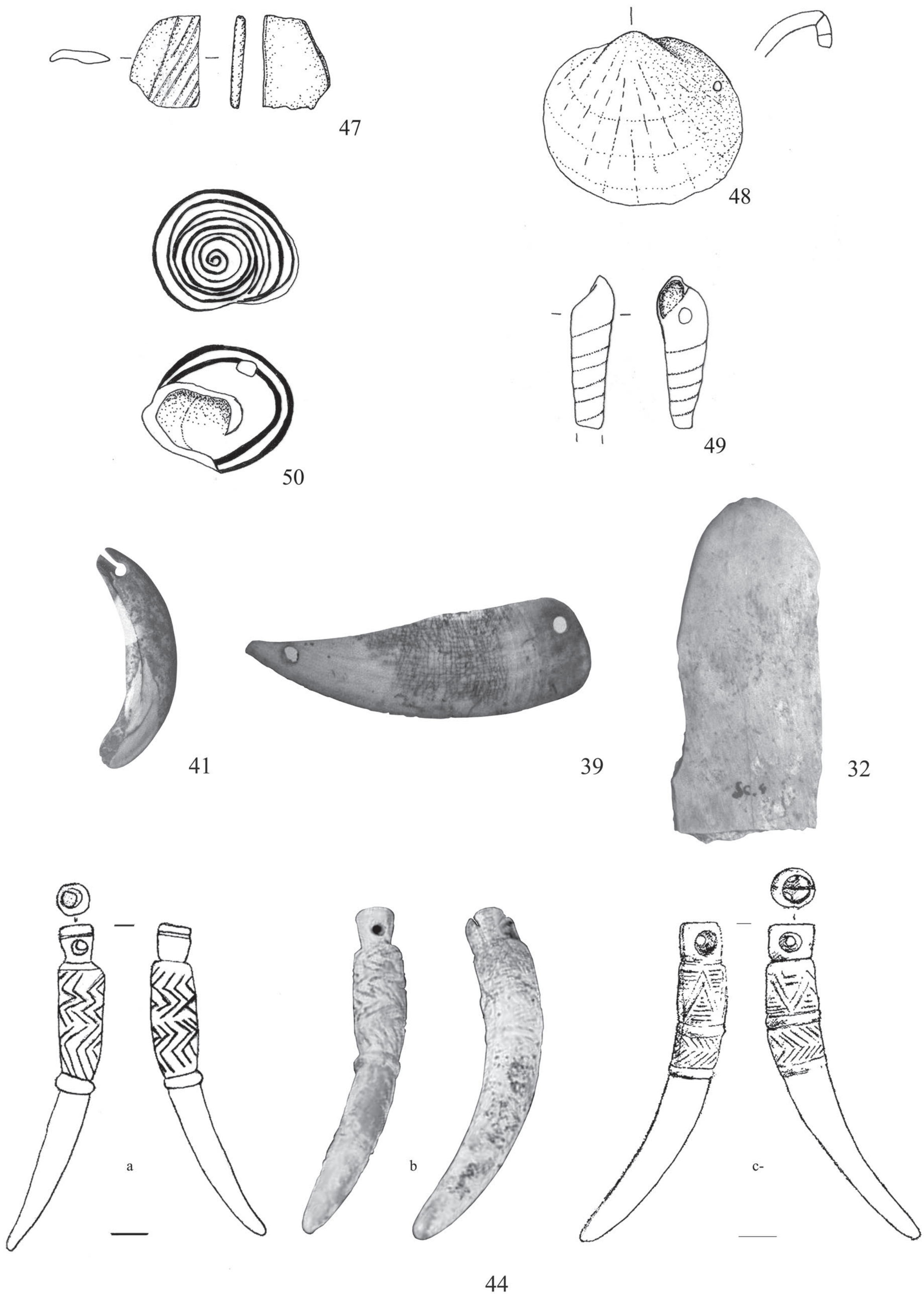


Fig. 6.4.8. Ornaments/miscellaneous, cat. nos. 32, 39, 41, 44, 47–50.

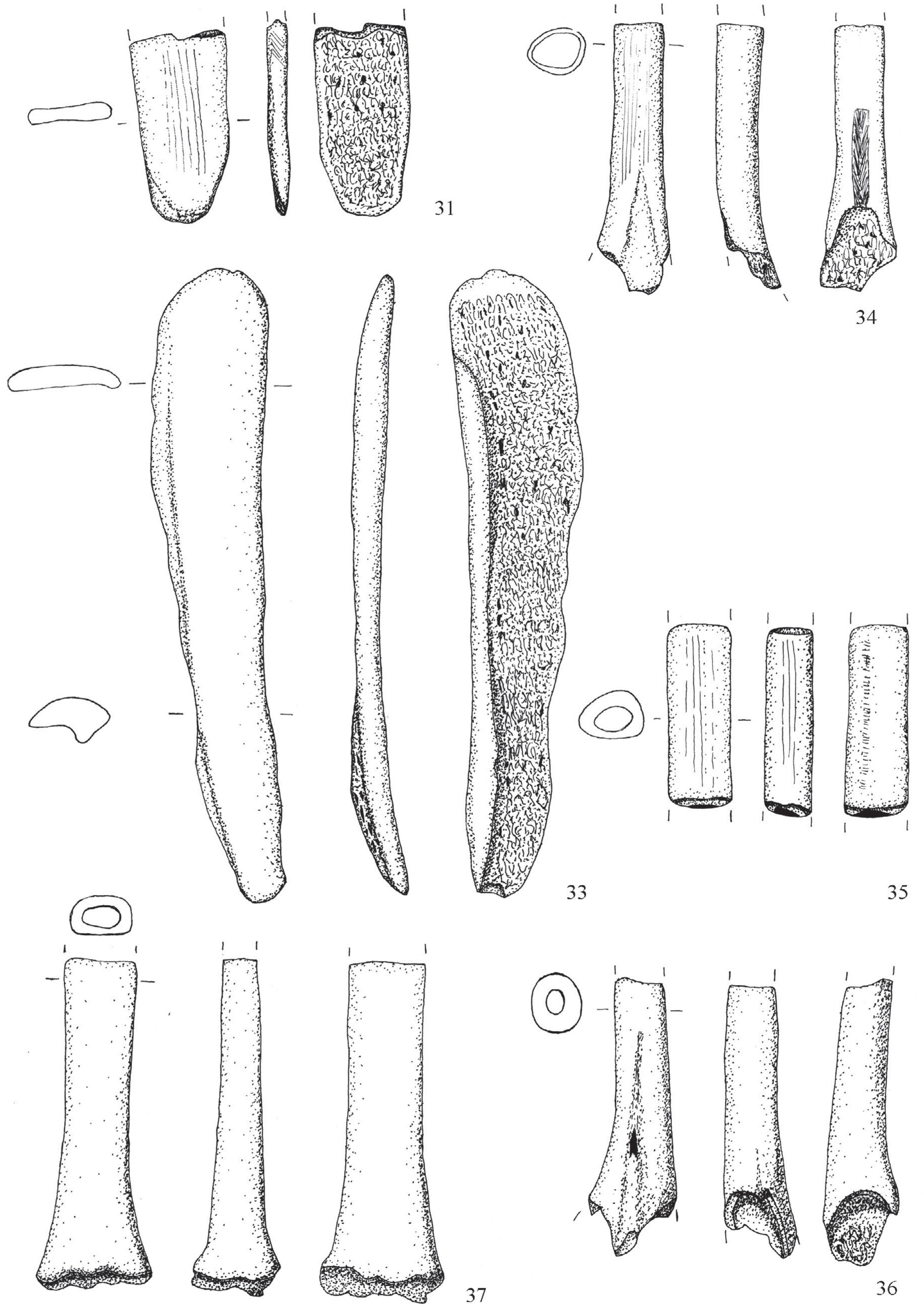


Fig. 6.4.9. Smoothed tools and handles, cat. nos. 31, 33–36.

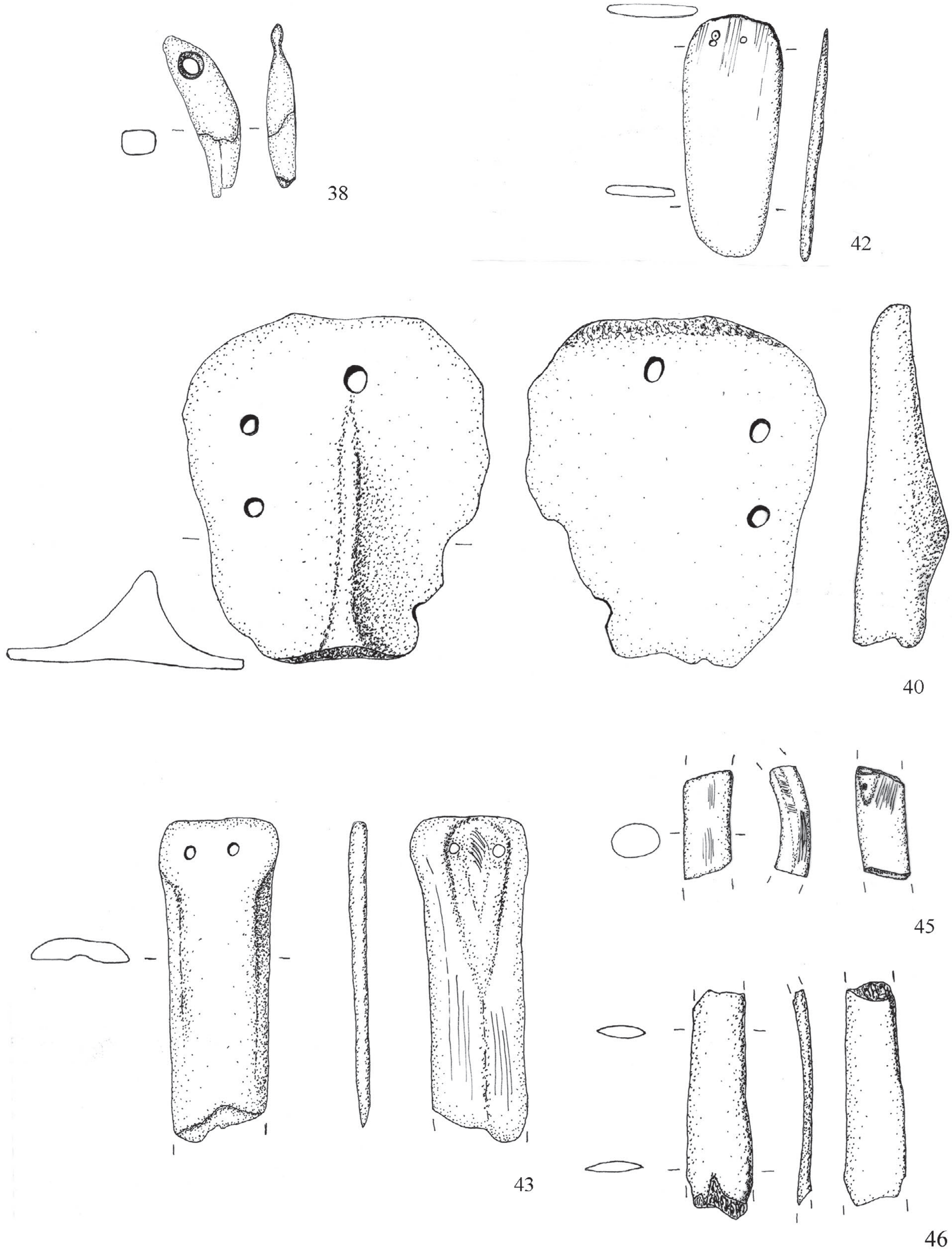


Fig. 6.4.10. Ornaments/miscellaneous, cat. nos. 38, 40, 42, 43, 45, 46.

one, fragmentary, at the bottom right. From the perforation arrangement, it would seem impossible to hang the object using all the holes, unless they were meant to affix the object onto a base and thus exploit all the holes, although they are not symmetrically placed. The ornaments described so far, especially the pendants obtained from teeth, cannot be usefully compared with others from contemporaneous and neighboring sites, because they are rather common objects widely spread within the Neolithic stratigraphies.

The pendants or earrings (cat. no 44a–c; Figure 6.4.8:44 and Figures 2.1.25 and 2.1.26) made from tusks of *Sus scrofa L.*, however, deserve particular mention. Their engraved decoration shows a set of broken lines (chevrons) on two overlapping registers and can be compared with some bone pins found during excavations at Obre II within the levels attributed (through links with pottery of the Lisičići Culture) to the Upper Neolithic (Serra d'Alto and Diana phases within the Italian peninsula) (Benac 1973).

Animal Species Used

Our determination of the species used for these tools indicates that half of those found inside the cave come from *Ovis/Capra*, whereas more than a third cannot be identified at all because the degree of elaboration of the artifacts has made any attribution to a specific species impossible (Figure 6.4.11).

The distribution of tool types by species is shown in Figure 6.4.12. Both the sharp tools and the slantwise ones were produced, for the most part, from metapodials of *Ovis/Capra*, while a good percentage of the ornaments, where recognizable, are attributable to the teeth of *Sus scrofa L.*

In a preliminary report on Scaloria, Gimbutas (1981) stated that about 20 species had been identified from Neolithic levels inside the cave: 76 percent of the samples represented domestic fauna, and among these, 90 percent were ovines and caprines—the hand-reared animals. Recent studies (see Bartosiewicz and Nyerges, Chapter 3.3, this volume) have defined the species found in the cave, separating the pre-Neolithic remains from the Neolithic ones. Among the 2,000-plus Neolithic fragments, 73 percent belong to ovines and caprines (ibid.). The data collected by the analysis of the bone tool industry are thus largely in agreement with the evaluations made in examining all the non-human osteological finds from the site: 35 percent of these cannot be attributed to any species.

Engraved Fragments

In addition to the recognizable tools with engraved marks on their surfaces listed in this catalogue—three fragmentary awls, two handles, one spatula (all without a species attribution), and three ornaments of teeth of *Sus scrofa L.* (one coming from the level attributed to the Late Upper Paleolithic)—excavators also recovered from inside the cave 23 fragments with engraved

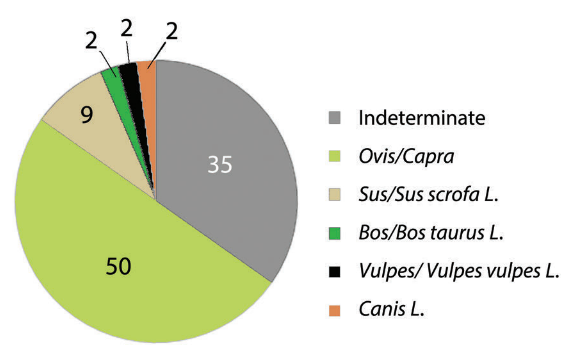


Fig. 6.4.11. Distribution of animal species used for bone tools (%).

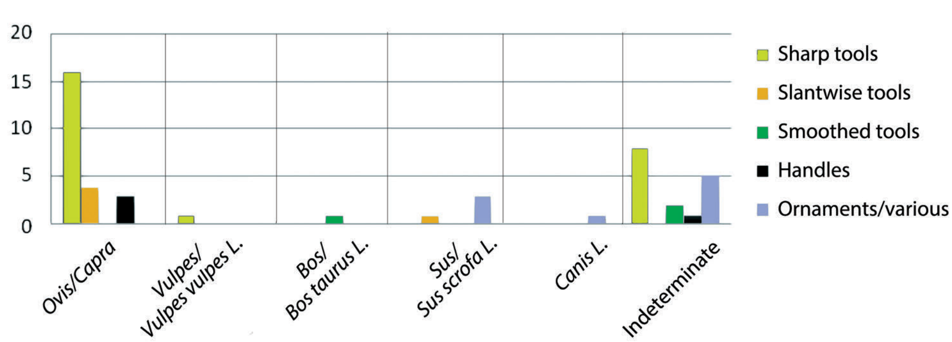


Fig. 6.4.12. Animal species used for bone tools, by tool type.

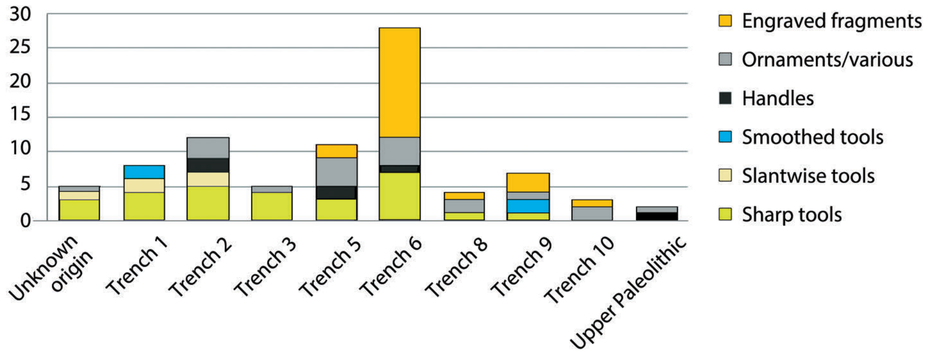


Fig. 6.4.13. Bone industry distribution, by type and trench.

markings. These were not available for physical examination, but could only be studied through photographs and/or drawings made at the time of the excavation. Too fragmentary to be assigned to a morphological type, we have categorized them as "engraved fragments." Most of these were obtained from ribs.

It is difficult to venture a guess about the meaning of these engraved fragments, but it is possible to make some evaluations. (Fortunately, some of the visual documentation showed the engravings clearly, having benefited by careful observation through a microscope.) The available surface is not completely exploited, but the engravings seem to be concentrated only in some areas (see Chapter 5.5 for Figure 5.5.4). The engravings can be described as short marks (single or multiple, arranged in bands or chaotically scattered), long marks with a rectilinear or slightly curvilinear trend, and sometimes tangent, cross-shaped signs, with continuing zigzags. On the whole, these objects are quite singular, not only in terms of their form, but also in their being found concentrated within just a few trenches (trenches 5, 6, and 9) (Figure 6.4.13).

CATALOGUE

Sharp Tools (Figures 6.4.2, 6.4.3, 6.4.7, 6.4.13)

1. Fragmentary point, with rectangular section, on a long-bone splinter; transverse smoothing, borders thinned (trench 5, level 7).

2. Awl obtained from metapodial of *Ovis/Capra*, longitudinally sectioned; smoothing; polished surface in the medial part of the lower side, head constituted by proximal epiphysis (trench 3, level 1).

3. Awl obtained from metatarsus of *Ovis/Capra*, longitudinally sectioned; head constituted by distal epiphysis; smoothing; polished surface near the point caused by wear and tear (trench 1, level 3).

4. Bone needle, body with circular section flattened near the head, which has a quadrangular shape with a perforation (diameter 0.17 cm); transverse and longitudinal smoothing; surface blackened by fire action (trench 3, level 3).

5. Awl obtained from metapodial of *Ovis/Capra*, body longitudinally sectioned; head constituted by proximal epiphysis; smoothing; frequent polished surfaces, carved notches on the medial part of the lower side (trench 1, level 1).

6. Fragmentary awl; smoothing; flattening of the borders on the lower side; surface blackened by fire action (trench 2, level 6).

7. Awl on ulna, probably of *Vulpes vulpes L.*; smoothing; fragmentary distal edge (trench 8/surface).

8. Awl from metapodial of *Ovis/Capra*, longitudinally sectioned; smoothing; frequent polished surfaces especially near the medial part and the distal edge; head constituted by proximal epiphysis (trench 3, level 1).

9. Awl on metapodial of *Ovis/Capra*, body longitudinally sectioned; smoothing; head constituted by proximal epiphysis, missing one trochlea; polished surfaces, especially on the medial part and on the distal edge; borders flattened on the lower side (trench 1, level 5).

10. Point on long bone (rib?), with circular section and flattened borders at the distal edge; proximal edge worked so as to place it inside a handle; frequent polished surfaces, especially at the distal edge (trench 6, level 6).

11. Awl on metatarsus of small *Ovis/Capra*, longitudinally sectioned; head constituted by distal epiphysis, missing the point (trench 2, level 11).

12. Awl on metapodial of *Ovis/Capra*; smoothing; body longitudinally sectioned, head constituted by proximal epiphysis missing one trochlea; polished surfaces, especially at the distal edge; very sharp (trench 6, level 1).

13. Awl on metapodial of *Ovis/Capra*; smoothing; body longitudinally sectioned, triangular section, head constituted by distal epiphysis; polished surfaces at the distal edge (trench 2, levels 9–10).

14. Point on long bone; smoothing; body with elliptical section, slightly flattened on the lower side (unknown provenance).

15. Awl on metapodial of *Ovis/Capra*; smoothing; body longitudinally sectioned, head constituted by distal epiphysis missing one trochlea; frequent polished surfaces, specially on the upper side; distal edge very sharp with quadrangular section (trench 6, level 1).

16. Awl on femur of *Ovis/Capra*; smoothing; body longitudinally sectioned with head constituted by proximal epiphysis; frequent polished surfaces, especially on the upper side (trench 6, level 5).

17. Awl on metatarsus of young *Ovis/Capra*; smoothing; body longitudinally sectioned with head constituted by proximal epiphysis (trench 6, level 6).

18. Fragmentary point on long bone; smoothing; body longitudinally sectioned (unknown provenance).

19. Awl on metapodial of *Ovis/Capra*; smoothing; body longitudinally sectioned with head constituted by distal epiphysis missing one trochlea and point; polished surfaces on the mesial part of the upper side (trench 3, level 3).

20. Fragmentary awl on ulna of *Ovis/Capra*; smoothing; head constituted by proximal epiphysis missing the edge (unknown provenance).

21. Fragmentary awl; smoothing; body longitudinally sectioned, preserving only the sharp distal edge and part of the medial one; worn surface on the upper side (trench 2, level 6).

22. Fragmentary point/awl on long bone; smoothing (scraping?); body longitudinally sectioned (trench 6, level 6).

23. Awl on metatarsus of *Ovis/Capra*; smoothing; body longitudinally sectioned, with head constituted by proximal epiphysis; frequent polished surfaces, especially on the distal part of the lower side (trench 1, level 5).

24. Fragmentary awl on metapodial of *Ovis/Capra*; smoothing; body longitudinally sectioned; frequent polished surfaces (trench 6, level 3).

25. Fragmentary awl on ulna of *Ovis/Capra*; smoothing (trench 2, level 4).

Slantwise Tools or Biseaux (Figures 6.4.5: 26–28)

26. Biseau on tibia of *Ovis/Capra*; smoothing, except on the head, constituted by distal epiphysis; body transversally sectioned (trench 2, level 11).

27. Chisel on incisor of *Sus scrofa L.*; transversally sectioned to the root (unknown provenance).

28. Biseau on tibia of *Ovis/Capra*; smoothing; body transversally sectioned and head constituted by distal epiphysis; frequent polished surfaces on the medial part of the tool (trench 1, level 4).

29. Biseau on tibia of *Ovis/Capra*; smoothing; body transversally sectioned, with head constituted by distal epiphysis; worn surface with trace of cross-shaped incision (trench 2, level 13).

30. Biseau on tibia of *Ovis/Capra*; smoothing; body transversally sectioned, with head constituted by distal epiphysis; polished surface near the distal

part of the upper side that is slanting and rounding off (trench 1, level 2).

Smoothed Tools (Figures 6.4.8:32; 6.4.9:31, 33)

31. Fragmentary spatula; smoothing; borders more rough-edged by wear and tear and worn on the distal part; the lower side is smoothed on the borders (trench 1, level 5).

32. Fragmentary spatula; smoothing only on the upper side; body constituted by a longitudinally sectioned splinter with an edge rounded off; consumed surface (trench 1, level 3).

33. Spatula on rib splinter of *Bos taurus L.*; smoothing; body longitudinally sectioned; frequent polished surfaces, especially on the proximal part and on the right border of the upper side; the distal part is rounded off and flattened (trench 9, level 4).

Handles (Figure 6.4.9:34–37)

34. Handle; smoothing; polished surface with traces of incisions on the lower side (trench 6, level 3).

35. Fragmentary handle obtained from long bone (maybe femur of *Ovis/Capra*), with sub-triangular section; smoothing; rounded off and smoothed borders (provenience is given as "surface mix, Mesolithic site," perhaps trench 8).

36. Fragmentary handle obtained from tibia of *Ovis/Capra*; scraping; consumed surfaces (trench 2/surface).

37. Handle obtained from radius of *Ovis/Capra*(?); head constituted by distal epiphysis, body with sub-elliptical section; consumed surface (trench 2/surface).

Ornaments/Miscellaneous (Figures 6.4.8:39, 41, 44, 47–50; 6.4.10:38, 40, 42, 43, 45)

38. Fragmentary pendant from canine of *Canis L.*, realized without modifying the original shape; perforation (diameter 0.41 cm); smoothing; polished surface (trench 2).

39. Fragmentary pendant, arc-shaped, obtained from tusk of *Sus scrofa L.*, with sub-triangular shape and smoothed angles; thickness decreases at one edge; two perforations at the edges (troncoconic shape where the thickness is greater); smoothing (trench 3, level 1).

40. Scapula fragment; pierced in four points (one hole is partially preserved); worn surface (trench 5, level 3).

41. Fragmentary pendant obtained from tusk of *Sus scrofa L.*, without modifying the original shape; perforation (diam. 0.33 cm) on the fragmentary edge (trench 2, levels 9–10).

42. Quadrangular pendant with two holes at one edge; smoothing; consumed borders near the pierced edge and smoothed borders from wear and tear on the other one (maybe reuse as another tool, a spatula?); above one of the holes is a small circular incision (trench 8, level 1).

43. Fragmentary pendant obtained from a long bone; smoothing; quadrangular shape with, at one edge, two holes near a widening; opposite edge fragmentary (picked up in cave).

44. Two pendants, used as earrings or pendants (see Figures 2.1.25 and 2.1.27), obtained from tusks of *Sus scrofa L.*, pierced and engraved with geometric incisions near the perforation (trench 10/"bone group" 8).

45. Fragmentary ivory bracelet with oval section, showing signs of smoothing over abrasion on the whole surface; traces of linear perforation on one break (trench 6, level 6). (Note: The ivory identification is questionable, but it may well be spondylus shell. Spondylus shell bracelets with oval sections are well-known Neolithic objects and their texture is very like ivory.)

46. Thinned and smoothed rib fragment; impossible to connect it to a precise tool (trench 9, level 1).

47. Splinter fragment worked with transverse parallel incisions (trench 2, level 13).

48. Four valves (one fragmentary and scraped off) of *Glycymeris insubrica* pierced at the umbo through wear and tear; the external surface is strongly altered (the specimen shown in Figure 6.4.8:48 has a second hole, smaller, on a border side) (trench 2, level 5; trench 5, level 7; trench 10, level 3; trench 10, level 8 burial) (see Chapter 6.5).

49. Pierced shell of *Rumina decollata* (interior cave at entrance) (see Chapter 6.5).

50. Pierced shell of *Cernuella cisalpina* (interior cave at entrance) (see Chapter 6.5)

Acknowledgment

I would like to thank Professor Claudio Sorrentino, University of Pisa, who checked the anatomical determinations.

Riassunto

Il complesso di materiali qui preso in esame è rappresentato da 50 reperti, la maggior parte in buono stato di conservazione, che ne ha quindi permesso l'identificazione tipologica.

Da un punto di vista quantitativo, gli strumenti maggiormente rappresentati sono quelli appuntiti (25), e tra questi soprattutto i punteruoli. Seguono gli ornamenti (13), gli strumenti ad immanicamento (4) e quelli a taglio obliquo (5), chiudono infine la rassegna gli strumenti smussati (3). L'analisi macroscopica delle tracce di lavorazione ha permesso di distinguere soprattutto le ultime fasi di lavorazione dello strumento, rifinitura finale e successivo utilizzo, che hanno quasi completamente cancellato la sbozzatura iniziale.

Gli strumenti appuntiti sono costituiti per la maggior parte da punteruoli (20 reperti); seguono le punte (4 reperti) ed un solo ago: essi sono ricavati per lo più da metapodiali di ovicaprino. Gli strumenti a taglio obliquo sono costituiti da cinque reperti: quattro ricavati da tibia di ovicaprino; interessante la presenza di uno scalpello ottenuto da un incisivo di suino. Appartengono alla categoria degli strumenti smussati tre spatole; solo una mantiene ancora ben individuabile la provenienza: si tratta di una spatola realizzata su costola di bovide. I quattro strumenti ad immanicamento non possono essere attribuiti ad un osso in particolare, ma genericamente ricondotti ad ossi lunghi di ovicaprini. Per quanto riguarda gli oggetti di ornamento, si possono fare ulteriori suddivisioni tipologiche: pendagli, placchette forate, orecchini.

La determinazione delle specie animali utilizzate, fatta anche grazie all'ausilio di un archeozoologo, ha portato a risultati interessanti: la metà degli oggetti in materia dura animale rinvenuti nella grotta può essere ricondotta ad Ovis/capra, mentre risulta non determinabile più di un terzo dei reperti, a causa dell'avanzato grado di elaborazione del singolo oggetto che non permette di attribuirlo ad una specie precisa.

I dati ricavati dall'analisi dell'industria in materia dura animale non sembrano in disaccordo con le valutazioni fatte prendendo in esame tutto il materiale osteologico non umano proveniente dal sito, come sottolineato altrove in questo volume, fermo restando che il 35 per cento dei ritrovamenti presi qui in esame risulta non riconducibile ad alcuna specie.

I confronti con reperti simili provenienti da siti affini, sia per posizione geografica che per attribuzione cronologica sulla base del materiale ceramico, hanno permesso di inquadrare perfettamente l'industria su materia dura animale di Grotta Scaloria nell'ambito del Neolitico Medio-Superiore dell'Italia sud-orientale.

6.5. Shell from the Grotta Scaloria

David S. Reese

Introduction

Grotta Scaloria, near Manfredonia on the Adriatic coast in southeastern Italy, was excavated in 1931 and 1936, and then rediscovered in 1967 and excavated for several seasons thereafter. UCLA's Institute of Archaeology and the University of Genoa held joint excavations in the summers of 1978 and 1979.

In 1981, the late Marija Gimbutas sent the author 18 marine shells of 10 species and four land snails of four species from the 1979 season for identification. These shells were returned to Los Angeles but cannot now be found. In late 2012, photographs and drawings of several 1979 shells were sent from Los Angeles to the author for identification. In January 2013, several 1978 shells and the bulk of the 1979 shells were sent to the author in the United States. Most are from the 1979 season, with only three samples from 1978 (two marine shells and five land snails). However, 20 shell samples noted in the 1979 catalogue[1] have not been examined. Most of the shells likely date to the Middle Neolithic, ca. 5500–5200 BCE, although exact dating is not clear for most of the samples.

[1] Fill at entrance [cat. no. 97); Fill at entrance [cat. no. 256, "Murex"; label says sent to USA); Trench 2, 6.00 [cat. no. 143); Tr. 5, Level 5 [cat. no. 714); Tr. 5, Lev. 9 [cat. no. 1057); Tr. 5, Lev. 9W [cat. no. 1078); Tr. 5, Lev. 9E [cat. no. 1094); Tr. 6, Lev. 2 [cat. no. 141); Tr. 6, Lev. 4-5 [cat. no. 334); Tr. 6, Lev. 6 [cat. no. 651); Tr. 6, Lev. 6 [cat. no. 702); Tr. 6, Lev. 2 extension, SE corner [cat. no. 1176); Tr. 6E, Lev. 3 [cat. no. 429, SF 96); Tr. 6E, Lev. 5 [cat. no. 519); Tr. 8, Lev. 3N [cat. no. 652); Back dirt adjacent to Tr. 8 [cat. no. 838); Tr. 8N, Lev. 3 [cat. no. 903); Tr. 8N, Lev. 4, SW quad [cat. no. 1081); Tr. 9S, Lev. 2 [cat. no. 805); Tr. 10, "Burial group 8" (perforated shell, cat. no. 1249, SF 275).

Marine Shells

There are 331 marine shell individuals available for study. They are not distributed randomly across the site. The locations with the largest numbers are trench 5 (N = 89, 26.9%), trench 6 (n = 71, 21.5%), trench 9 (n = 38), trench 6N (n = 32), fill at entrance (n = 24), and trench 6E (n = 22). Trenches 6N and 6E are northward and eastward extensions of trench 6, respectively.

The bivalve species represented comprise 48 *Ruditapes* (formerly *Tapes*) *decussatus* (carpet shell) individuals; 40 *Glycymeris insubrica* (dog cockle) individuals, with 29 water-worn, 3 worn or water-worn, and 10 naturally holed; 34 *Arca noae* (Noah's ark shell) individuals, with 1 collected dead and 3 holed; 30 *Solen marginatus* (razor clam) individuals; 21 *Ostrea edulis* (oyster) individuals with 3 burned; 16 *Pinna nobilis* (pen shell) individuals (1 burned); 10 *Cerastoderma glaucum* (cockle) individuals, with 1 water-worn; 7 *Mytilus galloprovincialis* (mussel) (Figure 6.5.1a–b) individuals; 5 *Acanthocardia tuberculatum* (cockle) individuals, with 1 water-worn; and 1 each of a *Spondylus gaederopus* (spiny or thorny oyster) water-worn valve; 1 *Chama gryphoides* (jewel box) valve (very small); and 1 *Mactra corallina* (trough shell) valve.

The gastropods (snails) comprise 52 *Patella caerulea* (limpet), 1 of which has an open center; 41 *Hexaplex trunculus* (formerly *Murex trunculus, murex*), with 3 water-worn and 1 holed; 15 *Phorcus turbinatus* (topshell; formerly *Monodonta turbinata*), 2 *Cerithium vulgatum* (cerith or horn shell); and singles of *Gibbula varia* (topshell); *Cyclope neritea* (nerite) holed as an ornament; *Bolinus brandaris* (formerly *Bolinus brandaris, murex*); *Columbella rustica* (dove shell) holed on the body whorl and a probable ornament (Late Upper Paleolithic); and a shell pendant (not seen).

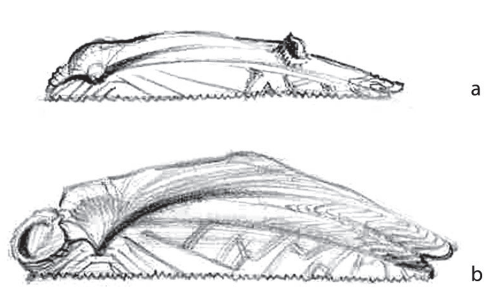


Fig. 6.5.1. (a) Mussel shell, excavated on 30/7, interior cave entrance (drawing 2_08-019). (b) Unmodified *Arca* right valve called "mussel shells with engraved + painted designs" (the designs are probably natural markings) (drawing 2_08-018).

Most of the marine shells are to be considered food debris. The exceptions are the shells collected dead on the beach: 29+ *Glycymeris* (more than 73%), 1 *Cerastoderma*, 1 *Acanthocardia*, 1 *Spondylus*, 3 *Hexaplex*, and the 3 ornamental shells (*Cyclope*, *Columbella*, pendant).

There are 171 land snails, comprising 82 *Rumina decollata*, 66 *Helicella* spp., 21 *Eobania vermiculata*, 1 *Helix aspersa*, and 1 *Eobania*/*Helix*. The *Eobania* and *Helix* are edible forms, but 7 of the land snails are from clearly mixed contexts.

According to Winn and Shimabuku (1980:9; cf. Appendix 2 [online]), from the 1978 excavations in trench 1, a human skull, exposed before excavation began,

> was covered with countless elongated tubular shells with glossy and fragile qualities. Such shells can be found buried in the sandy bottom of the Adriatic Sea and require considerable effort to locate (according to native informants). Many of the shells lying immediately on the skull displayed evidence of burning, suggesting funerary rites.

From the above description, I believe the shells were scaphopods. These tusk or tooth shells, naturally open at both ends, are mainly of the genera *Dentalium* or *Antalis*. *Dentalium* shells are known to have been used as ornaments during the Neolithic. Winn and Shimabuku (1980:9) also stated:

> Hundreds of tubular shells of the type described above also were found in a circular pit near the skull, but in a level sealed by mud deposits, and thus excluding any direct association with the skull. These tubular shells were associated with figulina ware. It is interesting to note that not a single shell of this type was found in Trenches 2 or 3.

They further noted that:

> [e]longated tubular shells were determined to be unmodified, but found in contexts suggestive of the ornamental nature of these delicate shells. (Winn and Shimabuku 1980:27)

The Early Neolithic impresso ware was sometimes decorated with cockle shell impressions. From the 1978 excavation, Winn and Shimabuku (1980:10, pl. IA) stated for trench 2: "While numerous cardium shells were found, no tubular shells were discovered." Only 15 cockles (10 *Cerastoderma*, five *Acanthocardia*) are in the present collection.

Land Snails

There are 172 land snails. Of these, there are 82 *Rumina decollata*, 66 *Helicella* spp., 21 *Eobania vermiculata*, 2 *Helix aspersa*, and 1 *Eobania*/*Helix*. Only five of these, all *Rumina*, came from the 1978 season. Many land snails (n = 49, 28.5%) came from the surface or from level 1. The land snails are not evenly distributed across the site: 43 (25%) come from the fill at the entrance and 48 (28%) from trench 8. The *Eobania* and *Helix* are edible forms, but all the others are probably naturally in the deposits. Eleven of the *Eobania* retain some color and/or gloss, suggesting they are probably post-Neolithic intrusions. Ten of the 21 *Eobania* came from the fill at the entrance.

Comparanda

Marine shells are an important food source at a number of pre-pottery sites in southern Italy, as at Grotta della Sanctuario della Madonna in Calabria (Cardini 1970; Durante and Settepassi 1972; Radmilli 1972:131) and at Cipolliane di Novaghie in Apulia (Peroni 1967:42–43). At Early Neolithic Coppa Nevigata, just south of Scaloria, shells are a common food item, particularly cockles (Peroni 1967).

At Neolithic Monte Tinello (Marche), there were 24 *Glycymeris* and 2 *Ostrea* (Wilkens 1989:269). At Copetella (Iesi, Marche), there were 28 marine shells, including 11 *Glycymeris*, 12 *Mactra*, 1 *Acanthocardia*, and 1 murex (Wilkens 1988:363). At Osimo (Ancona), there were 188 marine shells, including 132 *Glycymeris* (75.2%), 5 *Acanthocardia*, 3 *Mytilus*, 2 *Arca*, 6

Monodonta, 2 *Patella*, 2 *Gibbula*, and 1 *Bolinus* (Wilkens 1997a:237–238).

Middle Neolithic Serra del Palco-Mandria in the area of Milena produced *Glycymeris*, *Hexaplex*, and fossil dentalia (as well as *Rumina*, *Eobania*, and *Helix*) (Wilkens 1997b:127).

Catalogue of Shells at Scaloria

Catalogue number and Small find number refer to Appendix 8, the 1979 Field Catalogue; see Appendix 10, Portfolio, for photographs and drawings [both online].

Abbreviations

Cat. no.	Catalogue number
SF	Small find number
H	Height (in mm)
L	Length (in mm)
MNI	Minimum number of individuals
pres.	Preserved
W	Width (in mm)

Marine Shells

1978 Shells

Trench 2

1 *Spondylus*—very water-worn, lower valve, L 74.25, W 45, T 15.

1 *Ruditapes*—left valve, hinge/upper body fragment, pres. W 25.25, pres. H 19.25.

1979 Shells

Fill at Entrance

7 *Glycymeris* valves (6 MNI)—1 worn (possibly water-worn) body fragment, large (cat. no. 12); 1 water-worn, distal/side fragment, very large, pres. W 43 (cat. no. 14); 2 water-worn fragments: 1 broken distal and sides, pres. W 37.25, pres. H 35.25; 1 distal/side fragment, large, pres. W 45.5 (cat. no. 35); 3 distal fragments: 1 worn, large, pres. W 41; 1 water-worn, large, pres. W 32; 1 water-worn, large, pres. W 40.75; 1 worn or water-worn body fragment, medium or large (3 MNI) (cat. no. 38).

4 *Arca* valves (4 MNI)—2 left valves: W 30.75, H (no umbo) 12.5; W 39.75, H (no umbo) 16.75; 1 right valve, broken, W 41, H (no umbo) 23 (3 MNI by size) (cat. no. 35); 1 hinge/umbo fragment, right valve, large (cat. no. 56, SF 5).

3 *Solen* valves (2 MNI)—1 broken, medium, pres. H 12.75 (cat. no. 12); 1 fragment, medium, H 12.25 (cat. no. 14); 1 right valve, broken, pres. H 10.25 (cat. no. 35).

2 *Cerastoderma* valves (2 MNI)—2 right valves, 2 broken, 1 H ca. 25.5 (cat. no. 14).

1 *Acanthocardia*—1 distal fragment, thick, large (cat. no. 14).

8 *Hexaplex* (8 MNI [6 fresh])—1 open body, worn, vermetids in mouth, L 46.75, W 34.75, opening 18 × 24.25; columella/distal fragment, medium (2 MNI) (cat. no. 12); 4 fragments: apex/columella/distal, medium/ large, L 40; 1 mouth/columella/distal, medium); 1 columella/distal, medium/large; worn columella, medium (4 MNI) (cat. no. 14). 1 columella/distal, medium (cat. no. 35); 1 columella/distal, 1 body (1 medium MNI) (cat. no. 38). 1 columella/distal fragment, medium (cat. no. 100).

1 *Cerithium*—open mouth, gastropod-bored on upper spire, L 29.25, W 10, hole 0.75 (cat. no. 35).

Surface Layer above Cave Entrance (cat. no. 79)

1 *Ruditapes*—right valve, broken side, medium, H 25.25.

1 *Glycymeris*—2 fragments: worn hinge fragment, body (1 MNI).

1 *Arca*—right valve, hinge fragment, medium.

1 *Ostrea* valve (seen only in 1981).

4 *Hexaplex*—5 fragments (4 MNI): 3 columella/distal, 3 medium; 1 mouth/body/distal (very large); 1 body.

1 *Cerithium*—open mouth, medium, L 29.75, W 11.25.

1 *Gibbula*—medium.

Crevice above Cave Entrance

4 *Arca* valves—2 left, 1 right, 3 hinge/umbo fragments; 1 seen only in 1981 (2 MNI) (cat. no. 197, SF 50; catalogue says “Crevice between rocks”).

1 *Solen*—right valve, 6 fragments, pres. H 11 (cat. no. 88).

1 *Ostrea* valve—small, L 44.25, W 33.75 (cat. no. 88).

2 *Hexaplex* (2 MNI)—2 fragments: distal/siphon; body (1 medium MNI) (cat. no. 88); 1 distal/columella, medium (no cat. no.).

Interior Cave Entrance

4 *Arca* valves (4 MNI)—2 right valves: W 48.25, H (no umbo) 18.25; W 56.25, H (no umbo) 19.5 (2 MNI) (cat. no. 57, SF 6); 2 right valves: W 43.25+, H (no umbo) 18; W 58.5, H (no umbo) 19.75 (2 MNI) (cat. no. 95, SF 24).

1 *Chama* valve—very small, L 11.75, W 9.25 (cat. no. 57).

1 *Hexaplex*—2 fragments: distal/columella/lip, body (1 medium MNI) (cat. no. 92).

Central Cave, Surface (cat. no. 290)

1 *Ruditapes*—right valve, broken, medium.

1 *Arca*—right valve, gastropod-bored on upper body, very large, W 68.5, H (no umbo) 23.5, boring 1.25 × 1.75.

2 *Ostrea* valves—1 small, L ca. 36.25; 1 medium, pres. W 33.75 (2 MNI).

1 *Pinna*—2 fragments (1 eroded).

1 *Patella*—broken, medium, L 28.75, pres. W 19.

Cave Rear near Mesolithic Site, Surface (cat. no. 342; cat. entry "Mesolithic site debris, Surface")[2]

1 *Arca*—left valve, broken, medium, H (no umbo) 17.

1 *Ostrea* valve—medium, L 53.5, W 42.

1 *Hexaplex*—2 worn fragments (1 MNI): columella/distal, body.

Trench 4, West Floor Trench to Bedrock (cat. entry "Tr. 6W, bedrock")

1 *Hexaplex*—columella/distal fragment, medium (cat. no. 852).

Trench 5, Level 1

1 *Glycymeris*—water-worn, side/hinge fragment, medium (cat. no. 128).

Trench 5, Level 2 (master cat. no. 306)

2 *Ruditapes* valves (1 MNI)—right, medium, W 36, H 25.35; distal fragment.

1 *Glycymeris*—very water-worn, natural hole at umbo, W 34.25, H 34.25, hole 3.75 × 4.75 (cat. no. 316, SF 72, drawing 2_08-016) (Figure 6.5.2).

2 *Arca* valves—2 left valves: 1 medium; 1 concreted, large (2 MNI).

1 *Pinna*—delaminated fragments (cat. no. 311, some fragments seen only in 1981).

2 *Hexaplex*—open body, worn, large, L 61.25; columella/distal, medium (2 MNI).

Trench 5, Level 3 (master cat. no. 362; level produced LJ-4983 C-14 date)

2 *Glycymeris* valves—1 water-worn, broken distal/side, pres. W 33.75, pres. H 32.75 (cat. no. 362); 1 water-worn, natural opening at umbo (not seen, cat. no. 378, SF 86, drawing 2_08-015 and photo F01) (Figure 6.5.3).

1 *Ostrea* valve—bit worn, L 48.5, W 37.25.

1 *Pinna* valve—1 fragment (cat. no. 362); 2 fragments (cat. no. 447).

1 *Acanthocardia* valve—water-worn (seen only in 1981).

1 *Hexaplex*—columella/distal, medium.

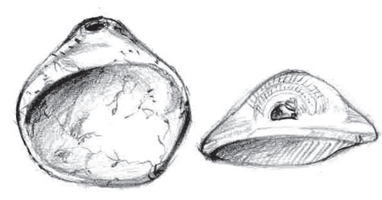


Fig. 6.5.2. *Glycymeris*—water worn, natural hole at umbo (drawing 2_08-016).

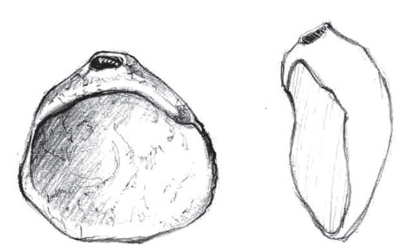


Fig. 6.5.3. *Glycymeris*—water worn, natural opening at umbo (drawing 2_08-015).

[2] The recalibration of dates in Chapter 2.3 indicate that Mesolithic is Late Upper Paleolithic and probably in this case refers to the area of trench 8.

Trench 5, Level 4 (master cat. no. 644)

1 *Glycymeris*—water-worn hinge/side, medium.

1 *Arca*—right valve, hinge fragment, medium (cat. no. 597).

1 *Solen* fragment—left valve, medium.

1 *Pinna*—2 fragments (cat. no. 670, under large stone, NE).

1 *Mytilus* valve—2 fragments, medium.

1 *Patella*—edge fragment, medium, pres. L 31.

1 *Hexaplex*: 1 lip/body fragment, medium (cat. no. 597); 2 fragments (1 medium/large MNI): columella/distal, body.

1 *Monodonta*—body fragment.

Trench 5, Level 4 (NW corner, near Neolithic intrusion)

1 *Cyclope*—broken hole in lower body, broken lip, L 10.5, W 9.5, hole ca. 2 × 3 (cat. no. 787).

Trench 5, Level 4NW (under stones; cat. no. 626)

2 *Glycymeris*—2 distal fragments (2 MNI): pres. W 31.25; water-worn, pres. W 33.25.

1 *Arca*—right valve, umbo fragment, medium.

1 *Mytilus*—distal fragment, small individual.

1 *Hexaplex*—2 fragments (1 MNI): apex; worn body fragment.

Trench 5, Level 5 (cat. no. 746)

2 *Arca* valves (1 MNI)—right, W 56.25, H (no umbo) 22.25; left fragment, H ca. 17.75.

1 *Solen*—left valve, 3 fragments, H 11.75+.

1 *Ostrea* fragment—small individual.

1 *Pinna* fragment.

2 *Patella*:—L 31.75, W 22.75+; L 23.75, W 18.75.

1 *Hexaplex*—2 fragments (1 medium MNI): lip/body; distal/columella.

Trench 5, Levels 5–8 (under NE corner rock)

2 *Arca* valves—right, large, W 59, H (no umbo) 21.75; valve (cat. no. 1079, seen only in 1981).

Trench 5, Level 6

2 *Glycymeris*—2 water-worn distal fragments (2 MNI): large, pres. W 40.25; very large, pres. W 51.5 (cat. no. 815).

1 *Arca*—right valve, hinge/umbo fragment, medium (cat. no. 795).

1 *Ostrea*—side fragment, medium (cat. no. 795).

1 *Pinna* valve—fragments (cat. no. 795); fragments (cat. no. 815, some seen only in 1981).

3 *Acanthocardia* valves (2 MNI)—1 right valve, H 31.5, W 32.25 (cat. no. 795); 1 right valve, broken distal, pres. H 26; 1 seen only in 1981 (cat. no. 815).

1 *Hexaplex*—columella/distal fragment, worn, medium (cat. no. 795).

1 *Monodonta*—2 fragments, medium (cat. no. 795).

Trench 5, Level 7

5 *Ruditapes* valves—1 right valve, W 35.75, H 25.25 (cat. no. 914); 3 right valves: W 30, H 20.75; W 32.75, H 23; 1 broken; 1 left valve, broken (3 MNI) (cat. no. 925) (4 MNI).

8 *Glycymeris* valves—1 water-worn, hinge/body fragment, pres. H 26, pres. W 24.75; 1 water-worn (cat. no. 863, seen only in 1981); 4 fragments (3 MNI): 1 umbo/side with hole at umbo, H 35+, hole 3.75; 1 distal/side, large; 2 distal (cat. no. 914); 1 probably water-worn (not seen, cat. no. 918, SF 217, catalogue as "perforated shell" but hole not visible in photo F01); 1 water-worn side fragment, medium (cat. no. 925).

1 *Solen* valve—fragment, left valve, medium/large (cat. no. 925).

1 *Ostrea*—umbonal fragment, medium (cat. no. 925).

1 *Pinna* valve—2 fragments (cat. no. 863).

2 *Acanthocardia* valves (2 MNI)—1 side/distal fragment, medium (cat. no. 863); 1 left valve, very large, W 39.75, H 41 (cat. no. 925).

1 *Mactra* valve—right, upper body fragment (cat. no. 914).

1 *Hexaplex*—body fragment, medium (cat. no. 863); body fragment, medium (cat. no. 914).

4 *Monodonta* (4 MNI)—3 fragments: 1 broken, 1 medium, 2 large (cat. no. 914); 1 distal fragment, medium (cat. no. 925).

Trench 5, Level 8 (master cat. no. 1025)

1 *Ruditapes*—left valve, W 33, H 23.25.

1 *Glycymeris*—right valve, worn, W 37.25, H 33.75.

1 *Arca*—collected dead, worn and eroded, left valve, broken, irregular open umbo, H ca. 16, opening 9.25 × 5.75.

1 *Solen*—left valve, fragment, pres. H 11.25.

1 *Ostrea*—small, L 44, W 48.25.

1 *Mytilus*—body fragment, medium (cat. no. 958).

3 *Hexaplex* (3 MNI)—4 fragments (2 MNI): 2 columella/distal (2 medium), 1 internal columella/body, 1 body (cat. no. 958); 1 columella/distal fragment, medium (cat. no. 1025).

NE Extension (cat. no. 1103)

2 *Ruditapes* valves—1 right, large, W 42.25, H 31; 1 left, W 27.75, H 21.75 (2 MNI).

1 *Glycymeris*—worn or water-worn body fragment, medium/large.

1 *Arca*—right valve, W 53.25, H (no umbo) 22.25.

1 *Ostrea*—pres. L 36, W 34.5; fragment (1 MNI).

1 *Pinna*: fragments, large individual.

Trench 5NW, Level 4 (under large stone; cat no. 654)

1 *Glycymeris*—water-worn, hinge/upper body fragment, large.

1 *Solen*—left valve fragment, large, H 14.75.

1 *Pinna*—2 fragments.

1 *Mytilus*—fragment, medium.

2 *Hexaplex*: columella/distal; siphon/lip/body (2 medium MNI).

Trench 6, Level 1

3 *Ruditapes* valves (2 MNI)—1 distal/side fragment, medium (cat. no. 181); 1 left valve, medium, 2 fragments (cat. no. 281); 1 right valve, 6 pieces (1 large MNI) (cat. no. 1095).

1 *Arca*—right valve, 2 pieces, medium (cat. no. 1095).

8 *Solen* valves—3 left valves; 1 right valve, pres. H 10.75 (4 MNI by size) (cat. no. 181); 3 right valves, 1 left, 9 fragments (3 medium MNI) (cat. no. 1095) (5 MNI by size).

3 *Ostrea* valves—1 fragment, small piece, medium (cat. no. 181); 6 fragments, 5 burned gray/black (2 MNI) (cat. no. 1095).

1 *Pinna* valve—1 fragment (cat. no. 260); 3 fragments (cat. no. 1095).

6 *Patella* (6 MNI)—medium, L 29.25, W 24.5 (cat. no. 116); medium, L 27.25, W 24.75; large, L 33.25, W 32.25 (cat. no. 181); 3 broken, 5 fragments (3 MNI: 2 medium, 1 medium/large) (cat. no. 1095).

3 *Hexaplex*—1 columella/distal, 1 body, medium (1 MNI) (cat. no. 181); distal/siphon fragment, medium/large (cat. no. 281); water-worn, open body and open apex, pres. L 47.25 (cat. no. 1095; 2 fresh + 1 water-worn MNI).

2 *Monodonta*—2 body fragments (cat. no. 181); 2 fragments (body, lip) (cat. no. 1095) (2 MNI).

Trench 6, Level 2 (cat. no. 203)

1 *Patella*—medium, L 32.75, W 29.25.

1 *Monodonta*—distal fragment, large.

Trench 6, Level 3 (master cat. no. 400)

1 *Ruditapes*—left valve, side/distal fragment, medium (cat. no. 223).

1 *Glycymeris*—2 water-worn fragments (1 MNI): distal, pres. W 36; 1 body.

3 *Ostrea* valves—medium, L 52.75, W 42 (cat. no. 223); 2 valves: broken, medium (1 seen only in 1981) (2 MNI).

9 *Patella*—L 24.75, W 29; L 27.75, W 23; L 28.75, W 23.5; L 31.75, W 27; L 32.25, W 25.25; broken, pres. L 35; L 37.25, W 33.5; L 43.75, W (slightly broken) 41.75; 1 seen only in 1981.

1 *Hexaplex*—siphon/body fragment (cat. no. 223); 2 fragments (1 medium MNI): apex; mouth.

1 *Monodonta*—distal fragment, large.

Trench 6, Level 4 (master cat. no. 541)

1 *Cerastoderma*—right valve, W 24.25, H 23.75.

2 *Patella*—broken, large, pres. L 33.75, W 29.5; medium, L 26.75, W 21.25 (pit, level 4+, cat. no. 518).

1 *Hexaplex*—apex fragment, medium/large.

Trench 6, Level 6 (cat. no. 725)

1 *Ruditapes*—distal fragment, medium.

10 *Solen* valves—21 fragments: 8 right, 2 left (8 MNI).

1 *Ostrea*—medium, pres. L 50.25, W 48.25.

1 *Pinna*—6 fragments.

1 *Cerastoderma*—right valve, very large, W 37.75, H 35.25.

1 *Mytilus*—umbo fragment, small piece, small/medium.

2 *Patella*—complete L 29.5, W 25.75; broken, 3 pieces, medium.

Trench 6, Level 7

1 *Arca*—side/distal fragment, very large, pres. W 36 (cat. no. 923; catalogue says level 10).

1 *Cerastoderma* valve—right, large, H 27.25, W 27 (cat. no. 939).

1 *Hexaplex* (cat. no. 891, seen only in 1981).

Trench 6, SE Quad, Wall Cleaning (cat. no. 821)

3 *Solen* valves—5 fragments (2 MNI): 2 left, 1 right.

1 *Cerastoderma*—left valve, worn, slightly broken distal and side, pres. H 30.75, pres. W 29.25.

6 *Patella*—L 28, W 24.25; L 30, W 26; L 33.25, W 27; L 33.75, W 28.75; L 34.5, W 29; L 37.5, W 32.75.

Trench 6, Pit

1 *Patella*—broken edges, pres. L 24.75, pres. W 20.25 (cat. no. 841).

Trench 6N (no level information; cat. no. 278, 4/VIII/79)

4 *Ruditapes* valves—7 fragments, 2 right valves: W 32.25, H 21.25; pres. W 33.5, pres. H 22.75; 2 left valves: W 28.75+ bit, H 20.25; W 36, H 24.5 (2 MNI).

3 *Glycymeris*—1 very water-worn fragment, natural hole at umbo, broken distal and side (ancient), W 38.25, W 32.75, hole 8 × 4; 1 water-worn, distal piece, broken body, pres. W 31.25, pres. H 17; 1 worn, slightly broken distal piece, W 44.25, H 39.25.

4 *Solen* valve fragments—2 right, 2 left (2 MNI).

1 *Ostrea*—broken, small, pres. L 23.75, W 25.25.

1 *Pinna*—2 fragments.

2 *Patella*—chipped edges, L 35.5, W 31; edge fragment, pres. L 37.75.

1 *Hexaplex*—columella/distal fragment, medium.

1 *Monodonta*—complete, medium.

Trench 6N, Level 3

3 *Ruditapes* valves (2 MNI)—1 left valve fragment, medium (cat. no. 323); 2 fragments (2 MNI) (cat. no. 398, seen only in 1981).

7 *Patella*—medium, L 27.5, W 25.75 (cat. no. 323); 6 fragments: L 26.5, W 23.75; L 31.75, W 27.5; L 33.25, W 22.75+; open center, L 33.75, W 26.25, opening 15.5 × 12.75; broken, pres. L 25.75, W 22.75 (cat. no. 398, 1 seen only in 1981).

2 *Monodonta* (2 MNI) (cat. no. 398, seen only in 1981).

1 *Bolinus*—lip/body fragment, medium (cat. no. 323).

Trench 6N, Level 4 (Level Produced LJ-5095 C-14 Date)

1 *Ruditapes*—right valve, W 32.25, H 21 (cat. no. 445).

1 *Glycymeris*—water-worn, natural hole at umbo (not seen, cat. no. 436, SF 98 [but catalogue as FS 99], drawing 2_08-008 and photo F01) (Figures 6.5.4 and 6.5.5).

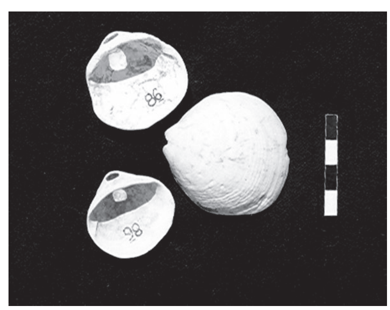


Fig. 6.5.4. *Glycymeris*—water worn, natural opening at umbo (negative_86036_F01).

Fig. 6.5.5. *Glycymeris*—water worn, natural hole at umbo (drawing 2_08-008).

3 *Patella*—2 broken, L 33,25, W 26.25; L 31.5; pres. L 30 (cat. no. 445).

Trench 6E, Level 5 (master cat. no. 560)

2 *Ruditapes* valves—right, broken; left, W 34.75, H 22.75 (1 MNI).

2 *Solen* valves—2 left (2 MNI).

1 *Ostrea*—fragment, medium.

1 *Pinna* valve—3 fragments (cat. no. 560); 5 delaminated fragments (cat. no. 607).

1 *Mytilus* (seen only in 1981).

7 *Patella*—L 24.25, W 20; broken, L 28.75; L 31.25, W 26; L 33.25, W 27.5; broken, L 32+, W ca. 29.75; L 37, W 32.75; L 42, W 35.5.

1 *Hexaplex*—2 fragments: apex, columella/distal fragment.

2 *Monodonta*—3 fragments: 2 distal, 1 body (2 MNI: 1 medium, 1 large).

Trench 6E, Level 6 (cat. no. 1023)

1 *Arca*—distal fragment, medium.

1 *Solen*—right valve, 2 small fragments, pres. H 11.

1 *Pinna* fragment—eroded.

Trench 6E, Level 7 (master cat. no. 1062)

1 *Arca*—left valve, slightly broken distal, medium, W 47.75, H (no umbo) 20.75.

1 *Patella*—large, L 40, W 34.25.

1 pendant—piece of shell with hole (not seen [cat. no. 1046], SF 245 (Figure 6.5.6a–c), from catalogue and photo Scaloria 093, F05, and F07; not identifiable from photographs).

Fig. 6.5.6. Three views of shell. Pendant—piece of shell with hole (photo Scaloria093, photo negative_86036_F05, and photo negative_86036_F07).

Trench 8, Surface

1 *Glycymeris*—very water-worn distal edge piece, pres. W 29.5 (cat. no. 195, SF 47).

3 *Arca* valves (2 MNI)—1 right, slightly broken ends, irregular hole in body center, W 33.25, H (no umbo) 15, hole 2.75 × 4.5; 1 fragment, W 35.75+, H ca. 16 (cat. no. 527); 1 left, W 55, H (no umbo) 18 (cat. no. 552).

Trench 8, Level 1

1 *Arca*—right valve, broken distal and side, medium, pres. W 44.25, pres. H (no umbo) 16.75 (cat. no. 250).

Trench 8, Level 2

1 *Solen* fragment—medium (cat. no. 388).

Trench 8, Level 4 (level produced LJ-5098 C-14 date: Upper Paleolithic/Mesolithic)

1 *Glycymeris*—distal fragment, worn, large, pres. W 37.25 (trench 8W, cat. no. 795).

1 *Columbella*—hole on body, L 13.75, W 8.75, hole 4.25 × 4.5 (cat. no. 695).

Surface Adjacent to Trench 8

1 *Glycymeris*—very water-worn, small hole at umbo, W 33.25, H 33, hole 0.75 × 1.35 (cat. no. 462).

2 *Arca* valves—2 right, 2 medium: W 50, H (no umbo) 17.75; pres. W 40.25, H (no umbo) 18.25 (2 MNI) (cat. no. 632).

1 *Pinna*—3 delaminated fragments (cat. no. 462).

2 *Cerastoderma* valves—water-worn, broken sides and distal, pres. W 18.25, pres. H 18.25 (cat. no. 462); left, large, W 37.75, H 28.25 (cat. no. 632).

1 *Hexaplex*—columella/distal/mouth, medium (cat. no. 632).

Trench 9, Level 1

7 *Ruditapes* valves—4 left valves: W 27.5, H (no umbo) 20.25; W 34+, H (no umbo) 24.75; W 41, H (no umbo) 30.25; broken, pres. W 31.25, pres. H (no umbo) 17.75; 2 right valves: W 31.75, H (no umbo) 20.75; W 35, H (no umbo) 23.25 (5 MNI) (cat. no. 366); right valve, 3 fragments, medium (level 1N, cat. no. 448) (5 MNI).

Trench 5, Level 2 (cat. no. 420)

12 *Ruditapes* valves—5 right valves: W 25.25, H 18.75; W 31.25, H 23.25; W 34.25, H 23; W 35.75, H 23; W 37.75, H 24.5; 7 left valves: W 26.25, H 19.75; W 31.25, H 22; W 31.75+ bit, H 21.5+ bit; W 33.75, H 23; W 39.25, H 26.25; 2 broken (9 MNI by size).

1 *Arca* body fragment.

1 *Patella*—L 26.5, W 22.25.

1 *Hexaplex*—columella/distal fragment, medium.

1 *Monodonta*—4 body fragments (1 medium MNI).

Trench 5, Level 3 (cat. no. 493)

15 *Ruditapes* valves (10 MNI)—10 right valves: broken, H 20.25; W 26.25, H 20.25; W 32, H 22; W 33.25, H 23.25; W 35.25, H 24.25; broken, W 37.75 + bit; broken, H 28.25; 4 left valves: W 36, H 23.75, 3 broken.

1 *Glycymeris*—water-worn distal fragment, large, W 45.25.

1 *Arca*—body fragment, medium.

1 *Mytilus*—fragment, large.

Trench 5, Level 4 (cat. no. 601)

1 *Glycymeris*—water-worn, ancient opening at umbo (not naturally worn), W 43.5, H 44.25, opening 5.25 × 6.75.

1 *Arca* valve—right, open around umbo, W 60.25, H (no umbo) 27.75, opening 22.75 × 11.25.

3 *Ostrea*—5 valve fragments (3 MNI), 1 slightly burned gray, 2 burned gray, largest L 65.

1 *Pinna*—2 fragments, 2 burned gray.

1 *Hexaplex*—lip/body fragment, small/medium.

Trench 10, Level 1 (cat. no. 943)

1 *Glycymeris*—distal fragment, eroded and concreted, very large, pres. W 41.25.

Trench 10, "Burial group 3" (cat. no. 1238)

1 *Cerastoderma*—left valve, bit worn, W 20.75, H 19.75.

Trench 10, "Burial group 8" (cat. no. 1234) (context produced OxA-21211 C-14 date)

1 *Cerastoderma*—right valve, slightly broken distal and side, pres. W 22, pres. H 22.

Fig. 6.5.7. Two water-worn *Glycymeris insubrica* shells, with one open at the umbo and the other with small circular hole on one side (photo 44-3-2).

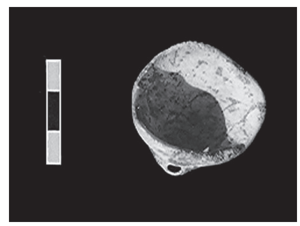


Fig. 6.5.8. *Glycymeris*—water worn, with a small hole on umbo (photo negative_86036_F02).

Trench 10 "Burial 11" (cat. no. 174)

1 *Solen*—left valve, 4 fragments, pres. W 66, H 13.25.

Trench 10E, Level 3 (cat. no. 1051, SF 245 A-1) (Figure 6.5.7)

2 *Glycymeris* valves—2 water-worn, 1 has opening at umbo and other has a small hole on the right side of the shell (not seen, SF 245 A-1, from catalogue and photos 44 3 2, 86036, FO2, and F04; Figure 6.5.8).

No Label

1 *Ruditapes*—left valve, 2 fragments, pres. H 17.

Land Snails

1978 Shells

Trench 3, Level 12

1 *Rumina*—has gloss, large.

4 *Rumina*—3 have some gloss, 1 broken, 3 large.

1979 Shells

Fill at Entrance

26 *Rumina*—3 fragments: 1 young and small, 1 large (cat. no. 12); 8 fragments: 6 have gloss, 3 large, 2 very large (cat. no. 14); 11 fragments: 11 with gloss, 2 small, 5 large (cat. no. 35); 4 fragments: 1 has gloss, large (cat. no. 38).

7 *Helicella*—broken, medium (cat. no. 12); 4 fragments: 1 has slight color (cat. no. 14); has some color, medium (cat. no. 35); medium (cat. no. 100).

10 *Eobania*—2 fragments: 1 has slight color, 1 broken (cat. no. 12); 5 fragments: 1 has color, 1 has slight color, 3 broken, 5 large (cat. no. 14); 2 fragments: both have some color, 1 broken, both large (cat. no. 35); 1 body fragment: has color (cat. no. 38).

Surface Layer above Cave Entrance (cat. no. 79)

11 *Rumina*—10 have gloss, 3 large.

3 *Helicella*—3 broken, 3 medium.

2 *Eobania*—2 have slight color, 1 broken, 2 large.

Crevice above Cave Entrance (cat. no. 88)

2 *Rumina*—1 large (1 seen only in 1981).

1 *Helicella* (seen only in 1981).

1 *Eobania*—body fragment, has color.

Interior Cave Entrance

2 *Eobania* (not seen: drawing 2 08-009 + 010) (cat. no. 41) (Figure 6.5.9a and b).

4 *Rumina*—3 fragments (not seen: drawing 2 08-011 + 012 [shows 2 shells]) (cat. no. 41) (Figure 6.5.10a–b)); large (cat. no. 92).

1 *Helicella*—medium (cat. no. 92).

Fig. 6.5.10. (a) *Rumina* shell found in interior of cave at entrance (mixed) (drawing 2_08-011). (b) *Rumina* shell found in interior of cave at entrance (mixed) (drawing 2_08-012).

Central Cave, Surface (cat. no. 290)

1 *Rumina*—broken, large.

1 *Eobania*—very large.

Cave Rear near Mesolithic Site, Surface (cat. no. 342; catalogue states "Mesolithic site debris, Surface")

1 *Rumina*—broken, medium.

1 *Eobania*—lip fragment, medium.

Trench 4, Level 4 (cat. no. 280)

3 *Rumina*—1 has gloss, 1 broken, all large.

5 *Helicella*—5 medium.

Trench 5, Level 1

5 *Rumina*—1 large, 2 very large (cat. no. 128); 2 large (cat. no. 257).

2 *Helicella*—broken, large (cat. no. 128); broken, large (cat. no. 257).

Trench 5, Level 2 (cat. no. 306)

2 *Rumina*—both have some gloss, both large.

1 *Helicella*—broken, encrusted, medium.

Trench 5, Level 3

1 *Eobania*—has some color and gloss (cat. no. 362).

Fig. 6.5.9. (a) *Eobania* shell found in interior of cave at entrance (mixed) (drawing 2_08-009). (b) *Eobania* shell found in interior of cave at entrance (mixed) (drawing 2_08-010).

Trench 5, Level 4 (cat. no. 644)

3 *Rumina*—2 have some gloss, 1 small/young, 2 medium.

1 *Helicella*—has slight color, medium.

Trench 5, Level 4 in NW (near Neolithic intrusion)

2 *Helicella*—2 have some gloss (cat. no. 787).

Trench 5, Levels 5–8 (under NE corner rock)

1 *Eobania*—distal fragment, has gloss, large (cat. no. 1079).

Trench 5, Level 7

2 *Helicella*—has gloss, medium (cat. no. 914); has gloss and slight color, medium (cat. no. 925).

Trench 5, Level 8

1 *Helicella*—medium, 3 fragments (cat. no. 958).

Trench 6, Level 1

4 *Rumina*—1 has some color, 2 broken (cat. no. 181); 2 large (cat. no. 1095).

Trench 6, Level 4 (extension)

3 *Helicella*—1 has slight gloss (cat. no. 1108); 2 have very slight gloss (cat. no. 1112).

Trench 6, Level 6

2 *Helicella*—both have very slight gloss (cat. no. 1182).

1 *Eobania* (cat. no. 725, seen only in 1981).

Trench 6E, Level 6

1 *Helicella*—has gloss, rather large (cat. no. 1023).

Trench 6E, Level 7

1 *Rumina*—distal fragment, large (cat. no. 1062).

Trench 8, Surface

1 *Helicella*—medium (cat. no. 527).

Trench 8, Level 1 (cat. no. 250)

4 *Rumina*—1 has some gloss, 5 broken, 2 large.

13 *Helicella*—5 broken, 2 large.

Trench 8, Level 2 (master cat. no. 388)

4 *Rumina*—2 broken, 1 large, 1 very large (cat no. 388); 2 distal, 1 large (trench 8N, cat. no. 876).

12 *Helicella*—6 fragments: 4 broken, 3 have gloss, 1 has slight color, 3 large (cat no. 388); broken, slight gloss (cat. no. 1206); 5 fragments: 3 broken (trench 8N, cat. no. 876).

1 *Eobania*/*Helix* body fragment—has slight color.

Trench 8, Level 3 (Level Produced LJ-4982 C-14 date: Upper Paleolithic/Mesolithic)

4 *Rumina*—1 broken, 2 very large (cat. no. 562); 2 broken, 1 large (trench 8N, cat. no. 968).

4 *Helicella*—1 broken (cat. no. 528); 3 fragments: 2 broken (trench 8N, cat. no. 968).

Trench 8, Level 4 (Level Produced LJ-5098 C-14 date: Upper Paleolithic/Mesolithic)

4 *Helicella*—3 broken, 2 small, 1 medium (trench 8W, cat. no. 795); 1 has some gloss (trench 8NW, cat. no. 814).

1 *Helix* (cat. no. 778, seen only in 1981).

Surface adjacent to Trench 8

1 *Helix*—distal fragment, encrusted (cat. no. 462).

Trench 9, Level 1N

1 *Eobania*—has slight color, large (cat. no. 448).

Trench 9, Level 2

1 *Helicella*—small (cat. no. 420).

Trench 9, Level 3 (cat. no. 493)

1 *Rumina*—has gloss, large.

1 *Helicella*—has gloss, medium.

Back Dirt adjacent to Track 8

1 *Rumina*—broken distal, large (cat. no. 764).

Riassunto

Principalmente dalla stagione del 1979, 331 conchiglie risalgono approssimamente al neolitico medio. Quasi la metà provviene dai fossi 5 e 6. La maggior parte delle conchiglie marine sembra detriti alimentari, essendo queste un fonte importante di alimento, come attestato da indizi da vari siti preceramici dall'Italia settentrionale. Scafopodi tubulari e con l'apertura basale, e cardiidae, erano usati come decorazione. Ci sono 172 chiocciole terrestre, il 53% di cui ritrovate nell'entrata e nel Fosso 8. Alcuni esemplari del catalogo non sono stati esaminati.

Chapter 7

Conclusions

John Robb, Ernestine S. Elster, Eugenia Isetti, and Antonella Traverso

Scaloria: The Site Everybody Knows, The Site Nobody Knows

Scaloria is the site that everybody knows and nobody knows. It has been since the 1930s, when it was investigated by some of the leading figures in Italian prehistory. The trichrome ceramic style that Rellini designated by the site's name has remained central to Tiné's widely accepted ceramic sequence for the Tavoliere. The site is well known for the "cult of the waters" in the Lower Cave (Tiné and Isetti 1975–1980, 1980). Moreover, it was the location of a major excavation in the Upper Cave in 1978–1979, and it has been known as a major Neolithic ritual and burial site since then.

However, particularly for the Upper Cave, there has been almost no reliable, widely available information. The reports from the 1930s (Quagliati 1936; Rellini 1934) are brief and do not reflect later archaeological work. Drago's 1950s work remains virtually undocumented. Gimbutas's excavations were never published in any detail. Winn and Shimabuku's (1980) report on the 1978 field season was both preliminary and virtually uncirculated and contains both valuable firsthand information and dated interpretations. Gimbutas's own public statements on the site were limited to two brief paragraphs in work outside mainstream prehistory (Gimbutas 1991:292, 1989:223). Only for the Lower Cave is knowledge of what the cave contains publicly available. For the Upper Cave, where most of the cave's human use took place and where almost all archaeological research has been conducted, Scaloria Cave exists in a kind of limbo: everybody knows there is something substantial and important there, but nobody knows what it actually is.

The purpose of this volume is simply to bring together all the information known about Scaloria Cave, particularly the unpublished 1978–1979 excavations. We both summarize and reinterpret old data and present the results of new studies. Many original accounts are republished in the appendices of historical documents, as many of these are almost impossible to obtain now (see Table of Contents for the location of the appendices we have archived online), and even when their content has been assimilated into later interpretations, the original accounts always contain irreproducible firsthand observations. We also see this as valuable for the history of archaeology as well. Every generation, and every national tradition, has its own way of investigating the past, its own preferred problems to study, its own methods of excavation and study. Like any site that has been studied at many moments, Scaloria Cave demonstrates this well, in the progression from 1930s work through 2013, and in contrasts between Italian approaches and the American approach of the 1970s. Gimbutas herself was an important figure with a complex and fascinating intellectual history;

Scaloria Cave formed part of a journey from pre-war Lithuania and German-style postwar culture history through 1970s American "New Archaeology," and finally to New Age ecofeminism. It is for historical purposes too that we see the republication of historical documents as valuable.

Scaloria Cave in the History of Archaeology

Archaeologists have investigated Scaloria Cave for 85 years, and the story of research is important not only for Italian prehistory but for the history of archaeology. Scaloria Cave is a steeply sloping cavern of a highly irregular form; it is an interstratal cave, formed by karstic processes and successive collapses of the ceiling following seismic events. Its entrance originally was probably via a kind of shallow sinkhole (a dolina or "swallow-hole") similar to one that is still accessible at the nearby and interconnected Occhiopinto Cave, which accessed the Upper Chamber, at that point a few meters below ground surface. Unlike Occhiopinto Cave, however, Scaloria's entrance had collapsed in antiquity, sealing the cave, which thus remained unknown for all of recent history. The archaeological history of Scaloria Cave began in 1931, when it was discovered by chance during the construction of an aqueduct that cut into the cave. Quintino Quagliati, then the inspector of antiquities for Puglia, was called in to visit the site. It is not clear whether Quagliati's fieldwork (Quagliati 1936) involved excavation or simply collection from the surface deposits. In any case, Quagliati collected a substantial number of pottery vessels of all styles, particularly the trichrome style representing the later use of the Upper Cave (see Catalogue, Chapter 5.7, this volume). Based on Quagliati's finds, Rellini (1934) designated this trichrome pottery style "Scaloria" wares (the name was later modified to "Scaloria Alta" when the Lower Cave was archaeologically explored in the 1960s). He observed at least one articulated burial, which he seems to have left in situ. He also collected almost all of the polished stone axes known from the cave, another sign that the deposits he was excavating differed from the Middle Neolithic burials that were the principal focus of the 1970s excavations. Quagliati's report is also of historical interest. As well as reflecting concepts and methods of the 1930s, it takes a definite stand on the "Pigorini thesis," a major controversy of early 20th-century Italian prehistory. Pigorini, editor of the *Bollettino di Paletnologia Italiana* and founder of the Luigi Pigorini National Museum of Prehistory and Ethnography, and the dominant figure in Italian prehistory, argued controversially that there was no Upper Paleolithic in Italy of the kind defined in France; instead, in the view of his "Rome school" (and against the francophile "Florentine School"), the Neolithic developed directly from the "Chellean" or Acheulean (Guidi 1988:53). Large bifacially flaked tools of the kind later called "Campignian" (cf. Elster, Chapter 6.2, this volume) were common in Quagliati's collections, and Quagliati connected these with Paleolithic hand axes. Quagliati thus commented in his report on the "troglodita garganica" (cave-dwellers of the Gargano):

> *Credo che la necessaria esplorazione stratigrafica del deposito archeologico porterà a concludere fermamente che ai piedi del Gargano visse nei tempi progrediti della civiltà neolitica il discendente dell'uomo paleolitico col carattere industriale di scheggiare le selci nella tecnica solutreana come trasforazione e perfezionamento della primigenia manifattura scelleana.* (Quagliati 1936:119)
>
> [I believe that the necessary stratigraphic exploration of the archaeological deposits will lead us to definitively confirm that at the foot of the Gargano during an evolved period of the Neolithic civilization there lived the descendants of Paleolithic man, whose flint industry was flaked with the Solutrean (i.e., bifacial) technique as a transformation and perfection of the original Chellean manufacture.]

Quagliati then went on to argue that since it was well known that Neolithic people did not make flint axes, only polished stone ones, the makers of Campignian axes must have been local Paleolithic descendants trying to imitate Neolithic axes. Furthermore, they must therefore have obtained the polished stone axes found at the cave from the true Neolithic immigrants ("per scambi dalla gente della immigrazione neolitica"; Quagliati 1936:119). Thus, finding flaked flint axes

> *avvalora maggiormente la conclusione che gli imitatori delle asce neolitiche nella pietra locale non appartenessero alla razza degli immigrati e risalissero nelle origini ai paleolithici del luogo, e sotto codesto aspetto etnico la nostra scoperta assume un valore decisivo di primisimo ordine per la paletnologia garganica.* (Quagliati 1936: 121)

> [supports strongly the conclusion that these imitators of Neolithic axes in local stone did not belong to the race of the immigrants but took their origins from the local Paleolithic people, and under this ethnic aspect, our discovery assumes a decisive importance of the highest order for Gargano prehistory].

In Quagliati's view, Scaloria thus furnished a textbook example and development of the Pigorini view. Unfortunately, both Pigorini's general thesis and Quagliati's interpretation of Scaloria have turned out to be incorrect in the light of 80 years of research since they were formulated.

Drago's follow-up work in the cave in 1936 and the 1950s is of unknown extent but seems to have been relatively minor. It resulted in a small, little-known skeletal collection and additions to the pottery finds kept in the National Archaeological Museum of Taranto (cf. Chapter 5.7, this volume). Like Quagliati, Drago seems to have excavated primarily the more recent Neolithic levels.

The next development took place in the 1960s, when recreational speleologists from Manfredonia began to explore the lower reaches of the cave and found the dramatic remains of Neolithic vessels encrusted in stalactites. Realizing the archaeological importance of these finds, they contacted Santo Tiné. Tiné, a Sicilian trained by the eminent prehistorian Luigi Bernabò Brea, was a young inspector for the Soprintendenza at Foggia at that time; he later went on to become professor at Genoa and the doyen of Italian Neolithic studies, excavating at Passo di Corvo, Arene Candide, and many other sites. In 1967, collaborating with speleologists in the difficult conditions of the Lower Cave, Tiné documented various groups of vases located along the galleries and lowest part of the cave. With his young student Eugenia Isetti, Tiné produced the major description of the "cult of the waters" site in the Lower Cave (Tiné 1975; Tiné and Isetti 1975–1980, 1980).

In 1972, Tiné reported on his work at the Val Camonica Conference on religions in prehistory, a biannual event organized by Emanuale Anati that generally centered around Alpine rock art but had an eclectic element as well (Tiné 1975). Marija Gimbutas, who had met Tiné during his master's studies at Harvard, was also a participant. As described in Chapters 1 and 5.5, Gimbutas had begun as a young archaeologist from Lithuania and was a refugee from Russian and German occupation during the war. She had earned a PhD at Tübingen on Lithuanian prehistory and began synthesizing the Eastern and Central European Mesolithic, Neolithic, Chalcolithic, and Bronze Age (Gimbutas 1956, 1965). She emigrated to America, arriving in 1949, and taught first at Harvard and then from 1964 onward at UCLA. She had excavated a series of important Neolithic sites including Obre and Anzabegovo (in the Former Republic of Yugoslavia), both with US Counterpart Funds and in collaboration with local partners. Both Sitagroi (Greece), a Renfrew/Gimbutas project, and Achilleon (Greece), in *synergesia* with Dimitrios Theochares, were funded differently and excavated jointly. At the Val Camonica Conference, Gimbutas perceived the archaeological potential of Scaloria Cave, and she and Tiné formed a plan to excavate it jointly.

Gimbutas's plan was very much a 1970s American approach, seeking funding from the National Science Foundation (NSF), employing a suite of then-new methods such as radiocarbon dating, statistical analysis, and scientific analyses of "environment" and "subsistence" through faunal analysis and other methods (Gilbert's write-up of the skeletons, for instance, was the first mention in Italian Neolithic studies of newly codified "stress markers" such as enamel hypoplasia) (cf. Gilbert 1980; and Appendix 2 [online]).[1] Their field recording methods followed the standard model taught in the United States from the 1970s onward (e.g., gridding the site into 1-m^2 "units" and excavating in 10-cm absolute levels). Such methods, which would have differed from those that Gimbutas herself had originally been trained in, were associated with "scientific" as opposed to traditional excavations (cf. Flannery 1976). In the self-confident, expansionistic atmosphere of American archaeology at that time, the local partner's role was principally to help with logistics and permits. The larger political environment included expanded funding from the NSF and various other initiatives to strengthen international collaboration with politically important areas of Europe. On a more local scale, Gimbutas's excavations coincided with the invention of the "field school," a peculiarly American form of excavation in which participants—often students and/or avocational retirees—enrolled in academic research projects, often in exotic locations abroad. While field projects thus received eager although untrained crew members, they also received a percentage of the enrollment fee, an important form of funding when major grants were not forthcoming. The University of California's Research Expeditions Program (UREP) pioneered this form of organization, and the 1979 and

[1] Available online at www.dig.ucla.edu.

1980 seasons at Scaloria utilized UREP participant crews composed mostly of teachers, computer programmers, doctors, and other professionals who chose to learn during their vacation, along with UCLA and Genovese students.

In the field, Gimbutas relied on Shan Winn (in 1978 and 1979) and Daniel Shimabuku (in 1978) to direct the actual excavation, concentrating primarily on overall project organization and analyzing the finds herself. Winn and Shimabuku's report on the 1978 field season describes the excavations well and also presents a very "New Archaeology" approach, both in methods (such as statistical tabulation of pottery) and in themes (such as attempting to read the burial record of the cave in terms of a mixture of hunting-gathering and farming "subsistence strategies"). Intriguingly, they built on Quagliati's version of the Pigorini theory, which associated flaked flint Campignian axes with a hunter-gatherer legacy and polished stone axes with farmers, in seeing Scaloria as a place where two "subsistence strategies" merged. In hindsight, such an interpretation does not really capture the problems posed by Scaloria Cave, whose main period of use postdates the transition to farming in the area by at least 500 years, but it does exemplify the American archaeology of its times—for instance, in tying the site to broad worldwide themes and in its assumption that farming must have begun as a result of hunter-gatherer acculturation. (This theme formed part of a rejection of the Childean culture-historical archaeology of the 1930s–1960s, which—"New Archaeologists" assumed—saw the past only in terms of sweeping migrations.)

Although Gimbutas held a study season in 1980 with Elster as co-director, the project was never followed through to publication, for a number of reasons. In addition to tensions between Gimbutas and Tiné, major funding never materialized, her cadre of skilled assistants had drifted apart over the years, and Gimbutas had a backlog of other excavations to write up. Moreover, it was precisely at this time that she was redirecting her attention toward the "goddess" studies that would mark the remainder of her career. Indeed, while writing standard NSF-speak in funding applications for Scaloria, Gimbutas's own research at the cave was principally directed at examining pottery decoration motifs to see if they contained elements from the writing system or symbology she was defining for "Old Europe" (Gimbutas 1974), a project distinctly outside the mainstream of American and Italian academic archaeology (cf. Elster, Chapter 5.5, this volume).

There was no further research on Scaloria until 1990, when John Robb contacted both Gimbutas and Tiné about the site. At that time, Robb was an advanced PhD student at Michigan, particularly interested in the Neolithic following experience excavating on teams at Ripa Tetta, Trasano, and Capo Alfiere. He was funding a year of shoestring-budget work in museums in Italy by working as a night supervisor at the University of Michigan's "study abroad" program for undergraduates in art history (itself an attenuated historical legacy of the 18th- and 19th-century "grand tour") which was based in a Renaissance villa in Florence. His research project was a quixotic and, in retrospect, somewhat naive New Archaeology quest to find evidence of social inequality in prehistoric skeletal remains. With the excavators' and Soprintendenza's permission, Robb studied the skeletal remains from the Gimbutas collections in the National Museum of Manfredonia. Taphonomic study of human bone to understand burial ritual was virtually unknown at that time, and provenience data for the site were unavailable. Although Robb's study (Robb 1991) contained the seeds of Chapter 4 in this volume, it was almost exclusively bioarchaeological in focus.

The latest episode in the history of research on Scaloria is the present project, a collaboration among the four editors and many others. As noted in Chapter 1, Elster is a prehistorian at UCLA who worked with Gimbutas on many projects, including during the Scaloria 1980 study season, and who had assumed the responsibility for seeing that Scaloria Cave material was published following Gimbutas's death. Isetti and Traverso, at the Istituto Italiani di Archeologia Sperimentale and the Università degli Studi di Genova, worked with Santo Tiné for many years, and bring in both unpublished archive material and an Italian approach to interpreting the cave; indeed, Isetti provides valuable firsthand experience of participating in the 1978–1979 excavations there as well as in earlier research in the Lower Cave. Robb contributes both an interest in the human remains, a central component of the finds, dating to his 1991 restudy of them, and a coordinating hand between the American and Italian components of the project. Bringing these together, we have gathered as much of the original archive material on the cave as possible, mobilized the Italian, American, British, and Hungarian specialists involved in this volume, and restudied almost all finds from scratch.

This stage of research has proved more difficult to situate in its historical context than were previous stages. No doubt we perceive the mote of historical con-

text in our predecessors' eyes and not the beam in our own, and we cannot yet see what will endure and what will be relegated to history. It may also be that, at present, Anglo-American archaeological theory is in an eclectic rather than polarized phase and that, above all, this collaboration among colleagues from quite different backgrounds makes our effort unlikely to shine as a "pure" example of any particular school of thought. The detailed empirical study of materials is a traditional strength of Italian prehistory; this is best exemplified here by Isetti and Traverso's studies of the ceramics, which follow the pioneering approaches of Tiné. As the national backgrounds of our colleagues show, many of the scientific methods are older (e.g., bioarchaeology), or more recent (e.g., isotope analysis, micromorphology, ceramic thin-section analysis) children of American New Archaeology that have been adopted by scholars from all backgrounds. Hamilton et al.'s Chapter 3.4, perhaps the most explicitly theoretical in the book, shows a strong influence of British post-processualism's interest in phenomenology and the perception of landscapes. Theoretically, Isetti and Traverso form part of an Italian tradition that remains somewhat skeptical about Anglo-American "post-processual" theory but brings a strong grounding in classical social anthropology (e.g., works by such figures as Arnold Van Gennep, Victor Turner, and Mary Douglas). On Robb's side, the general approach toward funerary archaeology (in the conclusions to Chapter 4, for instance) are rooted mostly in a kind of late, understated, and unprogrammatic post-processualism that considers death as a particular transition in the human life course (Parker Pearson 1999) and funerary rites as structuring how humans experience it. From both the Italian and Anglo-American sides, we also aim to understand funerary rites on their own in the first instance rather than relating them to master interpretive themes. The theoretical subtext is the huge variability in human symbolic behavior that cannot be reduced to a reflex of a trendy theme; just establishing what is going on at the cave is a legitimate goal in itself. For comparison, a classical 1980s processualist approach would attempt to relate deathways to individual social status, and by the 1990s such an approach might have tied the rites to general models of tribal political process in the Tavoliere villages; a Marxist approach would seek their roots in social inequalities; a more recent post-processualist approach would tie them to themes of "memory" and "landscape," and so on. No doubt social historians will have views on the validity of our approach as well.

In many ways, Scaloria Cave thus displays in microcosm the history of prehistoric research in Italy and internationally. This is the *latest* phase of research; we do not describe it as the *final* research. Scaloria Cave remains a fascinating and somewhat still unexplored site, and we are sure it contains many more surprises for us and for future archaeologists.

The Upper Paleolithic Occupation

Although a minor focus of past fieldwork, the Late Upper Paleolithic component of Scaloria Cave is of real interest, given the small number of Paleolithic and Mesolithic sites that have been excavated in the area; the only real exception is the Grotta Paglicci in the nearby Gargano massif, which dates to much earlier in the Upper Paleolithic. Excavations in the Upper Cave uncovered pre-Neolithic remains, all in the area of trench 8. The finds consisted principally of stone tools (cf. Conati Barbaro, Chapter 6.1; Elster, Chapter 6.2) and of bones from hunted game. Faunal remains were dominated by wild ass (*Asinus hydruntinus*), which made up 53.7 percent of the assemblage; other substantial components came from aurochs (*Bos primigenius*; 8.7%), red deer (*Cervus elaphus*; 6.4%), and fallow deer (*Dama dama*; 7.6%) (Bartosiewicz and Nyerges, Chapter 3.3). Hunters targeted principally adult animals. Wild ass was presumably hunted on the steppe-like plains surrounding the site; it was butchered at the kill site, and selected parts of the animal were transported to Scaloria Cave.

These finds thus attest to a sporadic, not very intensive use of the cave by a small group of hunter-gatherers living in a typical open post-glacial landscape. Although the pre-Neolithic occupation at Scaloria was originally thought to date to the Mesolithic, four radiocarbon dates push its date back by several millennia (Chapter 2.3, this volume). Four radiocarbon dates place this occupation in the Late Upper Paleolithic, during the twelfth millennium BCE and later on between the late tenth and early eighth millennia BCE. It thus dates to the end of the Pleistocene and the end of the Upper Paleolithic, between the last glacial maximum and the beginning of the Holocene.

The Neolithic Site and Its Landscape Setting

Scaloria Cave fits into a densely occupied landscape. The Neolithic Tavoliere is one of the best-understood

Neolithic landscapes in Europe, thanks to Bradford's pioneering discoveries through aerial photography of some 500 to 1000 ditched villages (Bradford 1949; Jones 1987; Tiné 1983), followed up by several decades of excavation at sites such as Guadone, Ripa Tetta, Masseria la Quercia, Masseria Candelaro, Coppa Nevigata, Passo di Corvo, and Lagnano da Piede (to name only the major excavations). Such excavations have established a clear picture both of village life and of the burial rites that took place at villages (see below). It is well established that the Tavoliere was occupied by a dense network of ditched villages; often several concentric ditches enclosed a village, and their purpose was probably some combination of practical considerations, such as containing livestock and drainage, and providing a symbolic boundary to the community. Villages contained wattle-and-daub small huts, sometimes surrounded by individual house ditches. Faunal and botanical studies have generally shown the economy at these villages to be overwhelmingly based on domesticated plants and animals. Although some villages are very large (the largest, Passo di Corvo, has outer ditches over 800 m in diameter and a population of several hundred people, and villages of 300 to 400 m across are not uncommon), much of the space encircled by the ditches was probably empty, perhaps used for gardens or for containing livestock. The population of a village probably rarely exceeded 50 to 100 people. Nevertheless, for Neolithic Europe, these were sizable agglomerations of people in a densely packed landscape; only the LBK villages and Greece's Thessalian plain with its hundreds of Neolithic *magoulas* offer something similar (Gallis 1996:58).

Between the villages, the landscape was probably much more varied than is the Tavoliere today. Charcoal recovered in the Upper Cave came from a range of trees and plants, suggesting a typical, semi-open mixed deciduous woodland (Fiorentino and D'Oronzo, Chapter 3.2, this volume). This was presumably interspersed with gardens and pastures, as well as with small watercourses now filled in (Delano Smith 1983). There is geological evidence (Caldara et al. 2002) that the coastline was located closer to the first terrace at the base of the Scaloria Cave, which underlines the role of the now-filled-in Candelaro lagoon or marsh that formed the border between the karstic substrate and the Pleistocene alluvial plain. Scaloria was located on the margins of this area, on a calcareous substrate covered by more or less substantial colluvial deposits from the upper terrace of the Gargano. It had little surface water but would also have been less vulnerable to variations in surface water. The cave is now situated at about 40 m asl, but in the mid-Holocene, it would have been located somewhat closer to the coastline, from which it would have been separated by a line of sandy dunes. It would also have had a higher water table, which may explain the location of archaeological deposits along the margins of the large masses at the base of the Lower Cave and the absence of archaeological deposits in the very lowest part of the Lower Cave, as well as the absence of stalagmites in this region; both suggest that the lowest part of the Lower Cave was filled with water at this time.

How does Scaloria Cave fit into this landscape? In some ways, it is clearly a very different kind of place than the inhabited surface. The Lower Cave is remote, inaccessible, a deep cave that must be reached through steep, difficult paths, often by crawling along low or narrow passages among stalactites. Experientially, it is a different kind of place (see discussion below). Tiné and Isetti (1975–1980, 1980) documented the use of the Lower Cave for a Neolithic "cult of waters" in which pottery vessels were placed under dripping stalactites to collect stillicide waters. Later, the Lower Cave formed a key exemplar for Whitehouse's argument that, because they afforded sensory experiences very different from everyday village worlds, and in particular experiences related to unusual forms of water, underground places with unusual waters were used as a secret world of ritual practices.

While everyone agrees on the remote and dramatic context of Lower Cave ritual, the situation is less clear for the Upper Cave and its relationship with the world around. The modern access to the Upper Chamber is quite difficult to negotiate, particularly when the reopened original entrance is not accessible, and in her influential "underground religion" model, Whitehouse (1992) originally argued that the cave as a whole was a hidden or secret location and a purely ritual site. Recent work brings the secret or hidden quality of the Upper Cave into doubt. Hearths found in the Upper Chamber (Rellini et al., Chapter 3.1, this volume) could potentially be of either quotidian or ritual use. However, recent micromorphological evidence for keeping herds within the Upper Chamber (Rellini et al., Chapter 3.1) seems very strong evidence for at least some quotidian use of the cave. A related question is how to interpret surface finds outside the cave. Surface collections in the fields around the cave and excavations conducted outside the cave's original entrance in 1978

contain abundant Neolithic debris. This includes not only pottery and stone tools but also fragments of daub (Figure 2.1.18b), commonly used for houses on village sites and found inside the cave in some trenches (1, 5, 6, and 10). It is possible, of course, to interpret these as the remains of ritual structures rather than domestic dwellings (Hamilton et al., Chapter 3.4, this volume). However, aboveground ritual structures outside the cave presumably would compromise its secret qualities, and it is also true that a similar assemblage found on any other site on the Tavoliere would probably be interpreted as evidence of domestic occupation. This does not exclude their being the remains of ritual structures, of course. Aerial photographs of the area around the cave reveal no ditched village of the kind abundantly documented aerially elsewhere on the Tavoliere; however, it is not evident that the geological substrate here would reveal ditches through clear crop marks in the same way that the geological situation of the Tavoliere does. Alternatively, it may have been a village without a surrounding ditch. At present, there is no agreement (even among the contributors to this book!) as to whether a village existed around the cave or not.

A related issue is the question of the cave's entrance. It was traditionally believed that the cave had a small, narrow opening and that this opening was sealed by a collapse shortly after the Neolithic occupation. Both of these views have recently come into question. Recent observations during fieldwork in 2013 revealed that the cave's mouth was originally wider; its narrow and restricted passage is due to the post-Neolithic collapse of several large masses from its roof. During the Neolithic, the cave probably had a larger, wider entrance similar to that still visible at nearby Occhiopinto Cave. Indeed, the edges of the aperture to the north have never been identified. Although the precise configuration of the cave's mouth remains a matter of speculation, we have to imagine a large, well-lit and well-ventilated open area close to the entrance, an area corresponding to the large cone of detritus resulting from collapses and infiltration of soil and the adjacent area containing trenches 1, 3, 4, and 5. The interior of the Upper Chamber would have been somewhat higher-ceilinged and more easily negotiated before the accumulation of 50 to 100 cm of Neolithic and later sediments. How visible this entrance was depended on the surrounding terrain and vegetation. The aperture faces northward toward the Gargano massif and would have been visible from afar only from the second terrace, but it may have been too far from this vantage point to have been seen, or may have been masked by vegetation.

Moreover, the entrance was probably not closed during the Neolithic. The National Archaeological Museum of Taranto collections (see catalogue in Chapter 5.7) contain a few items of post-Neolithic pottery from the Upper Cave, and recent evidence (Rellini et al., Chapter 3.1, this volume) shows that stalactites dated to early medieval times contain wind-borne sediments, implying that an aperture remained by which air could enter, even if it may not have been easily negotiated by people. However, it seems anomalous for a large chamber close to the surface not to have been used to any great extent for five or six millennia. This is the case at Scaloria's Upper Cave, which has no Bronze Age, Daunian, Roman, or early medieval remains; this may perhaps imply that, although open to air currents during these periods, the cave opening was neither easily accessible nor observable.

In summary, a middle-of-the-road position based on present evidence would interpret the Lower Cave in terms of secrecy, remoteness, and phenomenological otherness, while placing the Upper Cave in a more familiar and frequented landscape. It is unknown whether there was a village directly around the cave, and it is unknown how visible the entrance was. But there was certainly considerable activity on the surface outside the cave, and both funerary activities and quotidian activities such as keeping herds were carried out in the Upper Cave, leaving hearths, debitage, and faunal remains. Indeed, the alternation of funerary and quotidian use is commonly observed in Neolithic caves (e.g., Grotta Pacelli, Grotta dei Piccioni, Grotta Continenza); long-term use of an accessible chamber for a single purpose seems relatively rare.

The Cave as Part of a Neolithic Community

Scaloria Cave has yielded a rich assemblage of artifacts that contextualize activities in the cave within the broader ambit of Neolithic society and material production. Here we summarize briefly.

The human skeletal sample (Robb et al., Chapter 4.1, this volume) contains remains from a minimum of 23 to 33 individuals (the exact figure varies according to the method used to calculate it); but in highly fragmented and mixed collections, this is likely to seriously underestimate the number of people interred in the cave. To the limited extent possible in such a collection, the skeletal remains reveal people biologically similar

to those known from contemporary sites throughout Italy. Probably the most salient biological fact about the people of Scaloria is their demography. Children younger than about 2 years are under-represented, given the probable rate of infant mortality, and may have been buried elsewhere. Even so, the sample is a young one, with about a third of the skeletal sample consisting of juvenile remains. Among adults, men and women were both deposited in the cave, probably in approximately equal numbers; many adults died young, giving the population a "j"-shaped demographic curve rather than the "u"-shaped curve typical of modern populations. This supports the idea (Bocquet-Appel 2011) that Neolithic groups were characterized demographically by high fertility and high juvenile mortality. On the ground, half or more of such a group would have been infants or children, with relatively fewer older adults (Robb 2007).

The sample provides little information on health. Relatively few paleopathologies are evident; among them, cribra orbitalia is the only one significantly represented. This probably reflects both the highly fragmented nature of the sample and its relatively young age at death (paleopathologies tend to accumulate in the skeleton throughout the life span and thus are more common in older samples). Like other Neolithic Italians, the people of Scaloria were relatively small but robust. It is interesting to note the presence of both "kneeling facets" on the tibia and "squatting facets" on the metatarsals; this may be related not to kneeling or squatting per se but to hyperflexion during more generalized activities such as walking in the rough terrain of the Gargano Mountains.

Economic information comes from faunal analyses (Bartosiewicz and Nyerges, Chapter 3.3, this volume) and isotopic analyses (Tafuri et al., Chapters 4.2 and 4.3, this volume). The faunal assemblage strongly resembles Neolithic assemblages from throughout southern Italy. It is dominated by domestic fauna (principally cattle, pig, sheep, and goats), which made up 81.9 percent of the assemblage. Within this, sheep and goats form the majority by a large margin (71.9%); although Neolithic people kept cattle (3.9%) and pigs (4.0%), they ate relatively few of them compared to caprovines. Micromorphological evidence of spherulites reveals the presence of animal dung, demonstrating that Neolithic people sometimes used the Upper Chamber as a place to keep herds of sheep and/or goats (Rellini et al., Chapter 3.1, this volume). Wild fauna made up 19.1 percent of the assemblage. There is little evidence for the hunting of large animals (red deer 2.1%, fallow deer 2.0%, roe deer 3.7%), but small mammals are present (hare 1.3%), and there is a higher than normal presence of tortoises (4.9%). Cattle were eaten mostly as adult animals; sheep, goats, and pigs were consumed mostly as juveniles. All were brought to the cave as whole animals rather than as selected parts.

Isotopic studies of carbon and nitrogen (Tafuri et al., Chapter 4.2) reveal more detail on the food Neolithic people actually consumed. The balance of protein in the diet came from vegetable sources, not from animal sources; isotopic data reveal a trophic signature only slightly enriched from herbivores. This suggests that, although Neolithic people kept domestic animals, they may not have consumed much meat or milk; domesticated plants formed the mainstay of the diet. Animals may have been eaten infrequently (cf. Robb 2007:chapter 4). Moreover, isotopic data show that, in spite of Scaloria's proximity to the sea, the diet contained little marine food. This agrees well with analysis of the shell found in the cave (Reese, Chapter 6.5, this volume): a minority of shells offered a source of protein, but most of the remaining shells found in the cave were brought there for use as tools (perhaps for scraping or smoothing, or in making pottery) or as ornaments.

The pottery from Scaloria Cave can be classified in several styles, which confirm the general sequence for the area worked out by S. Tiné (see discussions by Traverso and Isetti, Chapters 5.1–5.4, this volume). The Early Neolithic occupation is represented by the Guadone style of impressed ware, supplemented by the painted impasto style designated "Masseria la Quercia." This is found in a few areas of the Upper Cave, particularly in the basal levels of trenches. While impressed wares continued in use as utilitarian wares, the typical pottery style found in the Middle Neolithic was the painted figulina style designated "Scaloria Bassa." This is typified by bowls and flasks in a fine, buff fabric painted with broad, reddish designs; the margins of the red-painted motifs are often bordered in brown or black paint. It is very similar to the "Catignano" style known from farther north in the Abruzzo (Tozzi and Zamagni 2003). Interestingly, although the common Middle Neolithic figulina style on the Tavoliere was the "Passo di Corvo" style, which is painted in broad red bands without this black edging, little Passo di Corvo–style pottery was found at Scaloria. Conversely, little Scaloria Bassa/Catignano pottery is found in the ditched villages of the Tavoliere. The reason for

this geographical patterning remains mysterious. Within Scaloria Cave, "Scaloria Bassa"–style pottery makes up the principal ware used in cult practices in the Lower Cave, and it is also found in the Middle Neolithic areas of the Upper Cave (e.g., in the funerary deposits in trench 10 and in general debris elsewhere). A particular form with two handles on one side only was made for the Lower Cave cults; this may be related to the needs of transporting pottery down to this inaccessible area or of securing vessels to stalagmites. Following this phase, the later Middle Neolithic is represented by the "Scaloria Alta" style, a finely painted trichrome figulina ware. Scaloria Alta wares were found in a few areas of the 1978–1979 excavations of the Upper Cave. They also seem to have been common finds in Quagliati's and Drago's earlier explorations of the Upper Cave (see catalogue in Chapter 5.7). They seem to be accompanied by a few examples of Serra d'Alto wares.

Technological analysis of the pottery (Muntoni and Eramo, Chapter 5.6, this volume) reveals that all or most of it was made in the Tavoliere area. Strikingly, the pottery fabrics are highly heterogeneous: while the 5 daub samples analyzed are all local, the 30 ceramic samples analyzed displayed no less than 10 distinct fabrics, almost all of them different in composition from the clay found inside the cave and the samples of house daub found in the fields around the site. While six samples are Early Neolithic impressed wares, and three are Late Neolithic Serra d'Alto wares, the Middle Neolithic painted wares are made of at least two distinct fabrics. Whether through exchange or through some other mechanism, pottery from many places found its way to Scaloria.

Lithics at Scaloria (Conati Barbaro, Chapter 6.1, and Elster, Chapter 6.2, this volume) are made both from local cobbles and from high-quality flint in many colors from the nearby Gargano massif; a few pieces of obsidian are also present, presumably from either Lipari or Palmarola. While the full reduction sequence is present for local cobbles, Gargano flint apparently came to the site in an already prepared form. Elster (Chapter 6.2, this volume) links the strong recovery of flint to the mining sites along the eastern coast of the Gargano Peninsula and considers the agents potentially involved in its trade. As is typical for Neolithic assemblages, the basic technology involved removing long blades from carefully prepared cores and then modifying them to obtain tools. Flakes and debitage are common, as are blades; there is also a complex typology of less frequent, formal tools such as burins, scrapers, and perforators. Many blades display edge gloss suggestive of intensive use as harvesting tools, but lithics may have also been important symbolic objects.

Hard stone tools (Garibaldi et al., Chapter 6.3, this volume) show clearly the difference between the areas explored in Quagliati's 1930s work and the 1978–1979 excavations. Quagliati's work recovered a large number of greenstone axes, many from Calabria and including at least seven Alpine greenstone axes in pristine condition. These were clearly ritual deposits, possibly related to the burials Quagliati investigated. In contrast, the 1978–1979 excavations found very few greenstone axes. They found instead much more varied tools, including pebbles, polishers, and grinding stones as well as axes; and the axes included specimens made from local limestone as well as Campignian flaked flint tools. The latter, small versions of tools recovered in the Gargano mines are widely distributed in sites on the Tavoliere, their use still ambiguous (Conati Barbaro, Chapter 6.1, and Elster, Chapter 6.2, this volume). The 1978–1979 assemblage seems to reflect the use of the cave as a habitation site, as it contains tools in all stages, from manufacture through use and discard, and it contains tools showing wear related to a wide variety of activities. This impression is confirmed by the bone tool assemblage (Pian, Chapter 6.4, this volume), which contains a wide range of awls, needles, spatulae, and other tools, many heavily worn or broken. Bone was also used to make a range of personal ornaments. Among these, the commonest was a perforated dog canine tooth, a form of ornament known from many Neolithic sites; the most elaborate was a pair of matching pendants, perhaps earrings, of wild boar canines, engraved with complex geometric patterns (see Figures 2.1.25 and 2.1.26).

A further insight into the social landscape of Scaloria comes from strontium isotope studies (Tafuri et al., Chapter 4.3, this volume). Strontium isotopes in bone and enamel derive principally from the geochemical composition of groundwater, which derives in turn from underlying geological formations. By observing whether the strontium signature in a human bone or tooth enamel sample corresponds with a "local" or "non-local" pattern, we can make inferences about patterns of mobility. Here, samples from three sites were compared: Scaloria Cave (the Upper Cave burials), Masseria Candelaro, and Passo di Corvo. Although the three sites all lie within a radius of about 15 km, bone samples from them all tend to follow different "local"

signatures. This suggests that many of the people at each site lived there for all or most of their lives; it reinforces the impression of a social landscape compartmentalized into small communities. At the same time, a small number of people in each site had "non-local" signatures, implying that there was some movement of people between villages, presumably through mechanisms such as intermarriage or ritual participation.

The Ritual Use of the Lower Cave

The Lower Cave of Scaloria provides one of the most extraordinary examples of cult practices documented for Neolithic Italy. Unlike the Upper Cave, whose configuration has altered significantly, that of the Lower Cave preserves its Neolithic aspect practically unchanged. The basic archaeological sources are Tiné (1975) and Tiné and Isetti (1975–1980, 1980), with additional discussion by Whitehouse (1992). Here about 40 groups of vessels were placed around concentrations of stalactites and stalagmites. Many of these were placed around a stalagmite broken in antiquity, part of which was concreted to a vessel; the truncated stalagmite showed traces of a vessel originally placed upon it. The remaining vases were placed in votive groups within a few meters, often in fragments. Most of these groups of vessels were situated along a relatively level gallery, at the edge of which a small rectangular basin (90 × 50 cm, with a depth of 15 cm) was cut into the rock, and in the large Lower Chamber, perhaps around a mirror of water that is now represented by a reduced pool or lake at the bottom of the cave. During the original exploration of the Lower Cave, Tiné identified the basin as the central focus of cult practices upon which participants focused their attention. The remains of a hearth and of foodstuffs were also found there. These vessels were Middle Neolithic fine wares of a type defined as "Scaloria Bassa," which, surprisingly, is not commonly found on the Tavoliere itself, although it is very similar to pottery from sites to the north such as Catignano. The vessels include open forms and large amphorae, closely linked to the collection of liquids, particularly large semi-conical bowls with a diameter greater than 30 cm and two handles located on one side only, a placement known only at Scaloria. This asymmetry of handles commonly used for suspension suggests objects intended for a specific, planned use; these vessels were carried along a tortuous path to the Lower Cave and then positioned permanently below stalactites to collect stillicide waters.

The Lower Cave provides a spectacular stage for such a ritual. Below, we discuss the possible significance of stillicide waters. Here we note the importance of the setting. As Whitehouse (1992) notes, Neolithic groups often practiced a cult of abnormal waters in liminal places. Today, as in the Neolithic, one reaches the Lower Cave through narrow, twisting galleries, at times crawling or sliding. It is completely dark and silent, with only the sounds of dripping water. The weak light of lamps illuminates stalactites and stalagmites of the color of milk. Green pools of water provide the only notes of color. In the cool, clammy air, vapors rise from the warm bodies that block the narrow spaces of passage, at times scraping against rough concretions. The water of the basin and the pool at the bottom of the cave shine; the basin and the groups of pots are the only signs of human presence. Anyone who has visited the Lower Cave will have noted the sense of being completely removed from the everyday world of the open air above, and it does not seem farfetched to think that this very sense of remoteness and otherworldliness may have been important to the Neolithic people negotiating their way down to it bearing fine pottery vessels to conduct rituals. It is not surprising that this multi-sensorial space offers an extraordinary setting for rituals (Whitehouse 2007:97). The space assumes a magical connotation, an idealized environment in which the living, the ancestors, or eternal presences, and natural forces can cohabit and communicate through all their senses (Skeates 2007:91).

The Funerary Use of the Upper Cave

During the 1978–1979 excavations, Scaloria Cave was understood to be principally a burial site, and understanding the funerary use of the Upper Cave is one of the major aims of the present work. Funerary ritual in the Upper Cave was restudied here through a suite of methods, including analysis of articulation, element representation, breakage, burning, and cut-marks.

Understanding funerary ritual in the Upper Cave has proved to be complicated. This complexity is partly due to historical reasons; for instance, while Gimbutas's summary reports talk of secondary depositions, field notebooks from 1979 show that excavators, probably misled by earlier findings of articulated burials, assumed that the human bone depositions they encountered resulted from primary single burials that had been disturbed in situ, and they recorded their observations accordingly. However, it is also compli-

cated simply because the dead were deposited at Scaloria with at least five rites that changed over time:

1. Single burials with grave goods (Scaloria Alta/Serra d'Alto period, late Middle Neolithic). Although this mode of burial was not documented in the 1978–1979 excavations, it is clear that Quagliati observed, and collected goods from, articulated primary single burials with grave goods. The associated pottery included fine, whole vessels in relatively late Middle Neolithic trichrome styles (Scaloria Alta, Serra d'Alto).

2. Single burial without grave goods. There is one example of this, excavated in trench 2 in 1978, an adult female. (Although the excavation report mentions grave goods, it is not clear whether these objects were actually associated with the body or incidentally mixed in the fill.) This was dated to sometime between 5322 and 5017 BCE.

3. Individual burial with retrieval of the skull. In 1979, burial of a juvenile aged about 5 to 7 years was excavated in trench 6; it was complete and articulated except for the skull, and field notes make clear that it was found in this condition, suggesting that after it was buried, the grave was revisited to remove the skull, presumably for ritual use. Dated between 5463 and 5221 BCE, this burial coincides generally with the major Middle Neoithic (Scaloria Bassa) funerary activity in the Upper Cave.

4. Skull deposition. One isolated skull was excavated in trench 1 in 1978, carefully placed on its base in a small stone niche with an associated flint blade. This deposition is certainly Neolithic but cannot be dated to a particular moment within the Neolithic.

5. Collective secondary depositions during the Middle Neolithic (Scaloria Bassa period, ca. 5500– 5200 BCE). The great majority of the human bone excavated and analyzed in this report comes from a deposit of human bone whose epicenter (at least in the excavated areas) was in the area of trench 10. Detailed taphonomic study of these remains shows that these were not burials in any real sense; disconnected remains were strewn upon the surface of the cave. Some came from complete bodies; others, major long bones and/or skulls, may have been selectively deposited. Strontium isotope evidence suggests that the dead at Scaloria came from a larger catchment than did the dead at nearby sites, suggesting that some of the dead may have been brought to the site from other communities (Tafuri et al., Chapter 4.3, this volume); if so, they may have been transported as selected elements rather than as complete bodies. The great variety of pottery fabrics found at Scaloria mentioned above may confirm a picture of people coming together at Scaloria from many communities. Almost all of these bones were completely disarticulated. Many bore cut-marks that reveal defleshing to remove residual soft tissue and sometimes to separate bones. Many became broken within the first 6 months to a year after death, quite possibly at the same time as defleshing or during additional depositions. Although a few objects (notably the pair of carved bone pendants) found with these bones may suggest votive depositions, there are no personal grave goods per se, and these bones are mixed casually with faunal remains, broken pots, and stone tools. As discussed below, the intention seems to have been to break the body down to individual bones, to strip them to produce clean bones, and then to discard them with little ceremony.

Some of the difference is chronological; here we would underline a clear evolution toward single burials with grave goods, which occurs in Puglia and the Materano toward the end of the Middle Neolithic (e.g., Pulo di Molfetta, Serra Cicora, Serra d'Alto, Trasano, and indeed at Masseria Candelaro). The single burial with no grave goods in trench 2 may be transitional to this development, as its date (later than dates for the collective deposition although overlapping with them) suggests. But this multiplicity of burial rites is also typical both of nearby sites such as Masseria Candelaro (Cassano and Manfredini 2004) and of the Tavoliere as a whole (Robb 2007).

Bones, Stalactites, Liminality, and Transitions: Some Final Speculations on Ritual at Scaloria

Finally, we turn to one of the most puzzling aspects of Scaloria: is there a relationship between the unique cult in the Lower Cave and the equally unique Middle Neolithic burial rites in the Upper Cave? Unfortunately, no radiocarbon dates are available for the Lower Cave; however, on ceramic grounds, both date to the middle to later sixth millennium BCE, making them potentially contemporary.

Faced with an enigma, there is a human impulse to form a gestalt, a single pattern that encompasses all of the known facts. Here it is completely possible that the Upper Cave collective depositions and the Lower Cave cult only appear to be contemporary within the resolution of archaeological knowledge (i.e., both fall within a single interval of two or three centuries, but within this interval they may well have happened generations apart). However, as an intellectual exercise, if we assume that the two uses of Scaloria formed part of a single ritual system, what was the nature of this system?

The circumstances of the cave suggest a rite of passage of some kind: removal to a place of secrecy where normal categories of matter and being are suspended (Whitehouse 2007:105), in which people can be reconfigured into new identities. Caves were often used as liminal places in prehistory, between aboveground and belowground, inside and outside, the known and the unknown (Skeates 2007). They afforded sensory experiences contradicting ordinary categories (Whitehouse 1992). Indeed, at Scaloria, the journey through the cave is challenging; it involves being buffeted by the walls, provoking weariness and fear, and a journey through unaccustomed senses and smells to places in which ordinary sensory references are suspended and disorientation from normality results. Such an experience may help overcome differences within the group and lead to stronger cohesion (Turner 1967, 1969).

But what kind of ritual transformation may have taken place at Scaloria? Here we put into relation with each other the two most striking facts about the cave's rituals:

1. The purpose of ritual in the Upper Cave was to collect bodies and produce clean bones with no flesh remaining on them. These were subsequently discarded within the cave.

2. The purpose of ritual in the Lower Cave was to collect water dripping from stalactites, presumably for ritual use.

There is no evidence at Scaloria for a rite of transition such as initiation into adulthood—for instance, through models reinforcing ideas of adult roles and behavior. Instead, it is relatively obvious what transition the rituals were aimed at effecting (namely, from life to the beyond). Sociologists have underlined the fact that while death involves the cessation of endogenous biological processes, it also involves a social transition from one kind of being to another, a transition that has to be produced socially through ritual actions (Kellehear 2007). Moreover, these almost always involved manipulation of the body to transform it into new forms (Robb 2013). Defleshing the dead to reduce them to clean bones may have been intended to complete the transformation from the living to the dead. Indeed, cleaning and redepositing bones is sometimes understood as the conclusion of a cycle of mourning or ritual observance. Given this, throwing the bones away in an ostentatiously casual manner may have been a ritual act. Ritual acts often switch between categories of profane and sacred. Indeed, at Scaloria, ad hoc depositions of functionally normal objects such as axes, pebbles, and awls gave such objects ritual meaning, transforming their polysemic potentiality into a new form (Turner 1967). From Tavoliere villages, we know that burials were probably not permanently marked; they were often casually disturbed and human bones scattered casually around village ditches. At Scaloria, the deliberately casual, ceremonial anti-ceremoniality may have been a ritual decommissioning, a semiotic indicator underlining the fact that the bones were no longer important remains of human beings, who may have been conceived to be henceforth elsewhere (disembodied, on some other plane of existence).

But what does this have to do with rites in the Lower Cave? The most direct explanation here involves a homology between bones and stalactites, which may have been understood as equivalent but different. Stalactites form continually in the cave and stand out as one of its most prominent visual features. Some are massive formations, but pencil- or finger-sized ones abound. Visually, bones and stalactites resemble one another: within the cave, the floor is littered with long, thin objects, whitish or coated with mud, and smaller stalactites are often even hollow inside. The two can sometimes be distinguished only with difficulty (indeed, experienced excavators not infrequently conserve broken-off fragments of stalactite thinking they are bones until they are washed). The formation of stalactites is evident to the observer, both from the water dripping from stalactites and from the formation of stalagmites below, which begin as a distinct, whitish smear below dripping water pools and then slowly rise upward; stalagmites in all stages of formation are visible throughout the cave. It may not be irrelevant here, but white is understood in many cultures as a color of socially productive substances, of milk and semen (Turner 1967). If we suppose that stalactites were

understood as an equivalent of bones on a timeless plane of existence, then cleaning bones and returning them to the cave may have been understood as returning the bones to an eternal plane in a place where bones came into being, the conclusion of a cycle of temporal incarnation. Conversely, the water that formed stalactites and bones may have been understood as spiritually powerful or nourishing, as containing an essence of timeless beings.

Well, it seems possible, but we don't insist upon it.

Grotta Scaloria: An Overall History of Human Use of the Cave

By way of conclusion, we would only underline the long history of human use of the cave. If we bring together evidence for the absolute chronology of human use of the cave, the ceramic evidence for periodization, and the archaeological evidence for activities within the cave, these three sources together create a very complex history. Scaloria Cave was used for habitation, for ritual, and for burial, not only in different periods but sometimes within a single period. The study of Scaloria Cave has affirmed the general pattern of life already known for the Middle Neolithic of the Tavoliere, and of the Neolithic in southern Italy generally. The Lower Cave ritual is unique in the current state of knowledge. In terms of burial, while confirming the variety of burial ritual known elsewhere in the southern Italian Neolithic, Scaloria also brings to light a new ritual (the collective deposition of defleshed remains), which is unknown elsewhere, not only in Italy but in Europe as well.

This is not to say that all questions have been answered. Even on the practical level, there is much more we would wish to know.

- What was the original configuration of the cave, particularly as regards its entrance, which would have been an important locus of activity and feature of the landscape?
- How did Scaloria relate to communities outside the cave? Was there a village outside the cave? Was it a place of ritual for multiple communities?
- What could be learned further from contextual evidence about the use of the cave (through contextual exploration of hearths, from spatial analysis of finds, or from use of methods such as microdebitage, organic residue analysis, etc.)?
- Did the funerary deposition in the Upper Cave occur in a limited number of episodes, or as a continual process? (Can Bayesian analysis of dates help us understand this?) In what form were bodies brought to the site? Is there a correlation between "non-local" skeletal elements and ways in which the body was reduced?
- Is the rite of defleshing and secondary deposition at Scaloria truly unique, or does it have parallels at other sites for which a similar taphonomic examination is needed?
- What were the relations among the different uses of the cave? Are the funerary, domestic, and ritual uses of the cave truly contemporary? Can more be learned about the relations between the Upper and Lower Caves?

And these are only the questions we can foresee at present; future researchers will doubtless ask as many questions as the cave holds new surprises.

Riassunto

Paradossalmente, Scaloria è al tempo stesso ben conosciuta e misteriosa. È stato investigata da figure di spicco a partire dal 1930, ma del sito si hanno per lo più informazioni poco dettagliate e affidabili. Lo scopo di questo volume è semplicemente quello di riunire tutte le informazioni note su Grotta Scaloria, in particolare quelle degli scavi inediti del 1978–1979, sia facendo una sintesi e reinterpretando i vecchi dati, sia presentando i risultati dei nuovi studi. Da un punto di vista storico, grotta Scaloria è importante non solo per la preistoria italiana, ma per la storia dell'archeologia. La relazione originale di Quagliati riflette i concetti e metodi in uso nel 1930, e segue anche la "tesi Pigorini," una polemica di grande portata della preistoria italiana all'inizio del 20° secolo che consisteva nel ricondurre la gente neolitica di Scaloria che ha prodotto le asce scheggiate di tipo "Campignano," direttamente agli antenati paleolitici locali, piuttosto che agli immigranti neolitici che hanno prodotto le asce di pietra levigata. Il lavoro di Tiné è tipico dell' archeologia diffusionista degli anni '60, e l'impostazione della ricerca di Gimbutas riflette fortemente la "New Archaeology" americana degli anni '70, entrambi impiegando il meglio dei nuovi metodi di allora come la datazione al radiocarbonio, le analisi statistiche, le analisi scientifiche di "ambiente" e "sussistenza," metodi standard americani

di registrazione sullo scavo, e richiedendo fondi dal National Science Foundation e da volontari paganti.

L'occupazione del Paleolitico Superiore

Gli scavi del Camerone superiore della grotta hanno portato alla luce resti pre-neolitici (tutti nell'area della Trincea 8), costituiti da strumenti in pietra e da ossa di selvaggina cacciata. La fauna era prevalentemente costituita da asino selvatico (Asinus hydruntinus, 53,7% del complesso), da Uro (Bos primigenius, 8,7%), dal cervo(Cervus elaphas, 6,4%) e dal daino (Dama dama, 7,6%). Questi ritrovamenti attestano così un uso sporadico, non molto intenso della grotta da parte di un piccolo gruppo di cacciatori-raccoglitori che vivevano in un tipico paesaggio aperto post-glaciale. Quattro date al radiocarbonio collocano questa occupazione nel tardo Paleolitico superiore, durante il 12° millennio a.C. e successivamente tra la fine del 10° e l'inizio dell' 8° millennio BCE.

Il sito neolitico e il suo paesaggio

Grotta Scaloria si colloca in un territorio densamente occupato e che è stato studiato intensamente dagli archeologi.

Il Tavoliere era occupato da una fitta rete di villaggi trincerati la cui economia era prevalentemente basata su piante e animali domestici. Fatta eccezione per gli esempi più grandi come Passo di Corvo, la popolazione di un villaggio probabilmente raramente superava le 50 persone e comunque non superava le 100 unità. I resti botanici dal camerone superiore venivano da un insieme di alberi e piante, che suggerisce una tipica foresta semi aperta a bosco deciduo misto, presumibilmente intervallata da giardini e pascoli. Scaloria è ora situata nell'entroterra, ma a metà dell'Olocene, sarebbe stata situata più vicina alla linea di costa e alla laguna del Candelaro ora colmata. All'interno di questo panorama, Scaloria era quindi un luogo diverso dall'attuale. La camera inferiore è lontana, inaccessibile, e anomala dal punto di vista esperienziale. Tiné e Isetti hanno documentato l'uso della parte bassa della grotta per un "culto delle acque" neolitico in cui i vasi di ceramica erano collocati sotto le stalattiti gocciolanti per raccogliere le acque di stillicidio. La parte alta della grotta sembra essere stata più aperta e luminosa, anche usata per ricoverare le greggi come dimostrato dalle recenti analisi micromorfologiche. I materiali archeologici rinvenuti fuori della caverna contengono abbondanti resti ceramici neolitici, suggerendo la possibile presenza di un villaggio. L'ingresso più ampio e più aperto di quanto non sia oggiresta così probabilmente fino all'età medievale. Oggi quest'ingresso è totalmente ostruito. Anche se controversie rimangono, una posizione mediana basata sull'evidenza presente interpreterebbe la parte più bassa della grotta in termini di segretezza, lontananza, e alterità fenomenologica, mentre collocherebbe la parte alta della grotta in un ambiente più familiare e frequentato. In effetti, l'alternanza di uso funerario e di uso quotidiano è comunemente osservata nelle grotte neolitiche (ad esempio Grotta Pacelli, Grotta dei Piccioni, Grotta Continenza) ed un uso a lungo termine di una camera accessibile per un singolo scopo sembra relativamente raro.

La grotta, come parte di una comunità neolitica

Il campione scheletrico umano contiene resti che vanno da un minimo di 23 a 31 individui. I bambini al di sotto dei 2 anni sono sottorappresentati, dato il probabile tasso elevato di mortalità infantile, e possono essere stati sepolti altrove. Ciò nonostante un terzo del campione scheletrico è costituito da resti giovanili. Gli adulti, uomini e donne, sono stati entrambi depositati nella grotta, probabilmente in numeri approssimativamente uguali; molti adulti sono morti giovani. L'insieme della fauna assomiglia fortemente a quella degli altri siti neolitici dell'Italia meridionale. È dominata dalla fauna domestica (principalmente bovini, suini, ovini e caprini), che costituiva 81,9 per cento del complesso. All'interno di questo, gli ovini e i caprini rappresentano di gran lunga la maggioranza (71,9%). La fauna selvatica costituisce il 19,1 per cento del complesso. Gli studi isotopici di carbonio e azoto mostrano che la maggior parte delle proteine nella dieta proveniva da fonti vegetali, non da fonti animali; gli animali erano quindi mangiati raramente (cfr Robb 2007: il capitolo 4). Inoltre la dieta conteneva pochi alimenti di origine marina. La ceramica proveniente da Grotta Scaloria può essere classificata in diversi stili, che confermano la sequenza generale delle ceramiche elaborata da S. Tiné per l'area: l'occupazione del primo Neolitico è rappresentata da ceramica impressa di stile Guadone, seguita nel Neolitico Medio dalla figulina dipinta dello stile detto "Scaloria Bassa." Poche ceramiche di stile Passo di Corvo sono state trovate a Scaloria, e viceversa, poca ceramica Scaloria Bassa/Catignano si trova nei villaggi trincerati del Tavoliere. L'analisi tecnologica della ceramica rivela che tutta o la maggior parte di essa fu fatta nella zona del Tavoliere ma alcune forme presentano elementi funzionali strettamente particolari non con-

frontabili con altri contesti, quali le doppie anse ravvicinate forse per fissare i contenitori alle stalagmiti. Gli impasti della ceramica sono molto eterogenei. La litica a Scaloria è stata ricavata sia da ciottoli locali sia da selce molto colorata di alta qualità proveniente dal vicino massiccio del Gargano; sono presenti anche pochi pezzi di ossidiana. Si tratta di un tipico insieme neolitico di industria su lama; molte lame mostrano margini lucidi suggerendo un uso intenso come falcetti, ma questi strumenti possono anche essere stati importanti in qualità di oggetti simbolici. Gli strumenti in pietra dura includono sia asce sottili finemente levigate ricavate da pietre verdi importate e depositate in contesti rituali, sia una serie di asce, ciottoli, brunitoi e macine di uso quotidiano. Tuttavia lo sfruttamento intensivo ed esauriente di molti manufatti, fino ad ottenere oggetti di ridotte dimensioni, fa pensare ad un uso rituale degli stessi. L'industria su osso contiene una vasta gamma di punteruoli, aghi, spatole e altri strumenti, alcuni pesantemente usurati o rotti. L'osso è stato utilizzato anche per una serie di ornamenti personali.

Studi sull' isotopo dello stronzio forniscono informazioni circa la mobilità e i paesaggi sociali. Sono stati confrontati campioni provenienti da tre siti: grotta Scaloria, Masseria Candelaro e Passo di Corvo. I risultati suggeriscono un panorama sociale suddiviso in piccole comunità, con una consistente minoranza di persone che si spostano da un gruppo all'altro durante la loro vita.

L'uso rituale del parte bassa della grotta

La parte bassa della grotta Scaloria fornisce uno dei più straordinari esempi di pratiche di culto documentate durante il neolitico in Italia. Non sono disponibili date assolute, ma la presenza esclusiva di ceramica di stile Scaloria Bassa rende questa frequentazione contemporanea con le deposizioni funerarie del Neolitico Medio nella parte alta della grotta. Circa 40 gruppi di vasi erano collocati intorno a concentrazioni di stalattiti e stalagmiti. La maggior parte era situata lungo un' impervia galleria e in una zona relativamente pianeggiante nella quale era tagliata nella roccia una piccola vaschetta rettangolare, e nella grande Camera Bassa. Questi vasi erano collocati lungo un percorso tortuoso che conduceva alla parte più bassa della grotta e poi posizionati in maniera permanente sotto stalattiti per raccogliere le acque stillicidio. La parte bassa della grotta può aver costituito un luogo altro, un mondo liminale per attività rituali, un ambiente idealizzato in cui i vivi, gli antenati o presenze eterne, e forze naturali possono convivere e comunicare e dove l'acqua raccolta doveva avere una valenza rituale

L'uso funerario della parte alta della grotta

La parte alta della grotta è stata spesso utilizzata per depositare i morti, con almeno cinque riti che sono cambiati nel corso del tempo:

1. *sepoltura individuale con recupero del cranio (inizio Neolitico Medio?)*
2. *Deposizione del cranio (non datato all'interno del Neolitico)*
3. *deposizioni collettive secondarie con scarnificazione (Neolitico Medio, circa 5500–5200 BCE)*
4. *sepoltura singola senza corredo (tardo Neolitico Medio?)*
5. *sepoltura singola con corredo funerario (tardo Neolitico, Serra d'Alto-Scaloria Alta)*

La maggior parte delle analisi qui condotte sulle ossa umane è stata focalizzata sull'indagine di un terzo di queste deposizioni secondarie collettive. Lo studio tafonomico dettagliato dimostra che questi resti non erano sepolture in senso stretto; resti disconnessi erano sparsi sulla superficie della grotta. Entrambi corpi interi ed elementi selezionati venivano deposti, molti scarnificati con strumenti di pietra e quasi tutti pesantemente frammentati e disarticolati post mortem. La prova dell'isotopo dello stronzio suggerisce che i morti a Scaloria venivano da un bacino più ampio rispetto a quelli dei siti vicini, facendo pensare che alcuni dei morti potevano essere stati portati in quel luogo da altre comunità.

Ossa, stalattiti, liminalità e transizioni: alcune speculazioni finali sul rito a grotta Scaloria

C'era una relazione tra "l'unico culto delle acque" nella parte bassa della grotta e "l'unico rito di scarnificazione" nella sua parte alta? Entrambi risalgono alla fase Scaloria Bassa del Neolitico Medio, ma naturalmente potrebbero non essere stati esattamente contemporanei. Tuttavia, se lo fossero, potrebbero essere stati collegati da un punto di vista semantico. Lo scopo del rituale nella parte alta della grotta era quello di raccogliere corpi e ottenere ossa pulite senza alcun resto di carne sopra. Queste ossa successivamente venivano buttate via all'interno

della grotta. La scarnificazione dei morti per ridurli a ossa pulite può essere stata intesa per completare la trasformazione da vivi a morti. Infatti, la pulizia e la rideposizione delle ossa è talvolta interpretata come la conclusione di un ciclo di dolore o di osservanza rituale.

Le stalattiti sono una delle caratteristiche più visibili della parte bassa della grotta, dove possono essere viste formarsi dalle gocce d'acqua dello stillicidio. Assomigliano anche fortemente a frammenti di ossa umane. Se noi supponiamo che le stalattiti erano considerate omologhe delle ossa, su un piano senza tempo dell'esistenza, allora la pulizia delle ossa e la loro restituzione alla grotta può essere stata interpretata come un ritorno delle ossa su un piano di eternità al luogo dove le ossa si erano formate, la conclusione di un ciclo d'incarnazione temporale. Viceversa, l'acqua che formava le stalattiti e le ossa può essere stata interpretata come potente, da un punto di vista spirituale, o nutriente, in quanto conteneva l'essenza di esseri senza tempo.

Bibliography

Adams, B. J., and L. W. Konigsberg
2004 Estimation of the Most Likely Number of Individuals from Commingled Human Skeletal Remains. *American Journal of Physical Anthropology* 125:138–151.

Agostini S., and V. D'Ercole
1986 Gli Insediamenti Preistorici in Grotta dei Monti Carseolani. In *9° Congreso Internacional de Espeleologia, Barcelona Agost 1–7, 1986*, pp. 209–211. Federació Catalana d'Espeleologia, Barcelona.

Albore Livadie, L.
1990 La Penisola Sorrentina nella Preistoria. *Archeologia a Piano di Sorrento. Ricerche di Preistoria e di Protostoria nella Penisola Sorrentina*, edited by C. A. Livadie, pp, 23–37. Comune di Piano di Sorrento, Naples.

Alessio, M., F. Bella, C. Cortesi, and B. Turi
1969 University of Rome Carbon-14 Dates VII. *Radiocarbon* 11.2:482–498.

Ambrose, S. H.
1990 Preparation and Characterization of Bone and Tooth Collagen for Isotopic Analysis. *Journal of Archaeological Science* 17:431–451.

Anati, E. (editor)
1975 *Valcamonica Symposium '72: Les Religions de la Préhistoire*. Centro Comuno di Studi Preistorici, Capo di Ponte.

Angel, J. L.
1966 Porotic Hypertosis, Anemias, Malarias, and Marshes in the Prehistoric Eastern Mediterranean. *Science* 153.3737:760–763.

Angeli, L., C. Arias, G. Cristoforetti, C. Fabbri, S. Legnaioli, V. Palleschi, G. Radi, A.Salvetti, and E. Tognoni
2007 Analisi Archeometriche Applicate allo Studio delle Ceramiche Dipinte del Neolitico dell'Italia Centro-Meridionale. In *Atti del IV Congresso Nazionale di Archeometria*, edited by C. D'Amico, pp. 421–429. Patron Editore, Bologna.

Anthony, D. W.
2007 *The Horse, the Wheel, and Language.* Princeton University Press, Princeton, New Jersey.

Anthony, D. W.
2010 The Rise and Fall of Old Europe. In *The Lost World of Old Europe: The Danube Valley 5000–3500 BC,* edited by D. W. Anthony and J. Liu, pp. 29–57. Princeton University Press, Princeton, New Jersey.

Antonioli, F.
2004 Sea Level Change in Italy During the Last 300ka, a Review. *Quaternaria Nova* 8:15–28.

Antonioli, F., A. Borsato, S. Frisia, and S. Silenzi
1998 L'Uso Degli Speleotemi per Reconstruzioni Paleoclimatiche e Variazioni del Livello del Mare. *Il Quaternario* 11.1:67–78.

Armit, I.
2012 *Headhunting and the Body in Iron Age Europe*. Cambridge University Press, Cambridge.

Armit, I., R. Schulting, C. J. Knüsel, and I. Shepherd
2011 Death, Decapitation and Display? The Bronze and Iron Age Human Remains from the Sculptor's Cave, Covesea, North-East Scotland. *Proceedings of the Prehistoric Society* 77:251–278.

Avram, M.
2009 The Legacy of Transhumance in National Park of Abruzzo, Lazio and Molise (PNALM): Rediscovery and Exploitation. *Geo: Journal of Tourism and Geosites* 4.2:153–159.

Azzati, P., G. Cresti, and A. Palma di Cesnola
1969 Il Campignano del Torrente Macchia, nel Gargano. *Rivista di Scienze Preistoriche* 24.1:145–162.

Bagnone, D., and B. Zamagni
2003 Lo Studio della Ceramica. In *Gli Scavi nel Villagio Neolitico di Catignano (1971–1980)*, edited by C. Tozzi and B. Zamagni, pp. 97–136. Istituto Italiano di Preistoria e Protoistoria, Florence.

Bailey, D.
2010 The Figurines of Old Europe. In *The Lost World of Old Europe: The Danube Valley 5000–3500 BC,* edited by D. W. Anthony and J. Liu, pp. 29–57. Princeton University Press, Princeton, New Jersey.

Balasse, M., S. H. Ambrose, A. B. Smith, and T. D. Price
2002 The Seasonal Mobility Model for Prehistoric Herders in the South-Western Cape of South Africa Assessed by Isotopic Analysis of Sheep Tooth Enamel. *Journal of Archeologial Science* 29.9:917–932.

Balenzano, F., M. Moresi, and A. Tria
1999 Significato della Presenza di Noduli Manganesiferi nelle Argille Plio-Pleistoceniche di Rutigliano (Bari). *Mineralogica et Petrographica Acta* 42:41–56.

Barker, G. W.
1981 *Landscape and Society: Prehistoric Central Italy*. Academic Press, London.

Barra A., R. Grifoni Cremonesi, F. Mallegni, M. Piancastelli, A. Vitiello, and B. Wilkens
1989–90 La Grotta Continenza di Trasacco. I Livelli a Ceramiche. *Rivista di Scienze Preistoriche* 42: 31–100.

Bartosiewicz, L.
1999 The Role of Sheep versus Goat in Meat Consumption at Archaeological Sites. In *Transhumant Pastoralism in Southern Europe*, edited by L. Bartosiewicz and H. Greenfield, pp. 47–60. Archaeolingua Kiadó, Budapest.

Bartosiewicz, L.
2007 Mammalian Bone. In *The Early Neolithic on the Great Hungarian Plain: Investigations of the Körös Culture Site of Ecsegfalva 23, County Békés*, edited by A. Whittle, pp. 287–326. Varia Archaeologica Hungarica 21. Institute of Archaeology of the Hungarian Academy of Sciences, Budapest.

Bartosiewicz, L.
2005 Plain Talk: Animals, Environment, and Culture in the Neolithic of the Carpathian Basin and Adjacent Areas. In *(Un)settling the Neolithic*, edited by D, Bailey, A. Whittle, and V. Cummings, pp. 51–63. Oxford: Oxbow Books.

Bartosiewicz, L., L. Zapata, and C. Bonsall
2010 A Tale of Two Shell Middens: The Natural versus the Cultural in "Obanian" Deposits at Carding Mill Bay, Oban, Western Scotland. In *Integrating Zooarchaeology and Paleoethnobotany: A Consideration of Issues, Methods, and Cases*, edited by A. M. VanDerwarker and T. M. Peres, pp. 205–226. Springer, New York.

Bass, B.
1998 Early Neolithic Offshore Accounts: Remote Islands, Maritime Exploitations, and the Trans-Adriatic Cultural Network. *Journal of Mediterranean Archaeology* 11.2:165–190.

Bass, W. M.
1987 *Human Osteology: A Laboratory and Field Manual*. Missouri Archaeological Society, Columbia.

Bazzanella, M.
2000 L'Industria in Materia Dura Animale: Elementi per l'Elaborazione di una Tipologia Relativa al Primo Neolitico. In *La Neolitizzazione tra Oriente e Occidente*, edited by A. Pessina and G. Muscio, pp. 173–184. Museo Friulano di Storia Naturale, Udine.

Beckett, J. F.
2011 Interactions with the Dead: A Taphonomic Analysis of Burial Practices in Three Megalithic Tombs in County Clare, Ireland. *European Journal of Archaeology* 14:394–418.

Benac, A.
1973 Obre II: A Neolithic Settlement of the Butmir Group at Gornje Polje. *Wissenschaftliche Mitteilungen des Bosnisch-Herzegowinischen Landesmuseums* 3:94–109.

Bender, B., S. Hamilton, and C. Tilley
2007 *Stone Worlds: Narrative and Reflexivity in Landscape Archaeology*. Left Coast Press, Walnut Creek, California.

Benson, D., and A. Whittle (editors)
2006 *Building Memories: The Neolithic Cotswold Long Barrow at Ascott-under-Whychwood, Oxfordshire*. Oxbow Books, Oxford.

Bentley, R. A.
2013 Mobility and the Diversity of Neolithic Lives: Isotopic Evidence from Skeletons. *Journal of Anthropological Archaeology* 32.3:302–312.

Bentley, R. A.
2006 Strontium Isotopes from the Earth to the Archaeological Skeleton: A Review. *Journal of Archaeological Method and Theory* 12:136–187.

Bentley, R. A., and C. Knipper
2005 Transhumance at the Early Neolithic Settlement at Vaihingen (Germany). *Antiquity* 79:306.

Bentley, R. A., T. D. Price, J. Lüning, D. Gronenborn, J. Wahl, and P. D. Fullagar
2002 Human Migration in Early Neolithic Europe. *Current Anthropology* 43:799–804.

Benyarku, C. A., and G. Stoops
2005 *Guidelines for Preparation of Rock and Soil Thin Section and Polished Sections*. Quaderns DMACS 33. Universidad de Lleida, Lleida.

Bernabò Brea, L.
1956 *Gli Scavi nella Caverna delle Arene Candide*. Collection de Monographies Préhistoriques et Archéologiques Vol. 2.1. Istituto Internazionale di Studi Liguri, Bordighera.

Bernabò Brea, L., I. Biddittu, P. F. Cassoli, M. Cavalier, S. Scali, A. Tagliacozzo, and L. Vagnetti
1989 *La Grotta Cardini (Praia a Mare–Cosenza): Giacimento del Bronzo*. Memorie dell'Istituto Italiano di Paleontologia Umana, Vol. 4. Istituto di Paleontologia Umana, Rome.

Betts, E.
2003 The Sacred Landscape of Picenum (900–100 BC): Towards a Phenomenology of Cult Places. In *Inhabiting Symbols: Symbol and Image in the Ancient Mediterranean*, edited by J. Wilkins and E. Herring, pp. 101–120. Accordia Research Institute, London.

Bianco, S.
1991–1992 Nuovi Dati da Puglia Meridionale, Basilicata e Calabria. *Rassegna di Acheologia* 10: 509–522.

Blanc, A. C.
1939 L'Uomo Fossile del Monte Circeo, Un Cranio Neandertaliano nella Grotta Guattari a San. Felice Circeo. *Rivista di Antropologia* 32:1–18.

Blanc, A. C.
1961 Some Evidence for the Ideologies of Early Man. In *Social Life of Early Man*, edited by S. L. Washburn, pp. 119–136. Viking Fund Publications in Anthropology, No. 31, Wenner-Gren Foundation for Anthropological Research. Aldine, Chicago.

Bloch, M.
1971 *Placing the Dead: Tombs, Ancestral Villages, and Kinship Organisation in Madagascar*. Seminar Press, London.

Bocquet-Appel, J. P.
2011 The Agricultural Demographic Transition during and after the Agriculture Inventions. *Current Anthropology* 52:497–510.

Boenzi, F., M. Caldara, M. Moresi, and L. Pennetta
2002 History of the Salpi Lagoon-Sabhka (Manfredonia Gulf, Italy). *Italian Journal of Quaternary Science* 14.2:93–104.

Boenzi, F., M. Caldara, L. Pennetta, and O. Simone
2004 Environmental Aspects Related to the Physical Evolution of Some Wetlands along the Adriatic Coast of Apulia (Southern Italy): A Review. *Journal of Coastal Research SI* 39:170–175.

Bökönyi, S.
1957/1958 *Az 1956-os lebői ásatások gerinces faunája*. Móra Ferenc Múzeum Évkönyve, Szeged, Hungary.

Bökönyi, S.
1974 *The History of Domestic Mammals in Central and Eastern Europe*. Akadémiai Kiadó, Budapest.

Bökönyi, S.
1977–1982 The Early Neolithic Fauna of Rendina: A Preliminary Report. *Origini* 11:345–350.

Bökönyi, S.
1983 Animal Bones from Test Excavations in Early Neolithic Ditched Villages on the Tavoliere, South Italy. In *Studi Sul Neolitico del Tavoliere della Puglia*, edited by S. Cassano and A. Manfredini, pp. 237–249. BAR International Series 160. British Archaeological Reports, Oxford.

Bökönyi, S.
1985 A Comparison of the Early Neolithic Domestic and Wild Faunas of the Balkans, Italy and South France. *Cahiers Ligures de Préhistoire et de Protohistoire* 2:181–192.

Bökönyi, S.
1988–1989 Takeover and Local Domestication: The Double-Faced Nature of Early Animal Husbandry in South Italy. *Origini* 14:371–386.

Bökönyi, S.
1992 The Early Neolithic Vertebrate Fauna of Endrőd 119. In *Cultural and Landscape Changes in South-East Hungary I: Reports on the Gyomaendrőd Project*, edited by S. Bökönyi, pp. 195–299. Archaeolingua Kiadó, Budapest.

Bökönyi, S.
2010 Animal Husbandry from the Late Neolithic through the Roman Imperial Period. In *The Chora of Metaponto 2: Archaeozoology at Pantanello and Five Other Sites*, edited by L. Bartosiewicz, pp. 1–33. University of Texas Press, Austin.

Bökönyi, S., and G. Siracusano
1987 Reperti Faunistici dell'Età del Bronzo del Sito di Coppa Nevigata: Un Commento Preliminare. In *Coppa Nevigata e il suo Territorio. Testimonianze Archeologiche dal VII al II Millennio a C*, edited by S. M. Cassano, E. Cazzella, A. Manfredini, and M. Moscoloni, pp. 205–210. Quasar, Rome.

Bon, M.
1996 La Fauna Neolitica della Grotta degli Zingari nel Carso Triestino. *Atti della Società per la Preistoria e Protoistoria della Regione Friuli–Venezia Giulia* 9:127–135.

Borsato A., S. Frisia, B. Jones, and K. Van Der Borg
2000 Calcite Moonmilk: Crystal Morphology and Environment of Formation in Caves in the Italian Alps. *Journal of Sedimentary Research* 70: 1171–1182.

Borzatti Von Lowenstern, E.
1969 Industrie Romanelliane e Neolitiche nella Grotta delle Prazziche. *Rivista di Scienze Preistoriche* 24.1:91–143.

Boschian, G., M. Colombo, and M. Gabriele
2011 Analyse archéométriques de la céramique de la culture de Catignano (Abruzzes-Italie) (5600–4600 cal BC): origine des matières premières et utilisation des pâtes pour la production des différentes formes vasculaires. *Archéométrie 2011*, XVIIIe Colloque du G.M.P.C.A., Liège, Belgique.

Boschin, F., and A. Riedel
2000 The Late Mesolithic and Neolithic Fauna of the Edera Cave (Aurisina, Trieste Karst): A Preliminary Report. *Società per la Preistoria e Protoistoria della Regione Friuli–Venezia Giulia* 8:73–90.

Bosellini, A., and M. Morsilli
1997 A Lower Cretaceous Drowning Unconformity on the Eastern Flank of the Apulian Platform (Gargano Promontory, Southern Italy). *Cretaceous Research* 18:51–61.

Bosellini A., C. Neri, and V. Luciani
1993 Platform Margin Collapses and Sequence Stratigraphic Organization of Carbonate Scope: Cretaceous-Eocene, Gargano Promontory, Southern Italy. *Terra Nova* 5:282–297.

Boulestin, B., A. Zeeb-Lanz, C. Jeunesse, F. Haack, R.-M. Arbogast, and A. Denaire
2009 Mass Cannibalism in the Linear Pottery Culture at Herxheim (Palatinate, Germany). *Antiquity* 83: 968–982.

Boulle, E.-L.
2001 Osteological Features Associated with Ankle Hyperdorsiflexion. *International Journal of Osteoarchaeology* 11:345–349.

Boylston, A., C. J. Knüsel, C. A. Roberts, and M. Dawson
2000 Investigation of a Romano-British Rural Ritual in Bedford, England. *Journal of Archaeological Science* 27:241–254.

Bradford, J.
1949 Buried Landscapes in Southern Italy. *Antiquity* 23:58–72.

Brankman, C. M. and A. Aydin
2004 Uplift Contractional Deformation along Segmented Strike-Slip Fault System: The Gargano Promontory, Southern Italy. *Journal of Structural Geology* 26:807–824.

Brewer, R.
1976 *Fabric and Mineral Analysis of Soils*. Robert E. Krieger Publishing Company, Huntington, New York.

Broodbank, C.
2000 *An Island Archaeology of the Early Cyclades*. Cambridge University Press, Cambridge.

Broodbank, C.
2006 The Origins and Early Development of Mediterranean Maritime Activity. *Journal of Mediterranean Archaeology* 19.2:199–230.

Brown, E. A. R.
1981 Death and the Human Body in the Later Middle Ages: The Legislation of Boniface VIII on the Division of the Corpse. *Viator: Medieval and Renaissance Studies* 12:221–270.

Brown, E. A. R.
1985 Burying and Unburying the Kings of France. In *Persons in Groups: Social Behavior as Identity*

Formation in Medieval and Renaissance Europe. Papers of the Sixteenth Annual Conference of the Center for Medieval and Early Renaissance Studies, edited by R.C. Trexler, pp. 241–266. Medieval and Renaissance Texts and Studies 36. Center for Medieval and Early Renaissance, Binghamton, New York.

Brown, T. A., D. E. Nelson, J. S. Vogel, and J. R. Southon
1988 Improved Collagen Extraction by Modified Longin Method. *Radiocarbon* 30.2: 171–177.

Buikstra, J., and D. H. Ubelaker
1994 *Standards for Data Collection from Human Skeletal Remains*. Arkansas Archaeological Survey, Fayetteville.

Bullock, P., N. Fedorroff, A. Jongerius, G. I. Stoops, and T. Tursina
1985 *Handbook for Soil Thin Section Description*. Waine Research Publishers, Wolverhampton.

Calattini, M.
1983 Industria litica della stazione di Molino di Mare (Rodi Garganico). In *Atti 5° Covegno sulla preistoria-protostoria-storia della Daunia*, pp. 136–160. San Severo 9–10–11 dicembre 1983.

Caldara, M., and G. Palmentola
1991 Lineamenti Geomorfologici del Gargano con Particolare Riferimento al Carsismo. *International Conference on Environmental Change in Karst Areas, Apulian Excursion,* September 23th–27th, 1991. 2.5:53–66.

Caldara, M., and L. Pennetta
1989 Interpretazione Paleoclimatica di Dati Preistorici e Storici Relativi all'Entroterra del Golfo di Manfredonia. *Memorie della Società Geologica Italiana* 42:197–207.

Caldara, M., and L. Pennetta
1993 Nuovi Dati per la Conoscenza Geologica e Geomorfologica del Tavoliere di Puglia. *Bonifica* 8.3: 25–42.

Caldara, M., L. Pennetta, and O. Simone
2002 Holocene Evolution of the Salpi Lagoon (Puglia, Italy). *Journal of Coastal Research* 36: 124–133.

Caldara, M., L. Pennetta, and O. Simone
2004 L'Ambiente Fisico Nell'Area dell'Insediamento. In *Masseria Candelaro. Vita Quotidiana e Mondo Ideologico in un Comunità Neolitica del Tavoliere*, edited by S. M. Cassano and A. Manfredini, pp. 25–38. Claudio Grenzi Editore, Foggia.

Camps-Fabrer, H. (editor)
1979 *L'Industrie en Os et Bois de Cervidé durant le Néolithique et l'Âge des Métaux*. Centre National Recherche Scientifique, Paris.

Camps-Fabrer, H. (editor)
1991 *Fiches Typologiques de l'Industrie Osseuse Préhistorique.* Cahier 4*, Objets de Parure*. Publications de l'Université de Provence, Aix-en-Provence.

Canti, M. G.
1997 An Investigation of Microscopic Calcareous Spherulites from Herbivore Dungs. *Journal of Archaeological Science* 24:219–231.

Canti, M. G.
1998 The Micromorphological Identification of Faecal Spherulites from Archaeological and Modern Materials. *Journal of Archaeological Science* 25:435–444.

Canti, M. G.
1999 The Production and Preservation of Faecal Spherulites: Animals, Environments and Taphonomy. *Journal of Archaeological Science* 26:251–258.

Capelli, C., T. Mannoni, E. Starnini, and R. Cabella
2006 Le Produzioni Preistoriche e Protostoriche Italiane nella Banca Dati delle Ceramiche Mediterranee di Genova: Storia delle Ricerche Archeometriche e Stato Attuale delle Conoscenze. In *La Ceramica in Italia Quando l'Italia non c'era: Atti della 8a Giornata di Archeometria della Ceramica (Vietri sul Mare, 27–28 Aprile 2004)*, edited by B. Fabbri, S. Gualtieri, and M. Romito, pp. 57–62. Edipuglia, Bari.

Cardini, L.
1970 Praia a Mare: Relazione degli Scavi 1957–70. *Bullettino di Paletnologia Italiana*, Nuova Serie 121:31–59.

Carucci, P.
1907 *La Grotta Preistorica di Pertosa (Salerno)*. Di Geranno and A. Morano, Naples.

Case, D. T., and S. E. Burnett
2012 Identification of Tarsal Coalition and Frequency Estimates from Skeletal Samples. *International Journal of Osteoarchaeology* 22:667–684.

Cassano, S., A. Cazzella, A. Manfredini, and M. Moscoloni
1987 *Coppa Nevigata e il Suo Territorio: Testimonianze Archeologiche dal VII al II Millennio A.C.* Edizioni Quasar, Rome.

Castelletti, L., L. Costantini, and C. Tozzi
1987 Considerazioni sull'Economia e Lambiente durante il Neolitico in Italia. *Atti della XXVI*

Riunione Scientifica dell'Istituto Italiano di Preistoria e Protostoria (Firenze 7–10 Novembre 1985), pp. 37–55. Istituto Italiano di Preistoria e Protostoria, Florence.

Cassano, S. M., G. Eramo, R. Laviano, and I. M. Muntoni
2004 Analisi Archeometriche delle Ceramiche. In *Masseria Candelaro. Vita Quotidiana e Mondo Ideologico in una Comunità Neolitica del Tavoliere*, edited by S. M. Cassano and A. Manfredini, pp. 221–249. Claudio Grenzi Editore, Foggia.

Cassano, S. M., R. Laviano, and I. M. Muntoni
1995 Pottery Technology of Early Neolithic Communities of Coppa Nevigata and Masseria Candelaro (Foggia, Southern Italy). In *The Cultural Ceramic Heritage, Fourth Euro Ceramics*, Vol. 14, edited by B. Fabbri, pp. 137–148. Gruppo Editoriale Faenza Editrice, Faenza.

Cassano, S. M., and A. Manfredini
1983 *Studi sul Neolitico del Tavoliere della Puglia. Indagine Territoriale in un'Area-Campione.* BAR International Series 160. British Archaeological Reports, Oxford.

Cassano, S. M., and Manfredini, A.
2004 *Masseria Candelaro: Vita Quotidiana e Mondo Ideologico in Una Comunitá Neolitico del Tavoliere.* Claudio Grenzi Editore, Foggia.

Cassano, S. M., A. Manfredini, G. Carboni, N. Marconi, and I. Muntoni
2003 Il Villaggio Neolitico di Masseria Candelaro (FG): Una Premessa Acheologico. *Atti, Riunione Scientifica dell' I.I.P.P.* 35:813–818.

Castex, D.
2005 Les anomalies démographiques: clefs d'interprétation des cimetières d'épidémies en archélogie. In *Epidémies et Crises de Mortalité du Passé, Maison des Sciences de l'Homme*, edited by D. Castex and I. Carton, pp. 95–120. Ausonius Editions, Etudes 15. De Boccard, Paris.

Castex, D.
2008 Identification and Interpretation of Historical Cemeteries Linked to Epidemics. In *Paleomicrobiology and Past Infections*, edited by D. Raoult and M. Drancourt, pp. 23–48. Springer, Berlin.

Castex, D., and S. Kacki
2013 Funérailles en Temps d'Épidémie: Croyances et Réalité Archéologique. In *Une Archéologie Funéraire? Hommage à Jean Leclerc*, edited by G. Perira, pp. 23–29. Nouvelles de l'Archéologie 132. Maison des Sciences de l'Homme, Paris.

Cauvin, J.
2000 *The Birth of the Gods and the Origins of Agriculture*. Translated by Trevor Watkins. Cambridge: Cambridge University Press.

Cavalier, M.
1960 La Grotte de la Zinzulusa et la Stratigraphie de Lipari. In *Mélange d'Archéologie et d'Histoire*, pp. 1–32. École Française de Rome, Rome.

Chadwick, J.
1970 *The Decipherment of Linear B.* 2nd edition. Cambridge University Press, Cambridge.

Chafetz, H., D. Srdov, and N. Horvatinnic
1994 Early Diagenesis of Plitvice Lakes Waterfall and Barrier Travertine Deposits. *Geographie Physique et Quaternaire* 48:245–255.

Chisholm, B. S., D. E. Nelson, and H. P. Schwarcz
1982 Stable Isotope Ratios as a Measure of Marine versus Terrestrial Protein in Ancient Diet. *Science* 216:1131–1132.

Ciaraldi, M.
2004 Paleobotanica. In *Masseria Candelaro: Vita quotidiana e mondo ideologico in una comunità neolitica del Tavoliere*, edited by S. M. Cassano and A. Manfredini, pp. 447–460. Claudio Grenzi Editore, Foggia.

Ciaranfi, N., P. Pieri, and G. Ricchetti
1988 Note alla Carta Geologica delle Murge e del Salento (Puglia centromeridionale). *Memorie della Società Geologica Italiana* 41:449–460.

Cipolloni-Sampò, M.
1973 Villaggio del Rendina: Scoperta di una Nuova Facies Decorativa del Neolitico Italiano a Ceramica Impressa. In *Actes du VIIIe Congrès international des sciences préhistoriques et protohistoriques, Beograd 9–15 Septembre 1971*, Vol. 2, pp. 359–367. Union Internationale des Sciences Préhistoriques et Protohistoriques, Beograd.

Cobianchi, M., V. Luciani, and A. Menegatti
1999 The Selli Level of the Gargano Promontory, Apulia, Southern Italy: Foraminiferal and Calcareous Nannofossil Data. *Cretaceous Research* 20: 255–269.

Cocchi Genick, D. (editor)
1995 *Aspetti Culturali della Media Età del Bronzo nell" Italia Centro-Meridionale*. Octavo F. Cantini Editore, Florence.

Cocchi Genick, D.
1999 L'Antica Età del Bronzo nell'Italia Centrale. In *Criteri di Nomenclatura e di Terminologia Inerente alla Definizione delle Forme Vascolari del Neolitico/Eneolitico e del Bronzo/Ferro*. *Atti del Congresso di Lido di Camaiore, 26–29 Marzo 1998,* Vol. 2, edited by D. Cocchi Genick, pp. 251–369. Octavo, Florence.

Colini, G. A.
1900 Il Sepolcreto di Remedello di Sotto e il Periodo Eneolitico in Italia. *Bullettino di Paletnologia Italiana* 26:57–101.

Colombo, M., and G. Boschian
2009 High-Technology Manufacturing of the 5th Millennium B.C. Pottery in Italy. *Materials and Manufacturing Processes* 24:928–933.

Conati Barbaro, C., A. Ciarico, and S. Sivilli
2004 L'Industria Litica di Masseria Candelaro. In *Masseria Candelaro (Foggia): Vita Quotidiana e Mondo Ideologico in un Villaggio Neolitico sul Tavoliere*, edited by S. Cassano and A. Manfredini, pp. 253–326. Grenzi Editore, Foggia.

Coppola, D.
1973 Nota Preliminare su un Villaggio di Facies Culturale Subappenninica a "Rissieddi" in Territorio di Ostuni (Brindisi). *Archivio Storico Pugliese* 26.3–4:607–650.

Coppola, D.
1988 La Grotta di S. Maria di Agnano ad Ostuni. In *Atti dell'VIII Convegno dei Comuni Messapici, Peuceti e Dauni, Alezio 14–15 novembre 1981*, pp. 175–188.

Coppola, D.
2003 Il Deposito di Asce Levigate "Alberto Scatigna" nell'Area di Masseria Sardella a Ceglie Messapica (Brindisi). *Atti della Società per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia* 13:128–135.

Cosgrove, D.
1995 Landscapes and Myths, Gods and Humans. In *Landscapes, Politics and Perspectives*, edited by B. Bender, pp. 281–305. Berg, Oxford.

Cossignani T., and V. Cossignani
1995 *L'Atlante delle Conchiglie Terrestri e Dulciacquicole Italiane*. L'Informatore Piceno, Ancona.

Costantini, L., and M. Stancanelli
1994 La Preistoria Agricola dell'Italia Centro-Meridionale: Il Contributo delle Indagini Archeobotaniche. *Origini* 18:149–244.

Courty, M. A., P. Goldberg, and R. Macphail
1989 *Soils and Micromorphology in Archaeology*. Cambridge University Press, Cambridge

Craig, O. E., M. Biazzo, and M. A. Tafuri
2006 Palaeodietary Records of Coastal Mediterranean Populations. *Journal of Mediterranean Studies* 16.1/2:63–77.

Cremaschi M., and F. Ferraro
2007 The Upper Pleistocene in the Paglicci Cave (Gargano, Southern Italy): Loess and Tephra in the Anthropogenic Sequenze. *Atti della Società Toscana di Scienze Naturali, Memorie*, Serie A, 112:153–164.

Cremilleux, H., and M. Livache
1976 Pour le Classément des Pièces Écaillées. In *Dialektikè*, *Cahiers de Typologie Analytique*, Centre de Palethnologie Stratigraphique "Eruri," pp. 1–5. Institut Universitaire de la Recherche Scientifique, Pau.

Cremonesi, G.
1965 Il villaggio di Ripoli alla Luce dei Recenti Scavi. *Rivista di Scienze Preistoriche* 20:85–155.

Cremonesi, G.
1966 Il Villagio Leopardi Presso Penne in Abruzzo. *Bullettino di Paletnologia Italiana,* Nuova Serie 17:27–49.

Cremonesi, G.
1976 *La Grotta dei Piccioni di Bolognano nel Quadro delle Culture dal Neolitico all'Età del Bronzo in Abruzzo*. Giardini Editori e Stampatori, Pisa.

Cremonesi, G.
1978a Gli Scavi nella Grotta della Trinità (Ruffano-Lecce). *Quaderni della Ricerca Scientifica* 100: 131–148.

Cremonesi, G.
1978b Gli Scavi nella Grotta n. 3 di Latronico. *Riunione Scientifica dell'Istituto Italiano di Preistoria e Protostoria* 20:182.

Curci, A., A. Facciolo, and A. Tagliacozzo
2005 I Dati Archeozoologici: un'Economia di Allevamento nel Neolitico dell'Italia Meridionale. In *Masseria Candelaro. Vita Quotidiana e Mondo Ideologico in una Comunità Neolitica del Tavoliere*, edited by S. M. Cassano and A. Manfredini, pp. 401–440. Claudio Grenzi Editore, Foggia.

Curci, A., A. Facciolo, A. Tagliacozzo, and C. Minniti
2004 Archeozoologia. In *Masseria Candelaro. Vita Quotidiana e Mondo Ideologico in una Comunità Neolitica del Tavoliere*, edited by S. M. Cassano

and A. Manfredini, pp. 401–444. Claudio Grenzi Editore, Foggia.

Danforth, L.
1982 *The Death Rituals of Rural Greece*. Princeton University Press, Princeton, New Jersey.

D'Argenio, B.
1974 Le Piattaforme Carbonatiche Periadriatiche: Una Rassegna di Problemi nel Quadro Geodinamico Mesozoico dell'Area Mediterranea. *Memorie della Società Geologica Italiana* 13: 137–160.

Darling, J. A.
1998 Mass Inhumation and the Execution of Witches in the American Southwest. *American Anthropologist* 100:732–752.

De Francesco, A. M., and G. M. Crisci
2003 L'Ossidiana. In *Gli Scavi nel Villagio Neolitico di Catignano (1971–1980),* edited by C. Tozzi and B. Zamagni, pp. 239–240. Origines, Studi e Materiali Pubblicati a Cura dell'Istituto Italiano di Preistoria e Protostoria, Florence.

Delaby, S.
2001 Palaeoseismic Investigations in Belgian Caves. *Netherlands Journal of Geosciences/Geologie en Mijnbouw* 80.3–4:323–332.

De Lucia, A., D. Ferri, A. Geniola, C. Giove, M. Maggiore, N. Melone, P. Pieri, and V. Scattarella
1977 *La Comunità Neolitica di Cala Colombo Presso Torre a Mare, Bari.* Società di Storia Patria per la Puglia, Bari.

Delano Smith, C.
1976 Tavoliere of Foggia: An Aggrading Coastland and Its Early Settlement Patterns. In *Geoarchaeology: Earth Science and the Past*, edited by D. A. Davidson and M. L. Shackley, pp. 197–212. Duckworth: London.

Delano Smith, C.
1983 L'Ambiente. In *Passo di Corvo e la Civiltà Neolitica del Tavoliere*, edited by S. Tiné, pp. 11–22. Sagep, Genoa.

Delano Smith, C.
1987 The Neolithic Environment of the Tavoliere Plain. In *Apulia Volume 1: Neolithic Settlement in the Tavoliere*, edited by G. D. B. Jones, pp. 1–27. Reports of the Research Committee of the Society of Antiquaries, London.

Dell'Anna, L.
1967 Ricerche su Alcune Terre Rosse della Regione Pugliese. *Periodico di Mineralogia* 36.2:539–592.

Dell'Anna, L., and C. L. Garavelli
1968 *Su Alcune "Terre Rosse" della Puglia Settentrionale*. Grafiche Rossi, Bari.

Dell'Anna, L., and R. Laviano
1987 Penisola Salentina: Stato delle Conoscenze Mineralogiche e Geochimiche. In *Atti del Convegno sulle Conoscenze Geologiche del Territorio Salentino, Lecce, 12 Dicembre 1987. Quaderni di Ricerche del Centro Studi Geotecnici d'Ingegneria* 11:303–321.

Dell'Anna, L., and R. Laviano
1991 Mineralogical and Chemical Classification of Pleistocene Clays from the Lucanian Basin (Southern Italy) for Use in the Italian Tile Industry. *Applied Clay Science* 6:233–243.

DeNiro, M. J.
1985 Postmortem Preservation and Alteration of In Vivo Bone Collagen Isotope Ratios in Relation to Palaeodietary Reconstruction. *Nature* 317: 806–809.

De Pompeis, C., and T. Di Fraia
1981 Un Insediamento Protoappenninico a Torre de' Passeri (Pescara). *Quaderni del Museo delle Tradizioni Popolari Abruzzesi* 5:3–38.

Di Fraia, T., and R. G. Cremonesi
1996 *La Grotta S. Angelo sulla Montagna dei Fiori (Teramo)*. Istituti Editoriali e Poligrafici Internazionali, Pisa-Rome.

Di Lernia, S.
1995 The Early Neolithic Mine of Defensola "A" (I 18): Flint Exploitation in the Gargano Area. *Archaeologia Polona* 33:119–132.

Di Lernia, S., G. Fiorentino, and A. Galiberti
1992 Gargano Prehistoric Flint Mines Project: The State of Research in the Neolithic Mine of Defensola-Vieste (Italy). *Origini* 15:175–199.

Di Lernia, S., R. Franchi, and P. Pallecchi
1993 Manufacture Characteristics, Provenance Problems and Content Residues: An Archaeometric Approach to the Neolithic Pottery of the Defensola Mine (Vieste, FG, Italy). *Quaternaria Nova* 3:151–175.

Di Lernia, S., and A. Galiberti
1993 *Archeologia Mineraria della Selce nella Preistoria: Definizioni, Potenzialita e Prospettive della Ricerca.* Quaderni del Dipartimento di Archaeologia e Storia delle Arti Sezione Archeologica 36, Universita di Siena. All'insegna del Giglio, Florence.

Doglioni, C., F. Mongelli, and P. Pieri
1994 The Puglia Uplift (SE Italy): An Anomaly in the Foreland of the Apenninic Subduction Due to Buckling of a Thick Continental Lithosphere. *Tectonics* 13:1309–1321.

D'Oronzo C., G. Colaianni, A. M. Grasso, D. Martella, A. Stellati, and G. Fiorentino
2008 Decoding Wood Exploitation in Archaeological Sites by Taphonomic Analysis. *Geological Survey of Belgium Professional Papers* 303.1:59.

D'Oronzo, C., G. Colaianni, A.M. Grasso, D. Martella, A. Stellati, and G. Fiorentino
2013 Decoding Wood Exploitation Strategies in Archaeological Sites in South-Eastern Italy. In *Proceedings of 4th International Meeting of Anthracology, Brussels, 8–13 September 2008, Royal Belgian Institute of Natural Sciences,* edited by Freddy Damblon, pp. 51–56. BAR, International Series 2486. British Archaeological Reports, Oxford.

D'Ottavio, F.
2001 La Caratterizzazione Chimica della Selce delle Miniere Preistoriche del Gargano. Proposta di un Metodo Archimetrico Basato Sulle Analisi chimiche Eseguite con la Tecnica Strumentale ICP-AES. *Origini* 23:111–144.

Driesch, A. von den
1976 *Das Vermessen von Tierknochen aus vor- und Frühgeschichtliche Siedlungen*. Institut für Paläoanatomie, Domestikationsforschung und Geschichte der Tiermedizin der Universität München, München.

Drucker, D. G., A. Bridault, K. A. Hobson, E. Szuma, and H. Bocherens
2008 Can Carbon-13 in Large Herbivores Reflect the Canopy Effect in Temperate and Boreal Ecosystems? Evidence from Modern and Ancient Ungulates. *Palaeogeography, Palaeoclimatology, Palaeoecology 266*:69–82.

Drysdale, R. N., J. C. Hellstrom, G. Zanchetta, A. E. Fallick, F. Sanchez Goni, I. Couchoud, J. McDonald, R. Maas, G. Lohmann, and I. Isola
2009 Evidence for Obliquity Forcing of Glacial Termination II. *Science* 325:1527–1531.

Duday, H.
1978 Archéologie Funéraire et Anthropologie: Application des Relevés et de l'Étude Ostéolique á l'Interprétation de Quelques Sepultures Pré- et Protohistoriques du Midi de la France. *Cahiers d'Anthropologie* 1:55–101.

Duday, H.
1998 Le Charnier Gaulois de Ribermont-sur-Ancre (Somme). In *Les Celtes: rites funéraires en Guale du nord entre le VI et le 1 siécle avant Jesus-Christ. Etudes et Documents Fouilles 4*, pp. 113–119. Ministére de la Région Wallone, Namur.

Duday, H.
2006 L'Archéothanatologie ou l'Archéologie de la Mort (Archaeothanatology or the Archaeology of Death). In *Social Archaeology of Funerary Remains*, edited by R. L. Gowland and C. J. Knüsel, and translated by C. J. Knüsel, pp. 30–56. Oxbow Books, Oxford.

Duday, H.
2008 Archeological Proof of an Abrupt Morality Crisis: Simultaneous Deposit of Cadavers, Simultaneous Deaths? In *Palaeomicrobiology: Past Human Infections*, edited by D. Raoult and M. Drancourt, pp. 49–54. Springer, Berlin and Heidelberg.

Duday, H.
2009, 2011 *The Archaeology of the Dead: Lectures in Archaeothanatology*. Oxbow, Oxford.

Duday, H., P. Courtaud, E. Crubézy, P. Sellier, and A.-M. Tillier
1990 L'Anthropologie de "Terrain": Reconnaissance et Interprétation des Gestes Funéraires. *Bulletins et Mémoires de la Société d'Anthropologie de Paris* 2.3–4:26–49.

Duerst, J. U.
1926 *Vergleichende Untersuchungsmethoden am Skelett bei Säugern. Handbuch der Biologischen Arbeitsmethoden*, Abt. 7: Methoden der Vergleichenden Morphologischen Forschung, Heft 2. Urban und Schwarzenberg, Berlin & Wien.

Durante, S., and F. Settepassi
1972 I Molluschi del Giacimento Quaternario della Grotta Madonna, a Praia a Mare (Calabria). *Quaternaria* 16:257–269.

Eade, J., and M. J. Sallnow (editors)
1991 *Contesting the Sacred: The Anthropology of Christian Pilgrimage.* Routledge, London/New York.

Edwards, R. L., J. H. Chen, and G. J. Wasserberg
1986 ^{238}U–^{234}U–^{230}Th–^{232}Th Systematics and the Precise Measurement of Time Over the Past 500,000 Years. *Earth and Planetary Science Letters* 81:175–192.

Elster, E. S.
1976 The Chipped Stone Industry. In *Neolithic Macedonia*, edited by M. Gimbutas, pp. 257–278. Monumenta Archeologica, Vol. 1. Cotsen Institute of Archaeology, UCLA, Los Angeles.

Elster, E. S.
2001 Middle Neolithic to Early Bronze Age Bone Tools from Sitagroi, Greece. In *Crafting Bone: Skeletal Technologies through Time and Space. Proceedings of the 2nd Meeting of the (ICAZ) Worked Bone Research Group, Budapest, 31 August–5 September 1999*, edited by A. M. Choyke and L. Bartosiewicz, pp. 355–369. BAR International Series 937. British Archaeological Reports, Oxford.

Elster, E. S.
2007 Marija Gimbutas: Setting the Agenda. In *Archaeology and Women: Ancient and Modern Issues*, edited by S. Hamilton, R. D. Whitehouse, and K. I. Wright, pp. 83–120. Institute of Archaeology, University College, London.

Elster, E.S., and C. Renfrew
2003 *Prehistoric Sitagroi: Excavation in Northeast Greece, 1968-1970,* Vol. 2: *The Final Report*. Monumenta Archaeologica 20. Cotsen Institute of Archaeology, UCLA, Los Angeles.

Elster E. S., A. Traverso, and E. Isetti
2008 Nuove Evidenze di sStudio dal Sito di Grotta Scaloria (Fg). In *Atti del Convegno XXVIII Preistoria, Protostoria e Storia della Daunia, San Severo*, pp. 111–128.

Emberling, G., J. Robb, J. Speth, and H. Wright
2002 Kunji Cave: Early Bronze Age Burials in Luristan. *Iranica Antiqua* 37:47–104.

Eramo, G., R. Laviano, I. M. Muntoni, and G. Volpe
2004 Late Roman Cooking Pottery from the Tavoliere Area (Southern Italy): Raw Materials and Technological Aspects. *Journal of Cultural Heritage* 5:157–165.

Eramo, G., I. M. Muntoni, G. De Benedetto, and R. Laviano
2009 Provenance of Calcite Tempered "Serra D'Alto" Coarse Ware in South-Eastern Italy: Preliminary Results. In *Micro et Nano Scientiae Mare Magnum, XIV International Clay Conference*, edited by S. Fiore, C. Belviso, and M. L. Giannossi, p. 42. Associazione Italiana per lo Studio delle Argille, Bari.

Ericson, J. E.
1985 Strontium Isotope Characterization in the Study of Prehistoric Human Ecology. *Journal of Human Evolution* 14:503–514.

Eroli, G.
1881 Tracce d'Antichità Preistoriche Presso Orte nella Campagna Romana. *Bullettino di Paletnologia Italiana* 7:45–48.

Ezzo, J. A., and T. D. Price
2002 Migration, Regional Reorganization, and Spatial Group Composition at Grasshopper Pueblo, Arizona. *Journal of Archaeological Science* 29: 99–520.

Ezzo, J. A., C. M. Johnson, and T. D. Price
1997 Analytical Perspective on Prehistoric Migration: A Case Study from East-Central Arizona. *Journal of Archaeological Science* 24:447–466.

Faragó, S.
2002 *Vadászati Állattan* [Zoology for Hunters]. Mezőgazda Kiadó, Budapest.

Fernández, Y., and P. Andrews
2011 When Humans Chew Bones. *Journal of Human Evolution* 60.1:117–123.

Fiorentino, G.
1995 New Perspectives in Anthracological Analysis: Palaeoecological and Technological Implications of Charcoals Found in the Neolithic Flintmine at La Defensola (Vieste, Apulia, Italy). *Quaternaria Nova* 5:99–128.

Fiorentino, G.
1998 L'Exploitation du Milieu par l'Homme du Paleolithique a l'Age du Bronze en Italie Sud-Orientale (Pouilles): Donne Anthracologique et Carpologiques. Unpublished Ph.D. dissertation, Université Montpellier II.

Fiorentino G.
2002 I Più Antichi Agricoltori ed i Processi di Sfruttamento delle Risorse Vegetali. In *La Preistoria della Puglia. Paesaggi, Uomini e Tradizioni di 8.000 Anni fa*, edited by F. Radina, pp. 85–86. Adda, Bari.

Fiorentino G., C. D'Oronzo, M. Primavera, M. Caldara, I. M. Muntoni, and F. Radina
2009 La Ricostruzione delle Variazioni Climatiche tra 5.600 e 4.000 a.C. e le Interazioni tra Uomo e Ambiente nel Corso del Neolitico in Puglia. In *Il Pieno Sviluppo del Neolitico in Italia*, *Atti del Convegno 8–10 Giugno 2009*, edited by A. Manfredini, M. Bernabò Brea, and R. Maggi. *Rivista di Studi Liguri*.

Flannery, K.
1976 *The Early Mesoamerican Village*. Academic Press, New York.

Ford, D.C., and P. W. Williams
1989 *Karst Geomorphology and Hydrology*. Allen and Unwin, London.

Forenbaher, S., and P. T. Miracle
2005 The Spread of Farming in the Eastern Adriatic. *Antiquity* 79:514–528.

Francalacci, P., and S. M. Borgognini Tarli
1988 Multielementary Analysis of Trace Elements and Preliminary Results on Stable Isotopes in Two Italian Prehistoric Sites: Methodological Aspects. In *Trace Elements in Environmental History*, edited by G. Grupe and B. Herrmann, pp. 42–52. Springer-Verlag, Berlin.

Franco, M. C.
1982 *L'Insediamento Preistorico del Lago di Mezzano: Risultati della Campagna di Ricognizione Preliminare Settembre 1973*. Edigraf, Rome.

Gaj, G., and O. Maestro
2002 Manufatti Ossei: Analisi Tecnologica. In *La Maddalena di Chiomonte: 6000 Anni di Storia sulle Alpi Occidentali*, edited by A. Bertone and L. Fozzati, pp. 100–102. Edizioni Nautilus, Turin.

Gál, E.
2010 Faunal Analysis: Bones from Animals of Economic Importance. In *The Chora of Croton 1: The Neolithic Settlement at Capo Alfiere*, edited by J. Robb and J. Morter, pp. 149–166. University of Texas Press, Austin.

Galiberti, A.
2012 La Selce delle Miniere: Caratteristiche Macroscopiche. In *Le Miniere Preistoriche del Gargano (VI-III Millennio a.C.): Alle Origini della Storia Mineraria Europea*, edited by M. Taratini and A. Galiberti, pp. 29–38, figs. 1–3. All'Insegna del Giglio, Florence.

Galiberti, A., S. Sivilli, and M. Tarantini
2001 La Miniera Neolitica delle Defensola (Vieste-Foggia). *Origini: Preistoria e Protostoria delle Civita Antiche* 23:85–110.

Garibaldi, P., E. Isetti, I. Molinari, and G. Rossi
2014 Le Asce in Pietra Levigata del Neolitico nella Penisola Italiana: Collezioni e Nuove Ricerche. In *Atti del Convegno "Il Pieno Sviluppo del Neolitico in Italia," Finale Ligure Borgo, 8–10 giugno 2009*, edited by M. Bernabò Brea, R. Maggi, and A. Manfredini. *Rivista di Studi Liguri 2011–13*, pp. 225–234. Bordighera, Museo Archeologico del Finale.

Gilbert, R.
1980 Preliminary Report on the Skeletal Material Found at Grotta Scaloria, Italy. In *The Heritage of Two Subsistence Strategies: Preliminary Report on the Excavations at Grotta Scaloria, Southeastern Italy, 1978*, edited by S. Winn and D. Shimabuku, pp. 30–32. St. Mary's University, Halifax, Nova Scotia.

Gimbutas, M.
1965 *Bronze Age Cultures in Central and Eastern Europe*. Mouton, The Hague.

Gimbutas, M.
1973 Pre-Hellenic and Pre-Indo-European Goddesses and Gods: The Old European Pantheon. In *Acta of the 2nd International Colloquium on Aegean Prehistory*, pp. 82–98. Ministry of Culture and Sciences, General Directory of Antiquity, Athens.

Gimbutas, M.
1974 *The Goddesses and Gods of Old Europe: 7000–3500 BC*. University of California Press, Berkeley.

Gimbutas, M.
1975 European Neolithic Figurines: What Do They Represent? In *Valcamonica Symposium '72: Les Religions de la Préhistoire*, pp. 117–142. Centro Comuno di Studi Preistorici, Capo di Ponte.

Gimbutas, M.
1981 *Grotta Scaloria: Resoconto sulle Recherché del 1980 Relative Agli Scavi del 1979.* Amministrazione Comunale, Manfredonia.

Gimbutas, M.
1989 *The Language of the Goddess.* Thames and Hudson, London.

Gimbutas, M.
1990 *Il Linguaggio della Dea*. Longanesi, Milan.

Gimbutas, M.
1991 *The Civilization of the Goddess: The World of Old Europe.* Harper and Row, San Francisco.

Giomi, F.
1999 Industria Ossea. In *Il Neolitico nella Caverna delle Arene Candide (scavi 1972–1977)*, edited by Santo Tiné, pp. 257–282. Istituto Internazionale di Studi Liguri, Bordighera.

Godynicki, Sz.
1965 Okreslanie Wysokosci Jeleni na Podstawie Kosci Sródrecza i Sródstopia. *Roczniki Wyższej Szkoły Rolniczej w Poznaniu* 25:39–51.

Gowland, R. L., and A. T. Chamberlain
2005 Detecting Plague: The Palaeodemographic Characterisation of a Catastrophic Death Assemblage. *Antiquity* 79:146–157.

Grainger, I., D. Hawkins, L. Cowal, and R. Mikulski
2008 *The Black Death Cemetery, East Smithfield, London*. Museum of London Archaeology Service

Monograph 43. Museum of London Archaeology Service, London.

Gravina, A.
1988 Caratteri del Neolitico Medio-Finale nella Daunia Centro-Settentrionale. In *Atti 6° Convegno Nazionale sulla Preistoria, Protostoria e Storia della Daunia (14–16 December, 1984)*, edited by B. Mundi and A. Gravina, pp. 22–41. Archeoclub d'Italia, San Severo.

Graziano, R.
2000 The Aptian-Albian of the Apulia Carbonate Platform (Gargano Promontory, Southern Italy): Evidence of Palaeoceanographic and Tectonic Controls on the Stratigraphic Architecture of the Platform Margin. *Cretaceous Research* 21:107–126.

Greenfield, H. J.
1999 The Origins of Metallurgy: Distinguishing Stone from Metal Cut-Marks on Bones from Archaeological Sites. *Journal of Archaeological Science* 26: 797–808.

Grifoni, R.
1967 La Grotta dell'Orso di Sarteano. Il Neolitico. *Origini* 1:53–115.

Grifoni Cremonesi, R.
1996 I Livelli Neolitici. In *La Grotta di Sant'Angelo nella Montagna dei Fiori (Teramo). Le testimonianze dal Neolitico all'Età del Bronzo e il problema delle frequentazioni cultuali in grotta*, edited by T. Di Fraia and R. Grifoni Cremonesi. Istituti Editoriali e Poligrafici Internazionali, Pisa, Rome.

Grifoni Cremonesi, R.
2002 Grotta Continenza. In *Le Ceramiche Impresse nel Neolitico Antico. Italia e Mediterraneo*, edited by F. Delpino, A. Pessina and V. Tiné, p. 534. Istituto Poligrafico e Zecca dello Stato, Rome.

Guidi, A.
1988 *Storia della Paletnologia*. Laterza, Bari.

Gutiérrez-Castorena, M. del C., and W. R. Effland
2010 Pedogenic and Biogenic Siliceous Features. In *Interpretation of Micromorphological Features of Soils and Regoliths*, edited by G. Stoops, V. Marcellino, and M. Florias, pp. 471–496. Elsevier, Amsterdam.

Haglund, W. D.
1992 Contribution of Rodents to Post-Mortem Artifacts of Bone and Soft Tissue. *Journal of Forensic Sciences* 37:1459–1465.

Haglund, W. D., D. T. Reay, and D. R. Swindler
1989 Canid Scavenging/Disarticulation Sequence of Human Remains in the Pacific Northwest. *Journal of Forensic Sciences* 34:587–606.

Hamilton, S., and R. Whitehouse
2006a Phenomenology in Practice: Towards a Methodology for a "Subjective" Approach (with K. Brown, P. Combes, E. Herring, and M. Seager Thomas). *European Journal of Archaeology* 9.1: 31–71.

Hamilton, S., and R. Whitehouse
2006b Three Senses of Dwelling: Beginning to Socialise the Neolithic Ditched Villages of the Tavoliere, Southeast Italy. *Journal of Iberian Archaeology* 8:159–184.

Hamilton, S., R. Whitehouse, and M. Seager Thomas
Forthcoming *Sensual and Social Landscapes of the Prehistory of Northern Puglia, S. Italy.* Accordia Research Institute, London.

Harding, A. F., R. Sumberova, A. K. Outram, and C. Knüsel
2008 *Velim: Violence and Death in Bronze Age Bohemia*. Archeologicky Ustav, Prague.

Hawkins, D.
1990 The Black Death and the New London Cemeteries of 1348. *Antiquity* 64:637–642.

Hedges, R. E. M., J. G. Clement, C. D. L. Thomas, and T. C. O'Connell
2007 Collagen Turnover in the Adult Femoral Midshaft: Modeled from Anthropogenic Radiocarbon Tracer Measurements. *American Journal of Physical Anthropology* 133:808–816.

Hedges, R. E. M., and L. Reynard
2007 Nitrogen Isotopes and the Trophic Level of Humans in Archaeology. *Journal of Archaeological Science* 34:1240–1251.

Hedges, R. E. M., A. Saville, and T. C. O'Connell
2008 Characterizing the Diet of Individuals at the Neolithic Chambered Tomb of Hazleton, North Gloucestershire, England, Using Stable Isotopic Analysis. *Archaeometry* 50:114–128.

Hellstrom, J.
2003 Rapid and Accurate U/Th Dating Using Parallel Ion-Counting Multicollector ICP-MS. *Journal of Analytical Atomic Spectrometry* 18:1346–1351.

Hoefs, J.
1997 *Stable Isotope Geochemistry*. Springer, Berlin.

Horvatinčić, N., I. Krajcar Bronić, and B. Obelić
2003 Differences in the ^{14}C Age, $\delta^{13}C$ and $\delta^{18}O$ of Holocene Tufa and Speleothem in the Dinaric

Karst. *Palaeogeography, Palaeoclimatology, Palaeoecology* 193:139–157.

Isetti, E.
1983 Industria su Osso. In *Passo di Corvo e la civiltà neolitica del Tavoliere*, edited by S. Tiné, pp. 130–132. Sagep, Genoa.

Jacquiot C., Y. Trenard, and D. Dirol
1973 *Atlas d'Anatomie des Bois des Angiospermes*. C.T.B., Paris.

Jarman, M. R., G. N. Bailey, and H. N. Jarman
2009 *Early European Agriculture: Its Foundation and Development*. Reprint (1982). Cambridge University Press, Cambridge.

Jeunesse, C.
1996 Variabilité des Pratiques Funéraires et Différences Sociale dans le Néolithique Ancien Danubien. *Gallia Préhistoire* 38:249–286.

Jones, G. D. B.
1987 *Apulia,* Vol. I: *Neolithic Settlement in the Tavoliere*. Reports of the Research Committee of the Society of Antiquaries of London No. 44. Society of Antiquaries of London, London.

Katzenberg, M. A., and H. R. Krouse
1989 Application of Stable Isotope Variation in Human Tissue to Problems in Identification. *Canadian Society of Forensic Science Journal* 22: 7–19.

Kellehear, A.
2007 *A Social History of Dying*. Cambridge University Press, Cambridge.

Knauft, B.
1989 Body Images in Melanesia: Cultural Substances and Natural Metaphors. In *Fragments for a History of the Human Body*, Vol. III, edited by M. Feher, pp. 192–278. Zone, New York.

Knüsel, C. J.
2005 The Physical Evidence of Warfare—Subtle Stigmata? In *Warfare, Violence, and Slavery,* edited by M. Parker-Pearson and I. J. N. Thorpe, pp. 49–65. BAR International Series 1374. British Archaeological Reports, Oxford.

Knüsel, C. J.
2013 Courteous Knights and Cruel Avengers: A Consideration of the Changing Social Context of Medieval Warfare from the Perspective of Human Remains. In *The Routledge Handbook of the Bioarchaeology of Human Conflict*, edited by C. J. Knüsel and M. Smith. Routledge, London.

Knüsel, C. J., and A. K. Outram
2004 Fragmentation: The Zonation Method Applied to Fragmented Human Remains from Archaeological and Forensic Contexts. *Environmental Archaeology* 9.1:85–97.

Knüsel, C. J., and A. K. Outram
2006 Fragmentation of the Body: Comestibles, Compost, or Customary Rite? *In Social Archaeology of Funerary Remains*, edited by R. Gowland and C. J. Knüsel, pp. 253–278. Oxbow Books, Oxford.

Laplace, G.
1964 Essai de Typologie Systématique. In *Annali dell'Università di Ferrara, Nuovo Seri, Sezione 15, Paleontologia Umana e Paletnologia*, Vol. 1, pp. 1–85. Università di Ferrara, Ferrara.

Laviano, R., and I. M. Muntoni
2006 Provenance and Technology of Apulian Neolithic Pottery. In *Geomaterials in Cultural Heritage*, edited by M. Maggetti and B. Messiga, pp. 49–62. Geological Society, London.

Laville, H.
1976 Deposits in Calcareous Rockshelters: Analytical Methods and Climatic Interpretation. In *Geoarchaeology: Earth Science and the Past*, edited by D. A. Davidson and M. L. Shackley, pp. 137–155. Duckworth, London.

Le Bras-Goude, G., D. Binder, V. Formicola, H. Duday, C. Couture-Veschambre, J.-J. Hublin, and M. Richards
2006 Stratégies de Subsistance et Analyse Culturelle de Populations Néolithiques de Ligurie: Approche par l'Étude Isotopique ($\delta^{13}C$ et $\delta^{15}N$) des Restes Osseux. *Bulletin et Mémoire Société Anthropologique de Paris* 18:45–55.

Le Bras-Goude, G., D. Binder, A. Zemour, and M. P. Richards
2010 New Radiocarbon Dates and Isotope Analysis of Neolithic Human and Animal Bone from the Fontbrégoua Cave (Salernes, Var, France). *Journal of Anthropological Science* 88:167–178.

Lee-Thorp, J. A.
2008 On Isotopes and Old Bones. *Archaeometry* 50: 925–950.

Lehrhaupt, L.
1985 Processional Aspects of Irish Pilgrimage. *Drama Review* 29.3:48–64.

Leighton, R.
1992 Stone Axes and Exchange in South Italy Prehistory: New Evidence from Old Collections. *Journal of the Accordia Research Centre* 3:11–40.

Lelli, R., R. Allen, R. Biondi, M. Calattini, C. Conati Barbaro, M. A. Gorgoglione, A. Manfredini, C. Martínez-Labarga, F. Radina, M. Silvestrini, M. Tozzi, O. Rickard, and O. E. Craig

2012 Examining Dietary Variability of the Earliest Farmers of South-Eastern Italy. *American Journal of Physical Anthropology* 149.3:380–390.

Lemorini, C.

2004 L'Analisi Funzionale dell'Industria Litica in Selce. In M*asseria Candelaro: Vita Quotidiana e Mondo Ideologico in un Villaggio Neolitico sul Tavoliere*, edited by S. Cassano and A. Manfredini, pp. 327–357. Claudio Grenzi Editore, Foggia.

Libanati, S.

2002 Le Ceramiche Dipinte a Bande Bianche nei Villaggi del Tavoliere. In *Omaggio a S. Tiné, Miscellanea di Studi di Archeologia Preistorica e Protostorica*, N.S. 206:57–64. Darficlet, Genoa.

Lightfoot, E., B. Boneva, P. T. Miracle, M. Šlaus, and T. C. O'Connell

2011 Exploring the Mesolithic and Neolithic Transition in Croatia through Isotopic Investigations. *Antiquity* 85:73–86.

Linick, T. W.

1984 La Jolla Natural Radiocarbon Measurements X. *Radiocarbon* 26.1:75–110.

Liston, M. A., and B. J. Baker

1996 Reconstructing the Massacre at Fort William Henry, New York. *International Journal of Osteoarchaeology* 6:28–41.

Lo Porto, F. G.

1964 La Tomba di S. Vito dei Normanni e il "Protoappenninico B" in Puglia. *Bullettino di Paletnologia Italiana* 73:109–142.

Longin, R.

1971 New Method of Collagen Extraction for Radiocarbon Dating. *Nature* 230:241–242.

Luciani, V., M. Cobianchi, and S. Fabbri

2007 The Regional Record of Albian Oceanic Anoxic Events at the Apulian Platform Margin (Gargano Promontory, Southern Italy). *Revue de micropaléontologie* 50:239–251.

Luperto Sinni, E.

1996 Schema Stratigrafico del Cretacico del Gargano Basato sul Risultato di Recent Ricerche. *Memorie della Società Geologica Italiana* 51:1019–1036.

Lyman, R. L.

1994 *Vertebrate Taphonomy*. Cambridge University Press, Cambridge.

Macchia F., V. Cavallaro, L. Forte, and M. Terzi

2000 Vegetazione e Clima della Puglia. *Cahiers Options Méditerranéennes* 53:29–49.

Mafart, B., J.-P. Pelletier, and M. Fixot

2004 Post-Mortem Ablation of the Heart: A Medieval Funerary Practice. A Case Observed at the Cemetery of Ganagobie Priory in the French Department of Alpes de Haute Provence. *International Journal of Osteoarchaeology* 14.1: 67–73.

Mallegni, F., and G. Fornaciari

1980 I Resti Scheletrici Umani del Villaggio Neolitico del centro di Foggia. *Archivio per l'Antropologia e la Etnologia* 110:461–496.

Mallory, J. P.

1989 Lagnano Da Piede I—An Early Neolithic Village in the Tavoliere. *Origini 13:*193–290.

Mannoni, T.

1980 Analisi delle Ceramiche Dipinte Neolitiche di Lipari. In *Meligunìs Lipára IV: L'Acropoli di Lipari nella Preistoria*, edited by L. Bernabò Brea and M. Cavalier, pp. 869–875. Flaccovio Editore, Palermo.

Mannoni, T.

1983 Caratterizzazioni Mineralogico-Petrografiche e Tecniche di Alcune Ceramiche del Tavoliere. In *Passo di Corvo e la Civiltà Neolitica del Tavoliere*, edited by S. Tiné, pp. 94–97. Sagep, Genoa.

Marconi Bovio, J.

1952 Isole Egadi: Esplorazioni archeologiche a Levanzo e Favignana. *Notizie degli Scavi* 185–199.

Marconi Bovio, J.

1979 *La Grotta del Vecchiuzzo*. G. Bretschneider, Rome.

Margerison, B. J., and C. J. Knüsel

2002 A Comparison of Attritional and Catastrophic Cemeteries: The Palaeodemography of the Medieval Plague Cemetery at the Mint Site, London. *American Journal of Physical Anthropology* 119.2:134–143.

Marlar, R. A., B. L. Leonard, B. R. Billman, P. M. Lambert, and J. E. Marlar

2000 Biochemical Evidence of Cannibalism as a Prehistoric Puebloan Site in Southwestern Colorado. *Nature* 407:74–77.

Marler, J., and M. Robbins Dexter (editors)

2009 *Signs of Civilization: Neolithic Symbol System of Southeast Europe.* Serbian Academy of Sciences and Arts, Novi Sad, Serbia.

Masse, J. P., and E. Luperto Sinni
1987 A Platform to Basin Transition Model: The Lower Cretaceous Carbonates of the Gargano Massif (Southern Italy). *Memorie della Società Geologica Italiana* 40:99–108.

Mastronuzzi, G., G. Palmentola, and G. Ricchetti
1989 Aspetti dell'Evoluzione Olocenica della Costa Pugliese. *Memorie della Società Geologica Italiana* 42:287–300.

Mastronuzzi, G., and P. Sansó
2002 Pleistocene Sea Level Changes, Sapping Processes and Development of Valleys Network in Apulia Region (Southern Italy). *Geomorphology* 46: 19–34.

Matolcsi, J.
1970 Historische Erforschung der Körpergrösse des Rindes auf Grund von Ungarischen Knochenmaterial. *Zeitschrift für Tierzüchtung un Züchtungsbiologie* 63:155–194.

Mattiocco, E.
1986 *Centri Fortificati Vestini*. Francesco Falocco, Teramo.

Merbs, C.
1996 Spondylolysis of the Sacrum in Alaskan and Canadian Inuit Skeletons. *American Journal of Physical Anthropology* 101:357–367.

Merla, G., A. Ercoli, and D. Torre
1969 *Note Illustrative alla Carta Geologica D'Italia alla 1:100.000. Foglio 164 Foggia*. Servizio Geologico d'Italia, Rome.

Minagawa, M., and E. Wada
1984 Stepwise Enrichment of ^{15}N along the Food Chain: Further Evidence and the Relation between $\delta^{15}N$ and Animal Age. *Geochimica et Cosmochimica Acta* 48.5:1135.

Miracle, P. T., and S. Forenbaher
2005 The Spread of Farming in the Eastern Adriatic. *Antiquity* 79:514–528.

Miracle, P. T., and L. Pugsley
2006 Vertebrae Faunal Remains from Pupićina Cave. In *Prehistoric Herders of Northern Istria. The Archaeology of Pupićina Cave, Volume 1*, edited by P. T. Miracle and S. Forenbaher, pp. 259–399. Monografije i Katalozi 14, Pula.

Mlekuž, D.
2005 The Ethnography of the Cyclops: Neolithic Pastoralists in the Eastern Adriatic. *Documenta Praehistorica* 32:15–51.

Molleson, T.
1989 Seed Preparation in the Mesolithic: The Osteological Evidence. *Antiquity* 63:356–362.

Molleson, T.
1994 The Eloquent Bones of Abu Hureyra. *Scientific American* 271:70–75.

Montgomery, J.
2010 Passports from the Past: Investigating Human Dispersals Using Strontium Isotope Analysis of Tooth Enamel. *Annals of Human Biology* 37.3: 325–346.

Mosso, A.
1910 La Necropoli Neolitica di Molfetta. *Monumenti Antichi dei Lincei* 20:237–252.

Mota, N. V., H. Duday, and F. Houët
1996 De la Fiabilité des Liaisons Ostéologiques. *Bulletins et Mémoires de la Société d'Anthropologie de Paris* 8:373–384.

Müller-Karpe, H.
1968 *Handbuch der Vorgeschichte*. Band II: *Jungsteinzeit*. Beck, Munich.

Muntoni, I. M., G. Eramo, and R. Laviano
2009 Production of Mid–Late Neolithic "Serra d'Alto" Ware in the Bradanic Trough (South Eastern Italy). In *Vessels: Inside and Outside. Proceedings of the Conference EMAC '07, 9th European Meeting on Ancient Ceramics. Hungarian National Museum, Budapest*, edited by K. T. Biró, V. Szilágyi, and A. Kreiter, pp. 53–62. Hungarian National Museum, Budapest.

Muntoni, I. M., and R. Laviano
2008 Archaeometric Data on Production and Circulation of Neolithic Serra d'Alto Ware in Southern Italy during the Fifth Millennium BC. *ArcheoSciences, Revue d'Archéométrie* 32:125–135.

Mussi, M.
2000 *Earliest Italy: An Overview of the Italian Paleolithic and Mesolithic.* Kluwer Academic/Plenum, New York.

Natali, E.
2004 Favella e la Facies delle Ceramiche Impresse Arcaiche del Sud-Est. In *Atti XXXVII Riunione Scientifica dell'Istituto Italiano di Preistoria e Protostoria. Scalea, Papasidero, Praia a Mare, Tortora 29 Settembre–4 Ottobre 2002*, pp. 397– 409. Istituto Italiano di Preistoria e Protostoria, Florence.

Necrasov, O., and S. Haimovici
1962 Studiul Resturilor de Fauna Neolitica (Cultura Hamangia) Descoperite in Consul Sapaturilor

de la Techirghiol (Étude de la Faune Découverte dans la Station Néolithique de Techighiol). *Materiale și Cercetári Arheologice* 8: 175–185.

Neri, C., and V. Luciani
1994 The Monte S. Angelo Sequence (Late Cretaceous–Paleocene, Gargano Promontory, Southern Italy): Physical Stratigraphy and Biostratigraphy. *Giornale di Geologia* 56:149–165.

Novak, S. A.
2000 Battle-Related Trauma. In *Blood Red Roses: The Archaeology of a Mass Grave from Towton, A.D. 1461*, edited by V. Fiorato, A. Boylston, and C. J. Knüsel, pp. 90–102. Oxbow Books, Oxford.

Novak, S. A., and D. D. Kollman
2000 Peri-Mortem Processing of Human Remains among the Great Basin Fremont. *International Journal of Osteoarchaeology* 10:65–75.

O'Connell, T. C., and R. E. M. Hedges
1999 Investigations into the Effect of Diet on Modern Human Hair Isotopic Values. *American Journal of Physical Anthropology* 108:409–425.

O'Hare, G.
1990 A Preliminary Study of Polished Stone Artefacts in Prehistoric Southern Italy. *Proceedings of the Prehistoric Society* 56:123–152.

Olsen, S. L., and P. Shipman
1994 Cut-Marks and Peri-Mortem Treatment of Skeletal Remains on the Northern Plains. In *Skeletal Biology of the Great Plains: Migration, Warfare, Health, and Subsistence*, edited by D. W. Owsley and R. L. Jantz, pp. 377–387. Smithsonian Institution Press, Washington, DC.

Orschiedt, J., and M. N. Haidle
2006 The LBK Enclosure at Herxheim: Theatre of War or Ritual Centre? References from Osteoarchaeological Investigations. *Journal of Conflict Archaeology* 2.1:153–167.

Outram, A. K.
1999 A Comparison of Palaeoeskimo and Medieval Norse Bone Fat Exploitation in Western Greenland. *Arctic Anthropology* 36:103–117.

Outram, A. K.
2001 A New Approach to Identifying Bone Marrow and Grease Exploitation: Why the Indeterminate Fragments Should Not Be Ignored. *Journal of Archaeological Science* 28:401–410.

Outram, A. K.
2002 Bone Fracture and Within-Bone Nutrients: An Experimentally Based Method for Investigating Levels of Marrow Extraction. In *Consuming Passions and Patterns of Consumption*, edited by P. Miracle and N. Milner, pp. 51–64. McDonald Institute for Archaeological Research, Cambridge.

Outram, A. K., C. J. Knüsel, S. Knight, and A. F. Harding
2005 Understanding Complex Fragmented Assemblages of Human and Animal Remains: A Fully Integrated Approach. *Journal of Archaeological Science* 32.12:1699–1710.

Osono, T.
2007 Ecology of Ligninolytic Fungi Associated with Leaf Litter Decomposition. *Ecological Research* 22:955–974.

Palma di Cesnola, A.
1954 Sulla Industria Campignana di due Stazioni in Comune di Rodi Garganico. *Rivista di Scienze Preistoriche* 9:148–172.

Palma di Cesnola, A.
1959 Contributo alla Conoscenza del Campignano Garganico: Nuove Stazioni di Facies Costiera ad Ovest della Punta di Cucchiara. *Memorie del Museo Civico di Storia Naturale di Verona* 7: 77–97. Verona.

Palma di Cesnola, A.
1967 Il Neolitico Medio e Superiore di San Domino (Arcipelago delle Tremiti). *Rivista di Scienze Preistoriche* 22:349–391.

Palma di Cesnola, A.
1988 Studio Sistematico del Primo Eneolitico del Gargano. 1. Dati e Considerazioni sulla Facies di Macchia a Mare. In *Atti 5° Covegno sulla Preistoria-Protostoria-Storia delle Daunia, San Severo 9–10–11 Dicembre 1983*, p. 85.

Palma di Cesnola, A., and A. Vigliardi
1984 Il Neo-Eneolitico del Promentoro del Gargano, in *La Daunia Antica*: *Dalla Preistoria all'Altomedioevo*, edited by M. Mazzei, pp. 55–74. Electo, Milan.

Papathanasiou, A.
2003 Stable Isotope Analysis in Neolithic Greece and Possible Implications on Human Health. *International Journal of Osteoarchaeology* 13:314–324.

Parker Pearson, M.
1999 *The Archaeology of Death and Burial*. Stroud, Sutton.

Parker Pearson, M., A. Chamberlain, M. Jay, P. Marshall, J. Pollard, C. Richards, J. Thomas, C. Tilley, and K. Welham
2009 Who Was Buried at Stonehenge? *Antiquity* 83: 23–39.

Pedley, H. M.
2000 The Karstic Origin of Solution Subsidence Structures in Western Gozo, Maltese Islands. In *Atti del I Seminario di Studi su Il Carsismo Negli Iblei e nell'Area Sud Mediterranea. Erimo della Giubiliana, Ragusa 1999*, pp. 225–230. Speleologica Iblea 8. Centro Ibleo di Ricerche Speleo-Idrogeologiche.

Pentecost, A., and Z. Zhaohui
2001 The Distribution of Plants in Scoska Cave, North Yorkshire, and Their Relationship to Light Intensity. *International Journal of Speleology* 30.1:27–37.

Perkins, D., and P. Daly
1968 A Hunters' Village in Neolithic Turkey. *Scientific American* 219.5:97–106.

Peroni, R.
1967 *Archeologia della Puglia Preistorica*. De Luca, Rome.

Pessina, A., and A. Salerno
2004 Le Asce in Pietra Levigata della Calabria nelle Collezioni del Museo Pigorini. *Riunione Scientifica dell'Istituto Italiano di Preistoria e Protostoria* 37:765–771.

Pétrequin, P., A. M. Pétrequin, M. Errera, S. Cassen, C. Croutsch, L. Kassen, M. Rossy, P. Garibaldi, E. Isetti, G. Rossi, and D. Delcaro
2005 Beigua, Monviso e Valais. All'Origine delle Grandi Asce Levigate di Origine Alpina in Europa Occidentale durante il V Millennio. *Rivista di Scienze Preistoriche* 55:265–322.

Pétrequin, P., A. M. Pétrequin, M. Errera, S. Cassen, C. Croutsch, L. Kassen, M. Rossy, P. Garibaldi, E. Isetti, G. Rossi, and D. Delcaro
2006 Produzione e Circolazione delle Asce in Rocce Alpine nel Neolitico dell'Europa Occidentale. Verso un Approccio Pluridisciplinare. *Riunione Scientifica dell'Istituto Italiano di Preistoria e Protostoria* 39:629–639.

Petrucci, G.
1997 Resti di Fauna dai Livelli Neolitici e Post–Neolitici della Grotta del Mitreo nel Carso di Trieste (Scavi 1967). *Atti della Società per la Preistoria e Protoistoria della Regione Friuli–Venezia Giulia* 10:99–118.

Piel-Desruisseaux, J. L.
1998 *Outils Préhistoriques. Du Galet Taillé au Bistouri d'Obsidienne*. Dunod, Paris.

Pigorini, L.
1876 Nuove Scoperte Preistoriche nelle Province Napoletane. *Bullettino di Paletnologia Italiana* 2: 225–230.

Pigorini, L.
1883 Notizie Diverse. Mt. S. Giuliano (TP). *Bullettino di Paletnologia Italiana* 9:29.32.

Pitti, C., and C. Tozzi
1976 Gli Scavi nel Villaggio Neolitico di Catignano (Pescara). Nota Preliminare. *Rivista Scienze Preistoriche* 31:87–107.

Pitts, M., A. Bayliss, J. McKinley, A. Boylston, P. Budd, J. Evans, C. Chenery, A. Reynolds, and S. Semple
2002 An Anglo-Saxon Decapitation and Burial at Stonehenge. *Wiltshire Archaeological and Natural History Magazine* 95:131–146.

Pollard, A. M.
2011 Isotopes and Impact: A Cautionary Tale. *Antiquity* 85:631–638.

Price, T. D., R. A. Bentley, D. Gronenborn, J. Lüning, and J. Wahl
2001 Human Migration in the Linearbandkeramik of Central Europe. *Antiquity* 75:593–603.

Price, T. D., G. Grupe, and P. Schröter
1998 Migration in the Bell Breaker Period of Central Europe. *Antiquity* 72:405–411.

Privat, K. L., T. C. O'Connell, K. Neal, and R. E. M. Hedges
2005 Fermented Dairy Product Analysis and Palaeodietary Repercussions: Is Stable Isotope Analysis Not Cheesy Enough? In *The Archaeology of Animal Fats, Oils and Dairying*, edited by J. Mulville and A. Outram, pp. 60–66. Oxbow Books, Oxford.

Puglisi, S.
1955 Industria Microlitica nei Livelli a Ceramica Impressa di Coppa Nevigata. *Rivista di Scienze Preistoriche* 10:19–37.

Puglisi, S.
1959 *La "Civiltà Appenninica": Origine delle Communit`a Pastorali in Italia*. Sansoni, Florence.

Quagliati, Q.
1896 Appunti sulle Scoperte Paletnologiche di Domenico Ridola nel Materano. *Bullettino di Paletnologia Italiana* 22:282–290.

Quagliati, Q.
1936a L'Eneolitico di Manfredonia nella Grotta di "Occhiopinto." In *La Puglia Preistorica*, R. Deputazione di Storia Patria per le Puglie: Documenti e Monografie Vol. 20, pp. 145–153. Vecchi, Trani.

Quagliati, Q.
1936b *La Puglia Preistorica*. Vecchi, Trani.

Radi, G., G. Boschian, L. Calani, A. R. Pistoia, and B. Zamagni
2001 Nuovi Dati dal Villaggio a Ceramica Impressa di Colle S. Stefano (Ortucchio). In *Il Fucino e le Aree Limitrofe nell'Antichità. Atti del II Convegno di Archeologia in Ricordo di Antonio Maria Radmilli e Giuliano Cremonesi, Museo di Preistoria, Celano-Paludi, 26/28 Novembre 1999*, edited by G. Grossi, U. Irti, and C. Malandra, pp. 70–81. Archeoclub d'Italia-Sezione della Marsica, Avezzano.

Radina, F.
2002 Pulo di Molfetta. In *Le Ceramiche Impresse nel Neolitico Antico. Italia e Mediterraneo*, edited by M. A. Fugazzola Delpino, A. Pessina, and V. Tiné, pp. 615–626. Istituto Poligrafico e Zecca della Stato, Rome.

Radina, F., and A. Ronchitelli
2001 Grotta S. Croce. In *Le Ceramiche Impresse nel Neolitico Antico: Italia e Mediterraneo*, edited by M. A. Fugazzola Delpino, A. Pessina, and V. Tiné, pp. 601–613. Istituto Poligrafico e Zecca della Stato, Rome.

Radmilli, A. M.
1953 Notiziario. *Bullettino di Paletnologia Italiana* 7.5: 43.

Radmilli, A. M.
1972 Die Neolithisierung Italians. In *Die Anfänge des Neolithikums vom Orient bis Nordeuropa*, Vol. 7, edited by J. Schwabedissen, pp. 128–165. Böhlau, Cologne.

Radmilli, A. M.
1977 *Storia dell'Abruzzo dalle Origini all'Età del Bronzo*. Giardini Editori, Pisa.

Railsback, L. B., G. A. Brook, J. Chen, R. Kalin, and C. J. Fleisher
1994 Environmental Controls on the Petrology of a Late Holocene Speleothem from Botswana with Annual Layers of Aragonite and Calcite. *Journal of Sedimentary Research* 64.1:147–155.

Recchia, G.
1993 Grotta Manaccora (Peschici), Considerazioni sulla Grotticella Funeraria e sull'Area Antistante (Scavi Rellini-Baumgärtel). *Origini* 17:317–401.

Reichs, K.
1998 Postmortem Dismemberment: Recovery, Analysis and Interpretation. In *Forensic Osteology: Advances in the Identification of Human Remains*, 2nd edition, edited by K. Reichs, pp. 353–388. Charles C. Thomas, Springfield, Illinois.

Rellini, U.
1923 La Grotta delle Felci a Capri. *Monumenti Antichi dei Lincei* 29:305–406.

Rellini, U.
1934 *La Più Antica Ceramica Dipinta in Italia*. Collezione Meridionale Editrice, Rome.

Richards, M. P., T. D. Price, and E. Koch
2003a Mesolithic and Neolithic Subsistence in Denmark: New Stable Isotope Data. *Current Anthropology* 44:288–295.

Richards, M. P., R. J. Schulting, and R. E. M. Hedges
2003b Sharp Shift in Diet at Onset of Neolithic. *Nature* 425:366.

Ridola, D.
1924 Le Grandi Trincee Preistoriche di Matera, I. *Bullettino di Paletnologia Italiana* 44:97–122.

Ridola, D.
1925 Le Grandi Trincee Preistoriche di Matera, II. *Bullettino di Paletnologia Italiana* 45:85–98.

Ridola, D.
1926 Le Grandi Trincee Preistoriche di Matera, III. *Bullettino di Paletnologia Italiana* 46:135–174.

Robb, J.
1991a Neolithic Skeletal Remains from the Grotta Scaloria: The 1979 Excavations. *Rivista di Antropologia* 69:111–124.

Robb, J.
1991b New Human Remains from the Southern Italian Neolithic: Ripa Tetta and Latronico. *Rivista di Antropologia* 69:125–144.

Robb, J.
1994a Burial and Social Reproduction in the Peninsular Italian Neolithic. *Journal of Mediterranean Archaeology* 7:27–71.

Robb, J.
1994b Gender Contradictions, Moral Coalitions, and Inequality in Prehistoric Italy. *Journal of European Archaeology* 2.1: 20–49.

Robb, J.
1994c The Neolithic of Peninsular Italy: Anthropological Synthesis and Critique. *Bullettino di Paletnologia Italiana* 85:189–214.

Robb, J.
1994d Skeletal Signs of Activity in the Italian Metal Ages: Methodological and Interpretative Notes. *Human Evolution* 9-N.3: 215–229.

Robb, J.
1997 Intentional Tooth Removal in Neolithic Italian Women. *Antiquity* 72.273:658–669.

Robb, J.
1998a The Archaeology of Symbols. *Annual Review of Anthropology* 27:329–346

Robb, J.
1998b The Interpretation of Skeletal Muscle Sites: A Statistical Approach. *International Journal of Osteoarchaeology* 8:363–377.

Robb, J.
1999a Great Persons and Big Men in the Italian Neolithic. In *Social Dynamics of the Prehistoric Central Mediterranean*, edited by R. H. Tykot, J. Morter, and J. E. Robb, 111–121. Accordia Specialist Studies on the Mediterranean, Vol. 3. Accordia Research Institute, University of London, London.

Robb, J.
1999b Secret Agents: Culture, Economy, and Social Reproduction. In *Material Symbols: Culture and Economy in Prehistory*, edited by J. Robb, pp. 3–15. Center for Archeological Investigations, Southern Illinois University Press, Carbondale.

Robb, J.
2001 Social "Status" and Biological "Status": A Comparison of Grave Goods and Skeletal Indicators from Pontecagnano. *American Journal of Physical Anthropology* 115:213–222.

Robb, J.
2002 Time and Biography. In *Thinking through the Body: Archaeologies of Corporeality*, edited by Y. Hamilakis, M. Pluciennik, and S. Tarlow, pp. 145–163. Kluwer/Academic, London.

Robb, J.
2007a Burial Treatment as Transformations of Bodily Ideology. In *Performing Burial*, edited by N. Laneri, pp. 287–298. Oriental Institute, University of Chicago, Chicago.

Robb, J.
2007b *The Early Mediterranian Village: Agency, Material Culture, and Social Change in Neolithic Italy.* Cambridge University Press, Cambridge.

Robb, J.
2013 Creating Death: An Archaeology of Dying. In *The Oxford Handbook of the Archaeology of Death*, Vol. 20, edited by L. Nilsson Stutz and S. Tarlow, pp. 441–458. Oxford University Press, Oxford.

Robb, J., and R. H. Farr
2005 Substances in Motion: Neolithic Mediterranean "Trade". In *The Archaeology of Mediterranean Prehistory*, edited by E. Blake and A. B. Knapp, pp. 24–45. Blackwell, Malden, Massachusetts.

Robb, J., F. Mallegni, and D. Ronco
1991 New Skeletal Material from the Southern Italian Neolithic. *Rivista di Antropologia* 69:125–144.

Robbins Dexter, M.
2010 The Danube Script and the Old European Goddess: The Intersection of Language, Archaeology, and Religion. *Journal of Archaeomythology* 6: 41–50.

Robbins Dexter, M.
2014 Further Thoughts on the V and the M in the Danube Script: The Danube Script and the Old European Goddess. In *Fifty Years of Tartaria Excavations. Festschrift in Honor of Gheorghe Lazarovici on the Occasion of His 73rd Birthday*, edited by J. Marler, pp. 139–161. Institute of Archaeomythology, Sebastopol; Universitatea "Eftimie Murgu," Reşiţa, Romania.

Rogers, T.
2004 Recognizing Inter-Personal Violence: A Forensic Perspective. In *Violent Interactions in the Mesolithic: Evidence and Meaning*, edited by M. Roksandic, pp. 9–21. BAR International Series 1237. British Archaeological Reports, Oxford.

Ronchitelli, A.
1983 L'Industria Litica dell'Area B. In *Passo di Corvo e la Civilta Neolitica del Tavoliere*, edited by Santo Tiné, pp. 101–122. Sagep Editrice, Genoa.

Rossi, G.
1983 Altre Industrie su Pietra. In *Passo di Corvo e la Civilta Neolitica del Tavoliere*, edited by S. Tiné, pp. 124–129. Sagep, Genoa.

Russell, M. D.
1987a Mortuary Practices at the Krapina Neandertal Site. *American Journal of Physical Anthropology* 72:381–397.

Russell, M. D.
1987b Bone Breakage in the Krapina Hominid Collection. *American Journal of Physical Anthropology* 72:373–379.

Russell, N.
1990 The Bone Tools. In *Selevac: A Neolithic Village in Yugoslavia*, edited by R. Tringham and D. Krstić, pp. 521–548. Monumenta Archaeologica 15. Cotsen Institute of Archaeology, UCLA, Los Angeles.

Salvadei, L., and E. Santandrea
2003 Condizioni di Vita e Stato di Salute nel Campione Neolitico di Masseria Candelaro (Fg). *Atti, Riunione Scientifica dell'I.I.P.P.* 35:829–834.

Scattarella, V.
1977 *La Comunità Neolitica di Cala Colombo Presso Torre a Mare (Bari)*. Società di Storia Patria per la Puglia 42. Bari.

Schoeninger, M. J., and M. J. DeNiro
1984 Nitrogen and Carbon Isotopic Composition of Bone Collagen from Marine and Terrestrial Animals. *Geochimica et Cosmochimica Acta* 48: 625–639.

Schoeninger, M. J., M. J. De Niro, and H. Tauber
1983 Stable Nitrogen Isotope Ratios of Bone Collagen Reflect Marine and Terrestrial Components of Prehistoric Human Diet. *Science* 220:1381–1383.

Schramm, Z.
1967 Kosci Dlugie a Wysokosc w Klebie u Kozy. *Roczniki Wyższej Szkoły Rolniczej w Poznaniu* 36: 89–105.

Schulting, R. J.
1998 Slighting the Sea: Stable Isotope Evidence for the Transition to Farming in Northwestern Europe. *Documenta Praehistorica* 25:203–218.

Schulting, R. J., and M. P. Richards
2002 The Wet, the Wild and the Domesticated: The Mesolithic–Neolithic Transition on the West Coast of Scotland. *Journal of European Archaeology* 5:147–189.

Schweingruber, F. H.
1978 *Mikroskopische Holzanatomie*. Swiss Federal Institute for Research, Birmensdorf, Zurich.

Schweingruber, F. H.
1990 *Anatomie Europäischer Hölzer*. Verlag Paul Haupt, Bern and Stuttgart.

Scott, A. C., J. A. Cripps, M. E. Collinson, and G. J. Nichols
2000 The Taphonomy of Charcoal Following a Recent Heathland Fire and Some Implications for the Interpretation of Fossil Charcoal Deposits. *Palaeogeography, Palaeoclimatology, Palaeoecology* 164:1–31.

Scott, D. D., P. Willey, and M. A. Connor
2002 *They Died with Custer: Soldiers' Bones from the Battle of Little Bighorn*. University of Oklahoma Press, Norman.

Semenov, S. A.
1964 *Prehistoric Technology*. Adams & Dart, London.

Shepard, A.
1968 *Ceramics for the Archaeologist*. Carnegie Institute, Washington, DC.

Skeates, R.
1994 A Radiocarbon Date-List for Prehistoric Italy (c. 46,400 BP–2450 BP/400 cal. BC). In *Radiocarbon Dating and Italian Prehistory*, edited by R. Skeates and R. Whitehouse, pp. 147–288. Archaeological Monographs of the British School at Rome, Vol. 8. British School at Rome, London.

Skeates, R.
2007 Religious Experience in the Prehistoric Maltese Underworld. In *Cult in Context: Reconsidering Ritual in Archaeology*, edited by D. A. Barrowclough and C. Malone, pp. 91–95. Oxbow, Oxford.

Skeates, R.
2010 *An Archaeology of the Senses: Prehistoric Malta*. Oxford University Press, Oxford.

Skeates, R., and R. D. Whitehouse
1994 Introduction. In *Radiocarbon Dating and Italian Prehistory,* edited by Robin Skeates and Ruth Whitehouse, pp. ix–x. Accordia Specialist Studies on Italy, Vol. 3. London: Accordia Research Centre, University of London, London.

Smith, M. J., and M. B. Brickley
2009 *People of the Long Barrows: Life, Death and Burial in the Earlier Neolithic*. History Press, Stroud, Gloucestershire.

Spalluto, L., P. Pieri, and G. Ricchetti
2005 Le Facies Carbonatiche di Piattaforma Interna del Promontorio del Gargano: Implicazioni Paleoambientali e Correlazioni con la Coeva Successione delle Murge (Italia Meridionale, Puglia). *Bollettino della Società Geologica Italiana* 124:675–690.

Spataro, M.
2002 *The First Farming Communities of the Adriatic: Pottery Production and Circulation in the Early and Middle Neolithic.* Società per la Prehistoria e Protostoria della Regione Friuli-Venezia Giulia, Quaderno 9. Edizioni Svevo, Trieste.

Stacul, G.
1972 Il Castelliere C. Marchesetti presso Slivia, nel carso triestino. *Rivista di Scienze Preistoriche* 27.1: 145–172.

Stoops, G.
2003 *Guidelines for Analysis and Description of Soil and Regolith Thin Section*. Soil Science Society of America, Inc., Madison, Wisconsin.

Striccoli, R.
1982 Il Complessi Ergologico e Oggetti Vari di Grotta Pacelli (Bari). Scavi 1977–78. In *Atti 2nd Con-*

vegno sulla Preistoria, Protostoria, Storia della Daunia, San Severo, 28–30 Novembre, 1980, pp. 83–114. Archeoclub d'Italia, San Severo.

Striccoli, R.
1988 *Le Culture Preistoriche di Grotta Pacelli (Castellana Grotta, BA), Brindisi*. Schena Editore, Fasano.

Stuart-Macadam, P.
1989 Nutritional Deficiency Diseases. In *Reconstruction of Life from the Skeleton*, edited by K. Kennedy and M. Iscan, pp. 201–222. New York: Liss.

Taboroši, D., K. Hirakawa, and T. Sawagaki
2005 Carbonate Precipitation along a Microclimatic Gradient in a Thailand Cave: Continuum of Calcareous Tufa and Speleothems. *Journal of Cave and Karst Studies* 67:69–87.

Tafuri, M. A., O. E. Craig, and A. Canci
2009 Stable Isotope Evidence for the Consumption of Millet in Bronze Age Italy. *American Journal of Physical Anthropology* 139:146–153.

Tafuri, M. A., P. Fullagar, T. C. O'Connell, P. Iacumin, G. Belcastro, R. Sanseverino, and J. Robb
Forthcoming Mobility and Social Landscapes in Neolithic Southeastern Italy: Evidence from Strontium Isotope Ratio. *Journal of Archaeological Science*.

Tafuri, M. A., J. Robb, M. G. Belcastro, V. Variotti, P. Iacumin, A. Di Matteo, and T. O'Connell
2014 Herding Practices in the Ditched Villages of the Neolithic Tavoliere (Apulia, South-east Italy): A Vicious Circle? The Isotopic Evidence. In *Early Farmers: The View from Archaeology and Science*, edited by A. Whittle and P. Bickle, pp. 143–158. Proceedings of the British Academy, 198. Oxford University Press, Oxford.

Tafuri, M. A., T. O'Connell, F. Bartoli, M. Giovanna Belcastro, P. F. Fabbri, N. Lonoce, P. Iacumin, E. Ingravallo, V. Mariotti, S. Minozzi, R. Sanseverino, S. Sublimi Saponetti, V. Scattarella, and J. Robb
Forthcoming Evidenze Isotopiche e Paleodieta nel Neolitico Pugliese. Verso la Globalizzazione? In *Atti della XLVII Riunione Scientifica dell'Istituto Italiano di Preistoria e Protostoria*.

Tagliacozzo, A.
1994 I Dati Archeozoologici: Economia di Allevamento e Caccia a Broglio di Trebisacce. In *Enotri e Micenei nella Sibaritide,* edited by R. Peroni and F. Trucco, pp. 587–652. Istituto per la Storia e l'Archeologia della Magna Grecia, Taranto.

Tagliacozzo, A.
2005–2006 Animal Exploitation in the Early Neolithic in Central-Southern Italy. *Munibe (Antropologia-Arkeologia)* 57:429–439.

Talalay, L.
2005 The Gendered Sea: Iconography, Gender, and Mediterranean Prehistory. In *The Archaeology of Mediterranean Prehistory*, edited by E. Blake and A. B. Knapp, pp. 130–155. Blackwell Publishing, Oxford.

Tanda, G.
1980 Gli Anelloni Litici Italiani. *Preistoria Alpina* 13: 111–155.

Tarantini, M.
1999–2000 *Distribuzione dei Manufatti Campignani nell'Italia Continentale. Tesina svolta per l'esame di Paletnologia della Scuola di Specializzazione in Archeologia*, Università degli Studi di Siena, anno accademico 1999–2000.

Tarantini, M., and A. Galiberti (editors)
2012 *Le Miniere di Selce del Gargano, VI–III millennio a.C.: Alle Origini della Storia Mineraria Europea*. All'Insegna del Giglio, Florence.

Tarantini, M., A. Galiberti, and F. Mazzarocchi
2011 Prehistoric Flint Mines of the Gargano: An Overview. In *Proceedings of the 2nd International Conference of the UISPP Commission on Flint Mining in Pre and Protohistoric Times (Madrid, 14–17 October 2009)*, edited by M. Capote, S. Consuegra, P. Diaz-del-Rio, and X. Terradas, pp. 253–263. BAR International Series 2260. British Archaeological Reports, Oxford.

Tauber, H.
1981 ^{13}C Evidence for Dietary Habits of Prehistoric Man in Denmark. *Nature* 292:332–335.

Teichert, M.
1969 Osteologische Unterschungen zur Berechnung der Widerristhöhe bei vor- und frühgeschichtlichen Schweinen. *Kühn Archiv* 83.3:237–292.

Teichert, M.
1975 Osteologische Unterschungen zur Berechnung der Widerristhöhe bei Schafen. In *Archeological Studies*, edited by A.T. Clason, pp. 51–69. North Holland and American Elsevier, Amsterdam/ New York.

Teschler-Nicola, M., F. Gerold, M. Bujatti-Narbeshuber, T. Prohaska, Ch. Latkoczy, G. Stingeder, and M. Watkins
1999 Evidence of Genocide 7000 BP—Neolithic Paradigm and Geo-Climatic Reality. *Collegium Antropologicum* 23:437–450.

Thomas, K.
Forthcoming Terrestrial Molluscs from Cava Petrilli. In *Sensual and Social Landscapes of the Prehistory of Northern Puglia, S. Italy*, edited by S. Hamilton, R. Whitehouse, and M. Seager Thomas. Accordia Research Institute, London.

Tilley, C.
1993 Art, Architecture, Landscape (Neolithic Sweden). In *Landscape: Politics and Perspectives*, edited by B. Bender, pp. 49–84. Berg, Oxford.

Tilley, C.
1994 *A Phenomenology of Landscape*. Berg, Oxford.

Tiné, S.
1964 La Grotta di S. Angelo III a Cassano Ionio. *Atti e Memorie della Società di Magna Grecia* 5:11–54.

Tiné, S.
1967a Alcuni dati circa il sistema di raccolta idrica nei villaggi neolitici del Foggiano. In *Atti XI–XII Riunione Scientifica dell'Istituto Italiano di Preistoria e Protostoria.*

Tiné, S.
1967b Lo Scavo di una Capanna nel Villaggio Neolitico di Passo di Corvo. In *Atti XI–XII Riunone Scientifica dell'Istituto Italiano di Preistoria e Protostoria,* 169.

Tiné, S.
1971a Lo Stile del Kronio in Sicilia, lo Stile Ghar Dalam a Malta e la Successione del Neolitico nelle due Isole. *Riunione Scientifica dell'Istituto Italiano di Preistoria e Protostoria* 13:75–88.

Tiné, S.
1971b La Grotta Scaloria Presso Manfredonia. *Fasti Archeologici* 20:175.

Tiné, S.
1975a Un Culto Neolitico delle Acque nella Grotta Scaloria. In *Valcamonica Symposium '72: Les Religions de la Préhistoire*, edited by E. Anati, 185–190. Centro Comuno di Studi Preistorici, Capo di Ponte.

Tiné, S.
1975b La Civiltà Neolitica del Tavoliere. In *Atti del Colloquio Internazionale di Preistoria e Protostoria della Daunia (Foggia, 24–29 Aprile 1973)*, pp. 99–111. Istituto Italiano di Preistoria e Protostoria, Florence.

Tiné, S.
1983 *Passo di Corvo e la Civilta Neolitica del Tavoliere*. Sagep Editice, Genoa.

Tiné, S.
1987 Considerazioni sul Neolitico della Puglia. In *Atti XXVI Riunione Scientifica dell'Istituto Italiano di Preistoria e Protostoria* I:121–331. Florence.

Tiné, S., and M. Bernabò Brea
1978 Il Villaggio Neolitico del Guadone di S. Severo (Foggia). *Rivista di Scienze Preistoriche* 35.1–2: 45–74.

Tiné, S., and E. Isetti
1975–1980 Culto Neolitico delle Acque e Recenti Scavi nella Grotta Scaloria. *Bullettino di Paletnologia Italiana* 82:31–70.

Tiné, S., and E. Isetti
1980 Recenti Scavi nella Grotta Scaloria. In *Atti Convegno Archaeologico Civiltà e Culture Antiche tra Gargano e Tavoliere*, pp. 77–96. Lacaita, Quaderni del Sud, Manduria, Taranto.

Tiné, S., and E. Isetti
1982 Recenti Scavi nella Grotta Scaloria. In *Atti Convegno Archaeologico Convento de S. Matteo 28–29 Settembre 1979, Quaderni del Sud, NS Saggi 1, San Marco in Lamis, Civiltà e Culture Antiche tra Gargano e Tavoliere*, pp. 125–128. Lacaita, Quaderni del Sud, Manduria, Taranto.

Toussaint, M.
2011 Intentional Cutmarks on an Early Mesolithic Human Calvaria from Margaux Cave (Dinant, Belgium). *American Journal of Physical Anthropology* 144:100–107.

Tozzi, C., and D. Bagnone
2003 L'Industria Litica Scheggiata. In *Gli Scavi nel Villagio Neolitico di Catignano (1971–1980)*, edited by C. Tozzi and B. Zamagni, pp. 145–174. Istituto Italiano di Preistoria e Protoistoria, Florence.

Tozzi, C., and B. Zamagni
1999 La Ceramic dipinta: La Cultura di Catignano-Scaloria Bassa; la Cerchia della Cultura di Ripoli. In *Criteri di nomenclatura e di terminologia inerente alla definizione delle forme vascolari del Neolitico/Eneolitico e del Bronzo/Ferro*, vol. 1, *Atti Congress di Lido di Camaiore, 26–29 marzo 1998*, edited by D. Cocchi Genick, pp. 97–107.

Tozzi, C., and B. Zamagni (editors)
2003 *Gli Scavi nel Villagio Neolitico di Catignano (1971–1980).* Istituto Italiano di Preistoria e Protoistoria, Florence.

Traverso, A.
2000 La Liguria e l'Area Altotirrenica durante il Neolitico Antico. Proposte per un'Articolazione

Cronotipologica del Materiale Fittile. *Rivista di Studi Liguri* 66:23–66.

Traversone, B.
1999 Le Parures. In *Il Neolitico nella Caverna delle Arene Candide (Scavi 1972–1977)*, edited by Santo Tiné, pp. 283–298. Istituto Internazionale di Studi Liguri, Bordighera.

Trigger, B. G.
1969 *The Huron: Farmers of the North*. Holt, Rinehart and Winston, New York.

Trigger, B. G.
1976 *The Children of Aataentsic: A History of the Huron People to 1660*. McGill-Queen's University Press, Montreal.

Tringham, R.
1988 The Flaked Stone Industry from Divostin and Banja. In *Divostin and the Neolithic of Central Serbia*, edited by A. McPherron and D. Srejovic, pp. 203–254. Department of Anthropology, University of Pittsburgh, Pittsburgh.

Tringham, R.
2003 Flaked Stone. In *Prehistoric Sitagroi: Excavations in Northeast Greece, 1968–1970*. Vol. 2: *The Final Report*, edited by E. S. Elster and C. Renfrew, pp. 81–126. Monumenta Archaeologica 20. Cotsen Institute of Archaeology, UCLA, Los Angeles.

Trinkaus, E.
1975 Squatting among the Neanderthals: A Problem in the Behavioural Interpretation of Skeletal Morphology. *Journal of Archaeological Science* 2:327–351.

Tropeano, M., L. Sabato, and P. Pieri
2003 Filling and Cannibalization of a Foredeep: The Bradanic Trough, Southern Italy. In *Sediment Flux to Basins: Causes, Controls and Consequences*, edited by S. J. Jones and L. E. Frostick, pp. 55–79. Geological Society, London.

Tsaliki, A.
2008 Unusual Burials and Necrophobia: An Insight into the Burial Archaeology of Fear. In *Deviant Burial in the Archaeological Record*, edited by E. Murphy, pp. 1–16. Oxbow Books, Oxford.

Tunzi Sisto, A. M.
1999 *Ipogei della Daunia: Preistoria di un Territorio*. Claudio Grenzi Editore, Foggia.

Türkan, A. U.
2014 Çatalhöyük Stamp Seals from 2000–2008. In *Substantive Technologies at Çatalhöyük: Reports from the 2000–2008 Seasons*, edited by I. Hodder, pp. 235–246. Çatalhöyük Research Project, Vol. 9. British Institute Ankara Monograph 48. Monumenta Archaeologica 31. Cotsen Institute of Archaeology Press, UCLA, Los Angeles.

Turner, V.
1967 *The Forest of Symbols: Aspects of Ndembu Ritual*. Cornell University Press, Ithaca/London.

Turner, V.
1969 *The Ritual Process: Structure and Anti-Structure*. Aldine Publishing, Chicago.

Tyrrell, A.
2000 Skeletal Non-metric Traits and the Assessment of Inter- and Intra-population Diversity: Past Problems and Future Potential. In *Human Osteology in Archaeological and Forensic Science*, edited by M. Cox and S. Mays, 289–306. Greenwich Medical Media, London.

Ubelaker, D. H.
1974 *Reconstruction of Demographic Profiles from Ossuary Skeletal Samples: A Case Study from the Tidewater Potomac*. Smithsonian Contributions to Anthropology 18. Smithsonian Institution Press, Washington, DC.

Ubelaker, D. H.
1979 Skeletal Evidence for Kneeling in Prehistoric Ecuador. *American Journal of Physical Anthropology* 51:679–686.

Uerpmann, H.-P.
1973 Animal Bone Finds and Economic Archaeology: A Critical Study of "Osteo-Archaeological" Method. *World Archaeology* 4.3:307–322.

Valimote, S.
2007 Food across Borders: A Consideration of the Neolithic and Bronze Age Archaeobotanical Evidence from Northern Greece. In *Between the Aegean and Baltic Seas: Prehistory across Borders. Proceedings of the International Conference. Bronze and Early Iron Age Interconnections and Contemporary Developments between the Aegean and the Regions of the Balkan Peninsula, Central and Northern Europe*. University of Zagreb, April 11–14, 2005.

Van Gennep, A.
1960 *The Rites of Passage*. University of Chicago Press, Chicago.

Van Klinken, G. J.
1999 Bone Collagen Quality Indicators for Palaeodietary and Radiocarbon Measurements. *Journal of Archaeological Science* 26:687–695.

Vegas, J. I. (editor)
2007 *San Juan Ante Portam Latinam: Una Inhumación Colectiva Prehistórica en el Valle Medio*

del Ebro (Memoria de las Excavaciones Arqueológicas 1985, 1990 y 1991). Fundación José Miguel de Barandiarán, Vitoria.

Vegas, J. I., Á. Armendariz, F. Etxeberria, M. Soledad-Fenández, and L. Herrasti
2012 Prehistoric Violence in Northern Spain: San Juan Ante Protam Latinam. In *Sticks, Stones and Broken Bones: Violence in a European Perspective*, edited by R. Schulting and L. Fibiger, pp. 265–302. Oxford University Press, Oxford.

Verano, J. W.
1986 A Mass Burial of Mutilated Individuals at Pacatnamu. In *The Pacatnamu Papers*, Vol. 1, edited by C. B. Donnan and J. A. Cook, pp. 117–138. University of California Los Angeles, Museum of Cultural History, Los Angeles.

Verano, J. W.
2001 The Physical Evidence of Human Sacrifice in Ancient Peru. In *Ritual Sacrifice in Ancient Peru*, edited by E. P. Benson and A. G. Cook, pp. 165–184. University of Texas Press, Austin.

Villa, P., C. Bouville, J. Courtin, D. Helmer, E. Mahieu, P. Shipman, G. Belluomini, and M. Branca
1986a Cannibalism in the Neolithic. *Science* 233:431–437.

Villa, P., J. Courtin, D. Helmer, P. Shipman, C. Bouville, E. Mahieu, G. Belluomini, and M. Branca
1986b Un Cas de Cannibalisme au Néolithique: Boucherie et Rejet de Restes Humains et Animaux dans la Grotte de Fontbrégoua à Salernes (Var). *Gallia Préhistoire* 29:143–171.

Villotte, S., C. J. Knüsel, P. D. Mitchell, and D. Henry-Gambier
2011 Probable Carpometacarpal and Tarsal Coalition from Baousso da Torre Cave (Italy): Implications for Burial Selection during the Gravettian. *Journal of Human Evolution* 61: 117–120.

Voytek, B.
1995 The Microwear Analysis. In *L'Insediamento Neolitico di Ostiano-Dugali Alti (Cremona) nel suo Contesto Ambientale ed Economico*, edited by Paolo Biagi, pp. 51–88. Monografie di "Natura Bresciana" 22. Museo Civicodi Scienze Naturali di Brescia, Brescia.

Voytek, B.
2014 *Plus ça change, plus c'est la même chose:* Change and Continuity in the Neolithic. *Rivista di Studi Liguri, LXXVII–LXXVIII* (2011–2012):91–95.

Wahl, J., and H. G. König
1987 Anthropologisch-traumatologiche Untersuchung der menschlichen Skelettreste aus dem Bandkeramischen Massengrab bei Talheim, Kreis Heilbronn. *Fundberichte aus Baden-Württemberg* 12:65–193.

Waldron, T.
1987 The Relative Survival of the Human Skeleton: Implications for Palaeopathology. In *Death, Decay, and Reconstruction: Approaches to Archaeology and Forensic Science*, edited by A. Boddington, A. N. Garland, and R. C. Janaway, pp. 55–64. Manchester University Press, Manchester.

Walker, P. L., R. R. Bathurst, R. Richman, T. Gjerdrum, and V. A. Andrushko
2009 The Causes of Porotic Hyperostosis and Cribra Orbitalia: A Reappraisal of the Iron-Deficiency-Anemia Hypothesis. *American Journal of Physical Anthropology* 139:109–125.

Whitbread, I. K.
1986 The Characterisation of Argillaceous Inclusions in Ceramic Thin Section. *Archaeometry* 28.1: 79–88.

White, T. D.
1986 Cut Marks on the Bodo Cranium: A Case of Prehistoric Defleshing. *American Journal of Physical Anthropology* 69:503–509.

White, T. D.
1992 *Prehistoric Cannibalism at Mancos 5MTUMR-2346*. Princeton University Press, Princeton, New Jersey.

White, T. D., and N. Toth
1991 The Question of Ritual Cannibalism at Grotta Guattari. *Current Anthropology* 32:118–138. With comments by Philip G. Chase, G. A. Clark, Nicholas J. Conrad, Jill Cook, F. D'Errico, Randolph E. Donahue, Robert H. Gargett, Giacomo Giacobini, Anne Pike-Tay, and Alan Turner.

Whitehouse, R. D.
1968a The Early Neolithic of Southern Italy. *Antiquity* 42:188–193.

Whitehouse, R. D.
1968b Settlement and Economy in Southern Italy in the Neothermal Period. *Proceedings of the Prehistoric Society* 34:332–367.

Whitehouse, R. D.
1971 The Last Hunter-Gatherers in Southern Italy. *World Archaeology* 2:139–254.

Whitehouse, R.
1987 Il Neolitico Antico: Cronologia Assoluta. In *Coppa Nevigata e suo Territorio: Testimonianze Archeologiche dal VII al II millennio a.C.*, edited by S. Cassano, A. Cazzella, A. Manfredini, and M. Moscoloni, pp. 95–97. Edizioni Quasar, Rome.

Whitehouse, R.
1990 Cave and Cult in Neolithic Southern Italy. *Accordia Research Papers* 1:19–37.

Whitehouse, R. D.
1992 *Underground Religion: Cult and Culture in Prehistoric Italy.* Accordia Research Centre at the University of London, London.

Whitehouse, R. D.
2001 A Tale of Two Caves: The Archaeology of Religious Experience in Mediterranean Europe. In *The Archaeology of Cult and Religion*, edited by P. F. Biehl, F. Bertemes, and H. Meller, pp. 161–167. Archaeolingua Foundation, Budapest.

Whitehouse, R. D.
2005 Extraction and Exchange of Flint in Neolithic Southeast Italy. In *Papers in Italian Archaeology VI: Communities and Settlements from the Neolithic to the Early Medieval Period. Proceedings of the 6th Conference of Italian Archaeology Held at the University of Groningen, Groningen Institute of Archaeology, the Netherlands, April 15–17, 2003,* edited by P. Attema, A. Nijboer, and A. Zifferero, pp. 545–553. BAR International Series 1452(2). British Archaeological Reports, Oxford.

Whitehouse, R. D.
2007 Underground Religion Revisited. In *Cult in Context: Reconsidering Ritual in Archaeology*, edited by D. A. Barrowclough and C. Malone, pp. 96–106. Oxbow, Oxford.

Whittle, A.
2005 Lived experience in the Early Neolithic of the Great Hungarian Plain. In *(Un)settling the Neolithic*, edited by D. Bailey, A. Whittle, and V. Cummings, pp. 64–70. Oxbow Books, Oxford.

Whittle, A., and M. Wysocki
1998 Parc le Breos Cwm Transepted Long Cairn, Gower, West Glamorgan: Date, Contents, and Context. *Proceedings of the Prehistoric Society* 64:139–182.

Wieberg, D. A. M., and D. J. Wescott
2008 Estimating the Timing of Long Bone Fractures: Correlation between the Postmortem Interval, Bone Moisture Content, and Blunt Force Trauma Fracture Characteristics. *Journal of Forensic Sciences* 53.5:1028–1034.

Wilkens, B.
1988 La Fauna di Coppetella (Iesi, Marche). *Atti della Società Toscana di Scienze Naturali* 95: 363–375.

Wilkens, B.
1989 La Fauna Neolitica di Monte Tinéllo (Marche). *Atti della Società Toscana di Scienze Naturali* 96:269–280.

Wilkens, B.
1997a I Resti Faunistici dei Livelli Piceni di Osimo. *Rassegna di Archeologia* 14:237–252.

Wilkens, B.
1997b Resti Faunistici Provenienti da Alcuni Siti dell'area di Milan. In *Dalle Capanne alle Robbe*, *La Storia Lunga di Milocca-Milena*, edited by V. La Rosa, pp. 127–134. Pro Loco, Milan.

Williamson, R. F., and S. Pfeiffer (editors)
2003 *Bones of the Ancestors: The Archaeology and Osteobiography of the Moatfield Ossuary.* Mercury Series Archaeology Paper 163. Canadian Museum of Civilization, Gatineau, Quebec.

Winn, S.
2009 The Danube (Old European) Script: Ritual Use of Signs in the Balkan–Danube Region c. 5200–3500 BC. In *Signs of Civilization: Neolithic Symbol System of Southeast Europe*, edited by J. Marler and M. Robbins Dexter, pp. 49–62. Serbian Academy of Sciences and Arts, Novi Sad.

Winn, S., and D. Shimabuku
1980 *The Heritage of Two Subsistence Strategies: Preliminary Report on the Excavations at the Grotta Scaloria, Southeastern Italy, 1978*. Department of Anthropology, St. Mary's University, Halifax, Nova Scotia.

Wood, J. W., G. R. Milner, H. C. Harpending, and K. M. Weiss
1992 The Osteological Paradox: Problems of Interpreting Prehistoric Health from Skeletal Samples. *Current Anthropology* 33:343–370.

Zamagni, B.
2003 Pietre Verdi. In *Gli Scavi nel Villagio Neolitico di Catignano (1971–1980)*, edited by C. Tozzi and B. Zamagni, p. 243. Origines, Studi e Materiali Pubblicati a Cura dell'Istituto Italiano di Preistoria e Protostoria. Florence.

Zamagni, B.
2003b L'Industria su Osso. In *Gli Scavi nel Villagio Neolitico di Catignano (1971–1980),* edited by C.

Tozzi and B. Zamagni, pp. 185–201. Istituto Italiano di Preistoria e Protoistoria, Florence.

Zanchetta, G., A. Fallick, and R. N. Drysdale
2005 Basic Principles of Stable Isotope Geochemistry and Their Application to Palaeoclimatology and Speleothems. In *Atti del Convegno "Le grotte raccontano: Un milione d'anni di storia naturale conservato nei sistemi carsici delle Alpi Apuane"*, pp. 83–100. Memorie dell'Istituto Italiano di Speleologia Serie II, Vol. 18. Istituto Italiano di Speleologia, Bologna.

Zapata, L., and L. Peña-Chocarro
2003 Uso y Gestión del Bosque en la Euskal Herria Atlántica: Aprovechamiento Tradicional de los Recursos Forestales en Encartaciones y Gorbea. *Zainak* 22:201–215.

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