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The Archaeology of Solvieux

An Upper Paleolithic Open Air Site in France

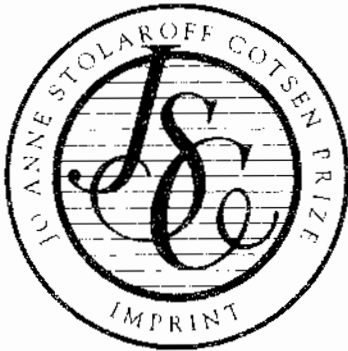
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The Archaeology of Solvieux

An Upper Paleolithic Open Air Site in France

James Sackett

Los Angeles, California
1999

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To Marie-Louise and Jean Gaussen

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Preface

Solvieux is an Upper Paleolithic open air (*plein air*) site in the archaeologically classic Perigord region of southwestern France. It falls far short of fulfilling our original vision of a Stone Age Pompeii whose occupations, once exposed, would document with clarity and detail the lifeways of their long-dead inhabitants. Nonetheless, apart from the value that resides in any reasonably intact open air station, there is much of interest about Solvieux and the work it has prompted.

One thing is the sheer wealth of its deposits, which for extent, complexity, and diversity of contents have few, if any, rivals in the open air archaeological record of Stone Age times in Western Europe. These deposits incorporate an extremely diverse succession of lithic industries that sample every one of the principal regional archaeological traditions of the Upper Paleolithic, along with an additional industry, the Beauronnian, which is seemingly unique. Equally important is the scale of our work at Solvieux. More than 2500 m³ of deposit were excavated, producing a kilometer of dressed stratigraphic sections, around 2000 m² of horizontally exposed occupation surfaces, and some 4000 retouched stone tools. Being subjected to such intense archaeological exploitation, Solvieux could not help but become a proving ground for new field methods designed to extend the yield and reach of open air research, as well as for new approaches to analyzing industrial variation. Solvieux's setting is also of fundamental importance. Locally this entails one of the most significant complexes of Upper Paleolithic open air sites in France, the so-called Neuvic group, while regionally it means, of course, the unparalleled Stone Age archaeological resources

of the Perigord. This archaeological landscape provides an exceptionally rich frame of reference within which to investigate Solvieux's structure and significance to culture history.

The organization of this monograph is straightforward. Chapter 1 outlines the background of research against which the Solvieux project evolved, the site itself, and the history of our work there. Chapters 2 through 4 detail the field methods used at Solvieux, its complex natural and cultural stratigraphy, and the makeup and organization of its archaeological couches. In the remainder of the volume we examine Solvieux's stone tool industries. Chapters 5 and 6 outline the fairly innovative methodology this investigation calls for. Chapters 7 through 10 present the substantive analyses of the industries themselves. Chapter 11 reviews how these industries—and the manner in which we have approached them—promote reconsideration of the nature and taxonomy of the regional industrial traditions to which they belong. Chapter 12 comments briefly on the significance of the Solvieux project and its implications for future research.

All of this makes for a long monograph, and no one would wish it any longer. Yet it does bring together within a single economical format the description of a rich and complicated site, several detailed analyses of sizable lithic industries, some ambitious essays on systematics, a typological lexicon, and a case study presentation of some fairly novel analytic techniques. Comparable efforts by other projects in recent decades have sometimes called for multiple volumes.

That this monograph appears so long after we quit Solvieux deserves comment. Except for letting

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down colleagues and hard-working crews, the price of delay seems pretty much limited to sedimentology. The standards and practices of sedimentological research have changed much in recent years, and consequently, we have been told, the results obtained at Solvieux are obsolete. Regretfully, they are not included here. For the rest, however, our work at Solvieux has not been overtaken by time. No site of comparable size and complexity has yet been discovered, let alone excavated, which means that the account of Solvieux's deposits and how we learned to attack them retain their original interest. No obvious parallel has yet been found to Solvieux's highly distinctive industry, the Beauronnian, and the interest of its other industries remains undiminished. Indeed, due to the publication in recent years of certain kindred ones from other key sites, the Solvieux collections have taken on added value because there are now materials of equal quality with which to compare them. (For this reason, the discussions of the Early and Middle Magdalenian, Raysse Perigordian, and Beauronnian in chapter 11 amount to short treatises in their own right.) Finally, the methodological and theoretical innovations developed during the course of the Solvieux analyses seem to have lost nothing of their novelty, while the literature continues to show that others might find them useful.

One more thing. It may surprise readers to find this monograph so heavily devoted to "straight" archaeology—the seemingly traditional concerns of deposits, lithic assemblages, and industrial variability. For one of the expressed aims of open air research has supposedly been to relieve Paleolithic archaeology of its preoccupation with stratigraphy and stone tools, and replace it with a more explicitly

paleoethnological concern for reconstructing the patterns of settlement and activity reflected by the horizontal spatial organization of the occupation surfaces of our sites. This was indeed why we dug Solvieux, and few if any Stone Age excavations in Western Europe have moved more dirt in the attempt. But the goals held at the beginning of a long-term project can be transformed as a result of the empirical restraints and opportunities that the site itself imposes on the logic of archaeological inquiry. And so it happened that the writer began the work at Solvieux as a paleoethnologist but, driven by necessity rather than by inclination, ended it as a stratigrapher and systematist.

Be that as it may, readers will discover that we are not in any event dealing here with quite the same stratigraphy or quite the same stone tools as those one usually encounters in the literature. Both assume somewhat novel form at Solvieux, and both have been approached in ways that are themselves somewhat novel. These data and methods should contribute toward an innovative approach to the archaeological record for Upper Paleolithic times. What follows, therefore, is written with more explicit regard than is usually paid in substantive monographs to questions of method and theory and to the logic that guided our work. In part the text may even approach the form of a case study. It is hoped that this will encourage and help prepare others in the trade to explore further some of the same avenues of investigation.

James Sackett
UCLA Institute of Archaeology

Acknowledgments

This monograph is the product of three decades of happy and fruitful collaboration with Jean Gaussen. It was he who pioneered open air archaeology in the Neuvic sector and who remains to this day the field's central figure. Over the years he has provided aid and ideas beyond measure, and his archaeological laboratory, library, and artifact collections have always been at our disposal. He drew all the stone tool illustrations that make up the typological plates, for which we are especially grateful. The writer is equally indebted to Jean's wife, Marie-Louise Gaussen, whose flow of hospitality, friendship, and kindnesses has been perpetual. This volume is dedicated to them with affection and thanks. The same feelings are also extended to the five generations of Gaussens with whom the writer's life was entangled in becoming a Neuvicois archaeologist, as well as to the collateral Mesnard, Roussel, and Larue families.

We have been lucky in our professional colleagues, who should be well enough known to readers that their formal titles can be dispensed with. It was the late Hallam L. Movius, Jr. who conceived the idea of the Solvieux project and opened the way. Francois Bordes joined the writer as its co-director, and Denise de Sonneville-Bordes was always generous with ideas and advice. Jean-Pierre Texier was a valued associate in the field and has contributed profoundly to an understanding of the depositional history of Solvieux as well as of many other regional Upper Paleolithic sites. His name appears frequently in what follows. Jean-Philippe Rigaud has played a comparable role in the archaeological domain of Perigord research. In addition, he oversaw the project as regional Director of Prehistoric Antiquities and, as a result of his excavations at Le Flageolet, provided a significant element of the

body of comparative data used in the Solvieux analysis. A great debt is owed to two old friends and colleagues, Nicholas David and Harvey Bricker, whose publications of the key Abri Pataud industries contributed much of the context of data and ideas in which this monograph was written. Some names on the list of valued associates whose aid and influence are reflected in these pages go back to the early years at Solvieux, such as Françoise Audouze, Ernestine Elster, and the late and much regretted Henri Laville. Later additions include three colleagues who wrote illuminating reviews of the draft of this monograph—Paul Mellars, Glenn Russell, and Jan Simek.

The project could not have had better hosts than those we found in France, from the archaeological authorities in Paris to the people of Faye, Mussidan, and Neuvic-sur-l'Isle. Some of the latter were very special friends of the project, such as Abel and Gilbert Coustillas and the resourceful Gaston Labatut. Also deserving acknowledgement is the Spout family of Mussidan, the proprietors of Solvieux during the digging years.

The work at Solvieux was generously funded. It was the National Science Foundation, to whom so many American archaeologists and anthropologists are indebted, that underwrote the project as a whole. Supplementary grants were provided by the Ford Foundation and the Deutsch Foundation. Our institutional debts are equally great. Few who follow the academic life have been luckier than those in the writer's generation who served at the University of California, Los Angeles. The UCLA University Research Library and Geology-Geophysics Library have been invaluable resources. The Department of Anthropology provided excellent colleagues,

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students, and staff, as well as generous laboratory facilities. And more recent years have seen the writer, now a Professor emeritus, equally well housed among particularly genial colleagues and associates in the UCLA Institute of Archaeology.

The project's debt to some four score students and friends who toiled in the laboratory and the field would be hard to exaggerate. The laboratory was run over the years by three excellent assistants, Linda (Taranik) Grimm, Carol Stockton, and Susan Blifeld, the last of whom remained a valuable project associate long after the fieldwork itself had ceased. Additional laboratory assistance was provided by many others, including Ruth Winterman and Gail Kamer. Deserving special mention is William Breece, a colleague and friend who served as field chief the last two seasons and who has continued down to the present to provide invaluable assistance both at home and in France.

Listed here in alphabetical order are those who served on the Solvieux field crews (the asterisks indicating those who returned for two or more years): Leslie Aiello*, Paul Aiello*, Françoise Audouze, Deborah Bachtell*, Michael Baksch, Peter Banks, Raymond Bernor*, Susan Blifeld*, Arthur Bond, Catherine Breece*, William Breece*, Bonnie Bucknam, Phillip Burnham, Mark Chaitkin, Douglas Cargile, Joseph Chartkoff, Kerrie Chartkoff, Robert Childs, Carol Cunningham, Carl Danowitz*, David Davis, Lee Davis, Lynn Eichen*, Linda Finn, Victor Fisher*, Françoise Gaussen, Michelle Gaussen, Nicholas Gessler, Dennis Gilliam, Barbara Greenstein, Linda Grimm**, Heidi Hansen*, Craig Harter, Linda Huggins, Diane Jeffress, Brigid Kelsey*, Alan King, Ellen Kroll, Thomas Kupper, Bernard Labrue, David Libbey, Catherine Martin, Steven McClean, Donald Miller, John Miner, Pauline Pallister, Nora Jane Palm*, Loren Penilis, Patricia Phillips, Frederick Prinz, Dwight Read, Bettina Rosenberg, Ross Sackett***, James Sackett, Jr.*, Tom Sackett, Barbara Scanlon*, Deborah Seitzer*, William Self, Clay Singer*, Lynne Singer*, Harold Slear**, Richard Snyder, Preston Staley, Eugene Sterud, Catherine Stevenson, Carol Stock-

ton*, Timothy Taylor, Melburn Thurman, Andrew Trubin*, Dean Veres, Helen Veres, David Weide, John Weil*, Polly Weissner, Deborah Weller, Kenneth Williamson, Ruth Winterman*, Ann Woosley, and Juris Zarins. To our knowledge, all of the above went on to make a success of things, a surprisingly large number in fact as professional archaeologists or anthropologists, or both.

Producing an archaeological monograph can be more of a challenge than conducting the fieldwork that lies behind it. Fortunately for its author, this one quickly evolved into something of a family industry. Ross Sackett executed most of the line drawings and graphics with skill and ingenuity, and was an invaluable source of ideas and insightful criticism at every stage. Susan Sackett produced most of the maps and stratigraphic sections, as well as the excellent isometric rendering of Solvieux and the endscraper megalith. Tom Sackett contributed computer expertise, as did James Sackett, Jr.; in addition, Tom helped design and then in turn produced all the statistical tables. Mary Sackett, the writer's wife, generated the tool distribution plots and brought a book expert's knowledge to issues of the volume's design and format.

The team expanded as the end approached. A special blend of energy and originality was contributed to the enterprise by John Steinberg, who was responsible, among other things, for the final computerized versions of the monograph's figures. Beverly Godwin subjected the text to masterful copyediting and provided much-needed editorial direction. Very special thanks are due to Lesley Zanich and her associates at Adecco Design Service, who collaborated with the writer on the monograph's layout and typography and then expertly brought the text, tables, and illustrations together into a finished volume. Marilyn Beaudry-Corbett, the Institute's Director of Publications, provided valuable counsel and also coordinated our efforts with those of her own division. Finally, a very special debt of gratitude is owed to Richard Leventhal, Director of the Institute, whose guidance and generosity ultimately made it all possible.

1

Introducing Solvieux

An understanding of the site begins with its setting, both in the archaeological record and the context of modern Upper Paleolithic research. Solvieux lies in the classic Perigord region of southwestern France. The fame of the Perigord derives from the rich and often deeply stratified rock shelter (*abri*) sites that occupy cliffs overlooking the region's numerous rivers and streams. Their complex deposits and occupational histories have required that archaeologists adopt an essentially vertical perspective, focusing primarily on stratigraphy and the systematics involved in ordering lithic industries over time. The results of this work have indeed been impressive. The regional industrial sequence wrested from the Perigord's shelters, especially its Upper Paleolithic segment (ca. 35,000 to 9000 BC), is the most detailed and complex available to us from Stone Age times (see figure 11.1). It continues to undergo revision, thanks to continued excavation and modern chronostratigraphic research, which are bringing to light kinds of complexity in industrial variation and its timing that defy containment within the ordering schemes left to us by our predecessors (Laville, Rigaud, and Sackett 1980).

1.1 Rock shelters and open air sites

Workers in the Perigord have, of course, shared the burgeoning interest of modern Stone Age research in paleoethnology, that is, the pursuit of questions about the form and content of the cultures that lie behind the industrial sequence (Sackett 1968).

Hence, recent decades have seen at least a partial shift in emphasis from the vertical to the horizontal perspective. Basic here is the notion that understanding the activities that made up prehistoric life-ways calls for more than consideration of the artifactual remains in and of themselves; it depends as well upon knowledge of how they pattern spatially with respect to one another over occupation surfaces. Excavations like those conducted by Halam L. Movius (1966) at Abri Pataud and Jean-Philippe Rigaud (1978) at Le Flageolet I revealed that shelter sites have much to contribute in an era of horizontal research, and their results stimulated sophisticated advances in both method and theory (for example, Simek 1987).

Yet shelters do not constitute the only, or necessarily even the best, source of spatial information. Sometimes such data may be obtained more profitably from stations in the open air, both because of the comparative speed with which their archaeological levels can be exposed and because their artifacts and associated features should, at least in theory, display more obvious horizontal organization. The latter stems from the likelihood that settlement tended to be shorter in duration and spatially less circumscribed in the open air than in shelters—factors that would have decreased the chances that vestiges of several different activities would be superimposed on occupation surfaces and hence spatially confused with one another. It also seems probable that one of the potentially most informative kinds of horizontal structure, the remains of

purposefully constructed habitations, is more likely to appear in the open air than in sites that constitute natural shelters in their own right. Finally, apart from the question of horizontal patterning, it is likely that open air occupation entailed kinds of settlement and activity—and, hence, kinds of lithic industrial variation—that are lacking in shelter deposits and thus are ignored by conventional regional systematics.

The Perigord's spectacular shelters understandably encouraged a *mentalité de grotte* among traditional prehistorians, who rarely troubled to explore the potential of the region's open air resources, let alone cultivate the special knowledge and skills their excavation called for. Open sites were often held traditionally to be no more than superficial artifact scatters, *gisements de surface*, more likely than not disturbed by erosion and cultivation and in any case lacking deep stratigraphic sequences like those provided by the shelters. Even today, although their presence is duly recorded in regional surveys, open air sites evoke moderate interest at best.

In two sectors of the Perigord, however, open air excavation has been given priority. One is the Bergeracois, where in the 1960s François Bordes and Jean Guichard explored a distinctive variety of open sites ranging in age from late Acheulian times to the Upper Paleolithic. Little of this work has been published in detail apart from the site of Corbiac, whose Final Perigordian levels yielded in one case an extraordinarily rich assemblage of flint tools and in another what is claimed to be a structured living floor (Bordes 1968). In addition to its substantive results, the work at Corbiac did much to stimulate thought concerning the methodological issues entailed in horizontal research (for example, Bordes 1975; Bordes, Rigaud, and de Sonneville-Bordes 1972). The second, and by far the more important of the Perigord's sectors for open air research, lies to the north of the Bergeracois in the drainage of the Isle River. In this sector appears one of the richest and most intensively investigated complexes of Upper Paleolithic open air sites in Western Europe. It is this complex, here termed the Neuvic group, that provides the immediate archaeological setting for Solvieux and of which Solvieux itself is the most formidable member.

1.2 The Neuvic group

The Neuvic stations are found along a 15 km stretch of the Middle Valley of the Isle River between the towns of Saint-Léon-sur-l'Isle and Mussidan (figure 1.1). Here the river meanders through a flood plain never more than 2 km wide; it broadens downstream from Mussidan as one enters the flat Bordeaux lowlands of the Lower Valley. Yet the landscape of the Neuvic sector itself is considerably less dramatic topographically than many found elsewhere in the Perigord. Its limestone bedrock is too friable to hold an edge for any appreciable length of geological time. As a result, the transition from the Pleistocene stream terraces that cover the valley floor to the Tertiary detritus that mantles the overlying plateaus usually takes the form of a gentle colluvial slope deposit rather than an abrupt face of exposed rock. Largely absent are impressive stretches of cliff like those that harbor so many of the classic shelter sites in the drainages of the Vézère and Dordogne Rivers in the Black Perigord, a day's walk to the southeast. Apart from the celebrated engraved cave of Gabilou (Gaussen 1964), the sector's known shelter resources comprise only a handful of sites, most of which were long ago dug or destroyed, or both, and are now literally lost (Gaussen 1980:20–22). It is not surprising that the sector was traditionally regarded as having only minor archaeological importance.

But four decades of investigation into its open air resources have profoundly altered this view. The work began in 1956, with the first systematic excavation conducted at Solvieux by Dr. Jean Gaussen of Neuvic-sur-l'Isle. It inaugurated what seems to have been the first sustained program of horizontal open air research in France. An important contribution was made by a Neuvicois trained by Gaussen, Jean-Claude Moissat, whose unrivaled gift for prospecting led to the discovery of many Upper Paleolithic sites of concern to us here, in addition to several others ranging from Acheulian to Gallo-Roman times. The scope of activities in the sector expanded considerably in the mid-1960s, when Gaussen and the writer entered into a warm and fruitful collaboration occasioned by the Solvieux project. The tempo of research increased still further soon after because of the efforts of Jean-Pierre

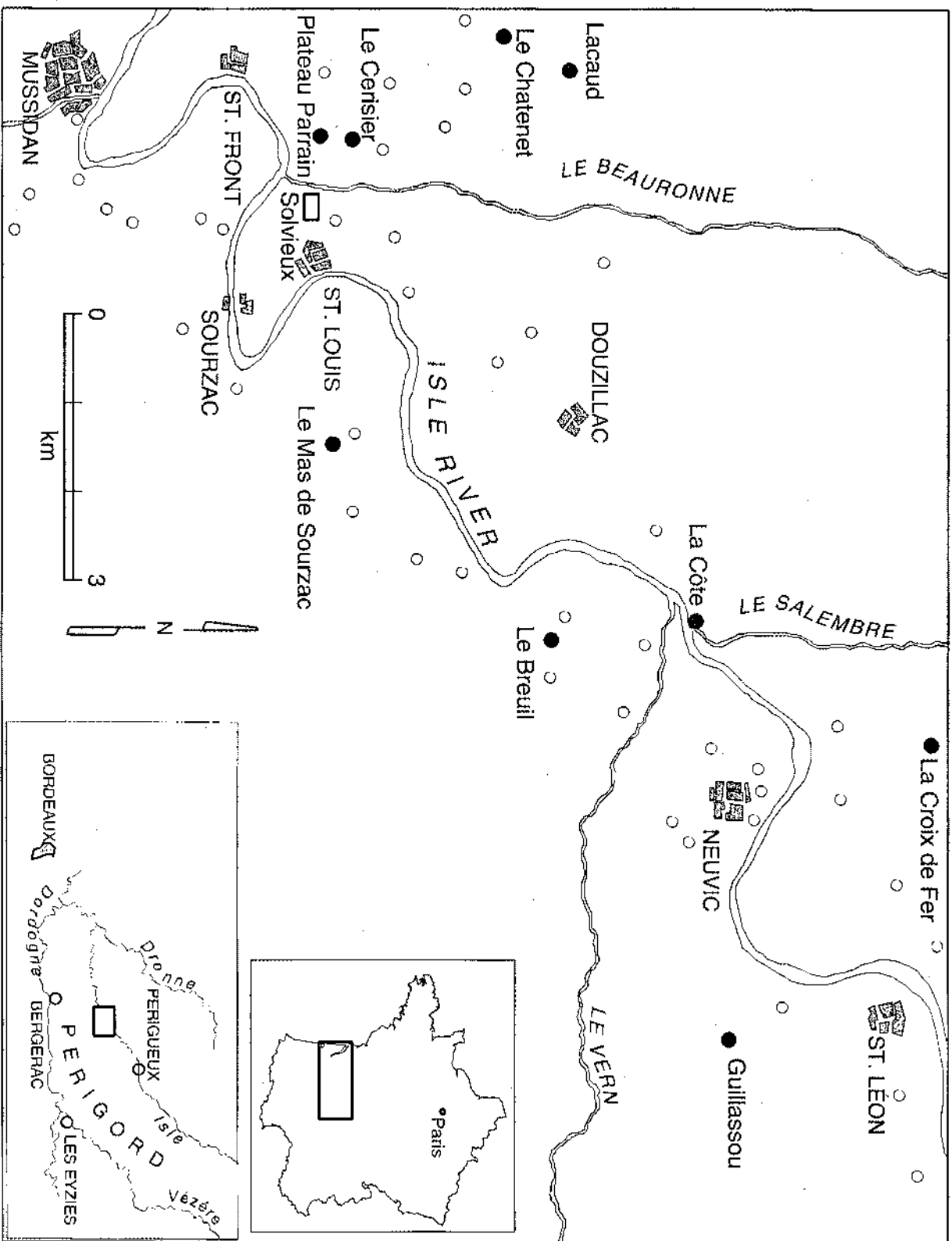


Figure 1.1. The Neuvié sites

Texier, a Pleistocene geologist at the Institut du Quaternaire, Université de Bordeaux, who undertook a comprehensive geological study of the Isle Valley as a whole, the analysis of the geology of several individual sites, and the discovery and excavation of additional open air stations from all epochs of the Paleolithic (Texier 1982)—work that continues to this day. Texier also played a key role in the Solvieux project. From its beginning, work in the sector received valuable support from the late Professor François Bordes and other associates of the Institut du Quaternaire. But Neuvic has remained both the intellectual and logistic center for research into the Middle Isle Valley sites, and so it is appropriate and convenient to refer to this complex of sites by the name of that village.

Open air resources in the Neuvic sector are not restricted to the Upper Paleolithic. Mousterian sites are common, and Lower Paleolithic ones are by no means unknown (Texier 1989). Particularly noteworthy in this regard is the station of Les Tares, which dates to Riss glacial times and yields one of France's most important Premousterian assemblages (Rigaud and Texier 1981). But here we are concerned with the Upper Paleolithic sites. Ten of them have been systematically investigated, and three times that number have been tested, or at least provisionally identified, by isolated finds of diagnostic stone tools.

We now turn to a general review of the Neuvic sites, which will provide the framework of facts, terms, issues, and points of comparison needed to understand the nature and significance of the findings at Solvieux. We focus primarily upon the sites designated by name on the map in figure 1.1, which are those that have undergone substantial excavation.

Although its members can be quite distinctive individually, certain features typify the Neuvic sites as a group. For one thing, at least its principal members are by no means the light, disturbed, and superficial scatters that typify the *gisements de surface* of received opinion. Their *couches*, or cultural levels, are as a rule reasonably intact stratigraphically, and they are often artifactually rich, areally extensive, and horizontally structured. A distinctive part of this structure are rock features made of cobbles and,

occasionally, of flagstones and slabs. These features range from relatively dense *pavages* of contiguous rocks to *cordons* (outlining enclosures), certain unique structures, and more general amorphous scatters. Quartz, schist, diabase, sandstone, and granite may all be involved, with the first comprising at least 80% of the total. These stones were brought into the sites from exposed fluvial terraces on the valley floor and from the Tertiary detritus that mantles the plateaus and hilly spurs. They are usually reddened and often fractured by heating, yet the random orientation of these stigmata among contiguous rocks indicates that the stones must have been heated prior to being arrayed the way we find them. Rather surprisingly, rock features whose shape and disposition might suggest hearths are virtually absent in the Neuvic sites (Gausson 1989a).

Apart from their inherent interest, the rock features can provide an organized background to occupation surfaces against which the spatial distributions of stone tools and industrial debris take on enhanced visibility and, in many cases, suggestive patterning. This is of particular importance because open air deposits in the Perigord are highly acidic and, as a result, strongly altered by leaching. Organic remains such as bone and charcoal that furnish so much spatial structure to open air sites in some European locales are virtually absent, as are nearly all vestiges of limestone and soil features such as pits, postholes, and hearth basins. The conventional French term for living floor, *sol d'habitat*, ought not to be taken literally here, because the flint and rock features that make up the Neuvic sites' archaeological couches rarely occupy distinct sedimentological units that stand apart from the broader, heavily weathered soil horizons that incorporate them.

Their flint artifacts are virtually all fashioned out of nodules obtained from local limestone and gravel deposits, although the specific varieties of flint employed vary significantly from one site to the next. The standardized types of retouched tools recognized in conventional lithic systematics are almost always accompanied by a variety of unused flakes and industrial debris collectively known as *débitage*. This debitage is usually abundant enough to indicate that the lithic industries represent

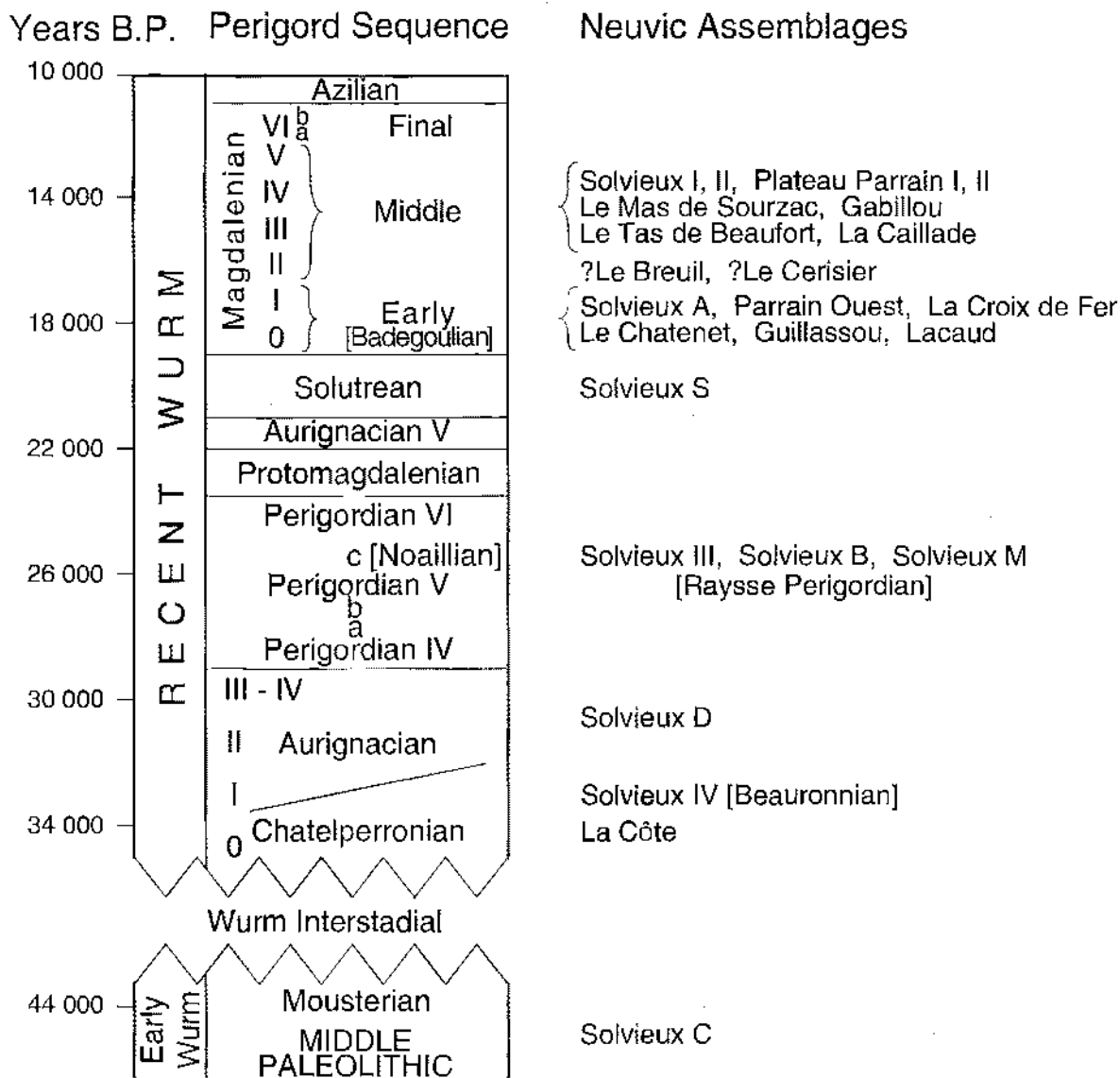


Figure 1.2. Industrial chronology of the Neuvic sites

expedient technologies, fashioned and presumably used on the occupation surfaces where they are found discarded.

Stone tool industries from the Neuvic group display considerable heterogeneity in types and type frequencies, presenting a broad range of comparisons to one another, as well as to the somewhat stereotyped rock shelter industries codified in regional archaeological systematics. Some are nearly identical to those found in the shelters, but others are distinctly different, and there are a few for which no shelter has provided even a rough analog. It is

difficult, therefore, to bring all of them into line with the regional sequence of the Perigord, and the chronology of the Neuvic sites ordered according to their industrial contents (figure 1.2) entails some ambiguities.

Ordering is further confounded because most Neuvic sites fall into the Magdalenian cultural tradition, where precise attribution can be equivocal even in the case of tool assemblages that exhibit no special idiosyncrasy or ambiguity in their own right. The problem arises because the definition of temporal subdivisions within the Magdalenian, except its

earlier and final phases, relies heavily upon diagnostic bone and antler *fossile directeur* index types (see § 11.1.1). The question does not arise with respect to stages 0 (zero) and I, the Early Magdalenian (or Badegoulian) industries, because their lithic traits are quite distinct from each other as well as from those that follow. But it is reflected in our lumping together into a broad Middle Magdalenian group (comprising stages III to VIa of conventional systematics) the several assemblages that presumably date somewhat later but not so late as to possess any of the special lithic *fossiles* that characterize the Final (stage VIb) Magdalenian.

We now review the principal Neuvic sites apart from Solvieux itself that have undergone substantial excavation. This should provide at least a general impression of the very distinctive nature of the group, as well as illustrate how and in what combinations the features described above appear in its individual members. The sites were investigated principally by Gaussen, whose *Le Paléolithique Supérieur de Plein Air en Périgord* (1980) remains the basic reference for the Neuvic group and the main document from which much of the empirical data summarized in this section has been culled. Only references other than this key source are cited in the text.

1.3 Upland sites

Although the distinction seems to have no consistent significance with respect to their form or content, it is convenient for purposes of exposition to divide the Neuvic sites into two groups according to their topographic situations. Members of the first group occupy relatively elevated positions either on the valley rim or on the plateaus that overlook the Isle and its principal tributaries. Those of the second group lie on the valley's lower slope or on the valley floor itself in soils immediately overlying fluvial gravel terraces.

1.3.1 Guillassou

The highest upland site is Guillassou, situated 120 m above the flood plain of the Isle on the crown of a plateau spur shared by the communes of Neuvic and Saint-Léon-sur-l'Isle. Its archaeological deposit extends over at least a hectare and presumably

incorporates several juxtaposed quasi-contemporary zones of habitation. The couche lies near the surface, however, and has been disturbed in many places both by more recent archaeological features and by cultivation. In addition to extensive testing and surface collecting, the principal exposure of 27 m² dug in 1965 and 1966 revealed a more or less rectangular pavage of contiguous cobbles terminating in, or perhaps simply neighboring, a circular scatter of stones (figure 1.3). An assemblage of 142 flint tools accompanied by an appropriately rich collection of debitage concentrates upon this pavement without restricting itself to its margins or showing any marked localizations. (It should be noted that figure 1.3, like the three that immediately follow it, simply depicts the exposure's rock plan and no more; excellent illustrations of how flint tools and debitage distribute spatially with respect to the rocks may be found in Gaussen's 1980 monograph.) The tool sample, dominated by burins on flakes, exhibits the quite special typological and statistical features of the archaic phase (stage 0) of the Early Magdalenian.

In 1988 Gaussen and Moissat dug an additional 35 m² exposure some 15 m from the original excavation (1988, 1992). Two dense concentrations of tools, chipping debris, and rock fragments appear here that apparently represent discrete work areas ancillary to the main pavage. Aside from its intrinsic interest, this twin feature is a telling example of the vagaries entailed in prospecting open air sites. For it took twenty-five years to come to light even though it lies alongside a major excavation on a terrain that has been grazed repeatedly by experienced prehistorians (Gaussen 1988:128).

1.3.2 La Croix de Fer

Downstream from Guillassou and occupying a similarly elevated position 100 m above the river flood plain is the station of La Croix de Fer (commune de Saint-Germain-du-Salembre). Flint tools and debitage, rocks, and also numerous fragments of red and yellow ochre appear here, in this case extending over several hectares. But all evidence of spatial organization is obliterated by cryoturbation. A small collection of 50 tools excavated with some difficulty from the site, which came to light in 1975 only after having been timbered and heavily bulldozed,

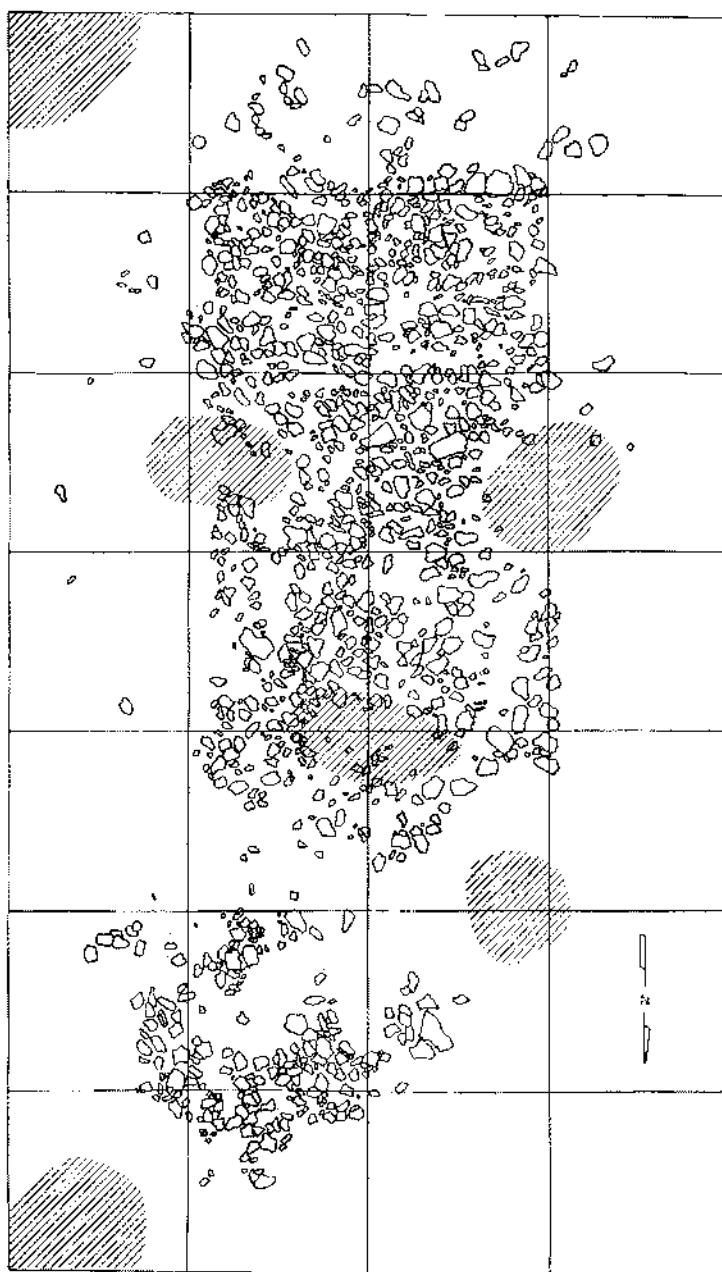


Figure 1.3. Guillassou rock plan. (After Gaussen 1980)
The shaded areas indicate zones of post-Paleolithic intrusion.

includes 13 raclettes and other typological features characteristic of a developed (stage I) Early Magdalenian industry. This industry appears elsewhere in the Neuvic group and in many of the Perigord's rock shelters. But the La Croix de Fer assemblage is distinctive in that its tool blanks are produced by a discoidal nucleus technique that creates pseudo-

Levallois forms unlike those usually encountered in the Magdalenian.

1.3.3 Plateau Parrain

Considerably farther downstream is the archaeologically important terrain of Plateau Parrain (commune de Saint-Front-de-Pradoux), whose sites lie

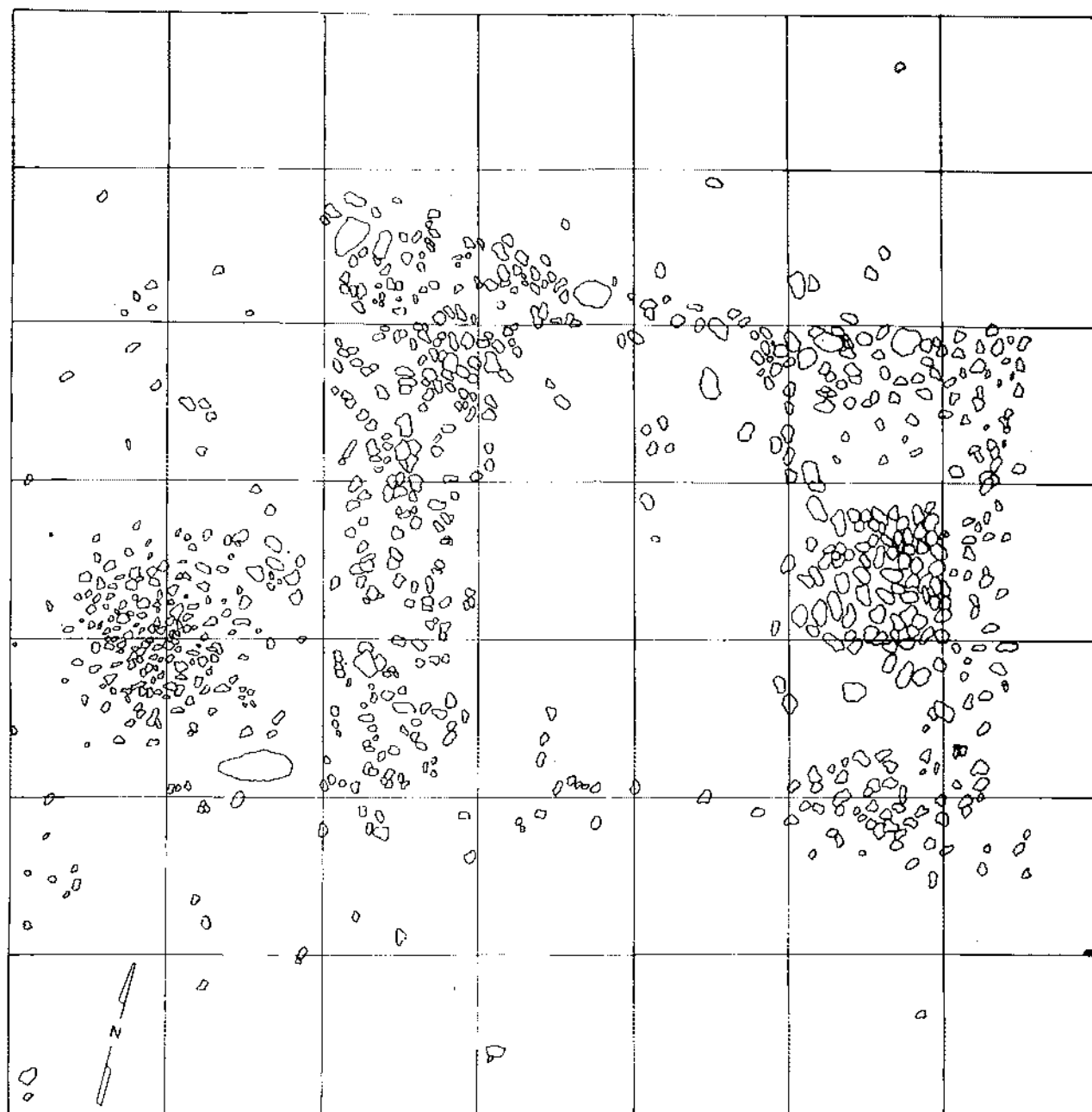


Figure 1.4. Plateau Parrain I rock plan. (After Gaussen 1980)

only some 20 to 30 m above the river but still occupy a commanding view of the valley. Excavations here have yielded information of considerably greater significance to spatial organization than those considered so far. One is the station named Plateau Parrain I (Bordes and Gaussen 1970), where a 56 m² exposure dug in 1960 and 1961 revealed an

archaeological horizon that has suffered some vertical dislocation but which nonetheless yields clear-cut organization when its elements are plotted on a horizontal plan. The rock feature framed by the exposure is a cobblestone cordon that describes a 4 x 4.5 m rectangular enclosure open to the south. A small square pavage is located inside the eastern

wall of this cordon, and a second, more diffuse one lies outside it to the west (figure 1.4). Stone tools and debitage concentrate into distinct knapping and work areas, although the tool types themselves show no obvious tendency to vary in kind or frequency from one area to the next. These artifact concentrations lie outside the cordon, whereas its interior is comparatively devoid of flint. Gaussen's reconstruction of the ensemble as a habitation site centered upon some sort of tent is well known (Bordes and Gaussen 1970). Its assemblage of 335 retouched tools represents what is the most common industry encountered in the Neuvic group, a reasonably well made if banal Middle Magdalenian that differs from its counterparts in the Perigord's shelters in terms of only a few local stylistic features.

Our attempt in the Solvieux laboratory to reconstitute the tool and debitage collections from this exposure lent considerable support to Gaussen's impression that it in fact reveals only a small portion of what must be a larger zone of occupation. A fairly extensive survey we conducted in 1984 confirmed that well over a hectare of the plateau's surface may be involved and that other types of rock structures are also present. One interesting feature, called Le Tas de Beaufort, which lies 40 m northwest of the original excavation (Gaussen and Sackett 1990), consists of a dense circular mound slightly more than a meter in diameter comprising some 300 rocks, 500 unworked blades and flakes, and 28 retouched tools. The relative barrenness of the surrounding surface, as well as the rarity of small chipping debris and the disposition of the cobblestones in the mound itself, suggest that it constitutes a secondary feature made by gathering up artifactual material that previously lay dispersed in the immediate vicinity. Whatever its origin and function, this feature does not suggest a hearth—a type of feature that is absent from all the Neuvic Magdalenian sites Gaussen excavated.

A 40 m² exposure dug in 1992, named Parrain II, samples another portion of the large zone of occupation 10 m south of the original excavation (Gaussen, Hesault, and Joyel 1992). Although the couche here is disturbed by cultivation, some sort of cobblestone pavage is clearly present along with four outlying clusters of artifacts that suggest localized work areas. A small collection of 50 tools

recovered from this exposure represents the same Middle Magdalenian industry seen in the two earlier excavations. Later the same year a 72 m² exposure, named Parrain Ouest, was excavated 150 m northwest of the original Parrain I excavation (Gaussen, Hesault, and Joyel 1993). Its diffuse and irregular pavage, seemingly also disturbed, occupies 16 m² and is relatively uninformative. Of great interest, however, is the assemblage of 122 retouched tools whose rich component of raclettes clearly assigns it to an Early Magdalenian industry and hence to an older era than the rest of the occupations on Plateau Parrain.

1.3.4 Le Cerisier

An altogether different archaeological situation reigns on a higher step of the plateau some 250 m to the north at a site named Le Cerisier. (The name commemorates the fact that it was a single rubified stone protruding from the bole of an uprooted cherry tree that betrayed to the sharp eye of Jean-Claude Moissat the presence of the buried archaeological horizon.) A 30 m² exposure dug in 1965 revealed what is undoubtedly the most extraordinary of the Neuvic cobblestone structures: a perfectly intact 16 m² solid pavage with an 'apse' attached at either end (figure 1.5). Flint comprises 45 retouched tools and the debitage testifying to their production on the spot (16 nuclei and 400 blades and flakes). This flint concentrates toward the outer edges of the pavement but in no case extends beyond its margins. The tools consist almost wholly of burins and crude notches and denticulations, all bearing signs of heavy use and breakage. Although the form and mode of manufacture of the burins may be consistent with a Middle Magdalenian assignment, no shelter assemblage of this or any other industrial tradition is known that has a similar quantitative makeup. Le Cerisier is undoubtedly the most singular member of the Neuvic group. The regularity of its outline and sharply delimited pavage and flint scatter suggest a solid-walled habitation or, perhaps, a semisubterranean hut.

Fairly intensive surface exploitation and son-daging over the years, including a full week's effort by a crew of five during the course of the 1984 campaign, have failed to bring to light any additional archaeological remains on the plateau step

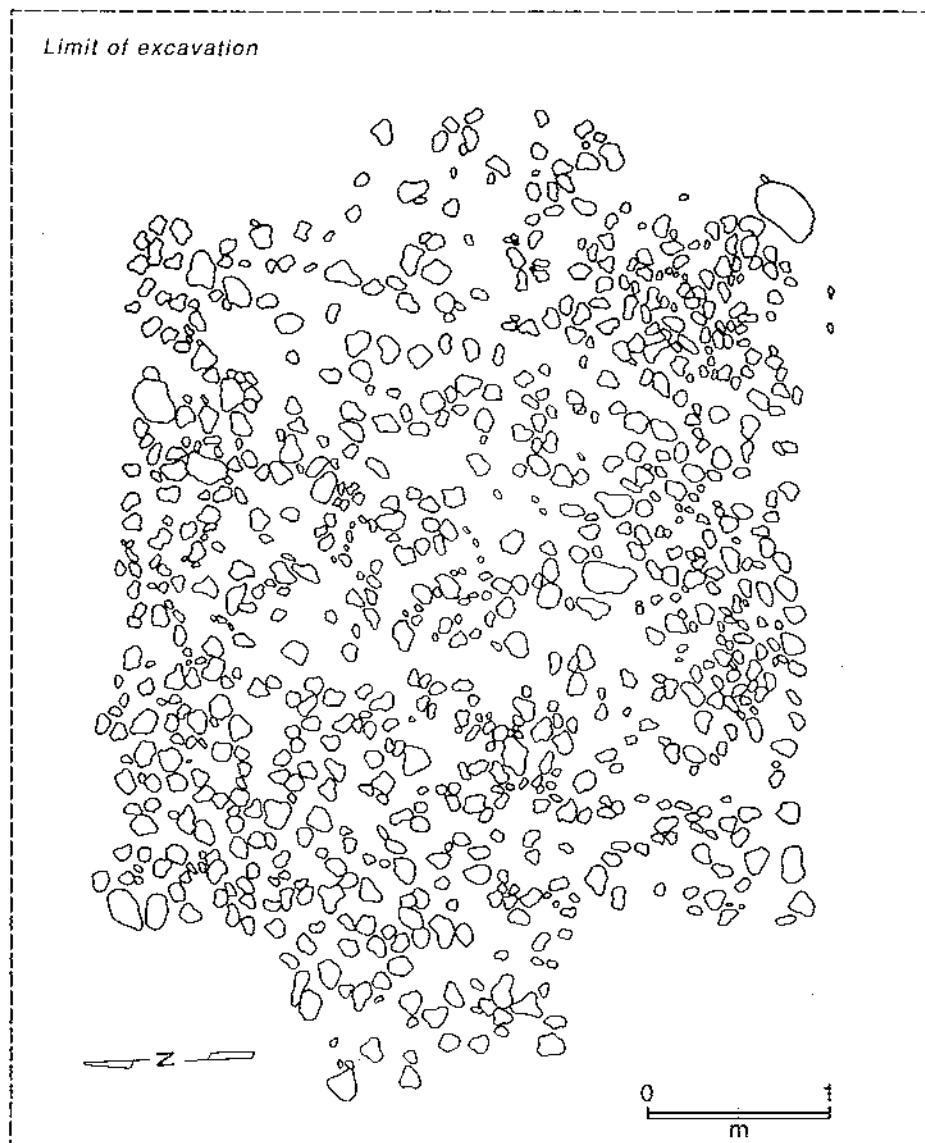


Figure 1.5. Le Cerisier rock plan. (After Gaussen 1980)

surrounding Le Cerisier. The site is specialized in its artifactual contents, is sharply defined and circumscribed areally, and is presumably referable to a limited set of activities conducted by a small group over a brief period of time. It constitutes what Gaussen (1992a) terms a *gisement élémentaire*, that is, an archaeologically hermetic site that might reasonably be regarded as the product of a single brief episode of occupation. The value of such 'elemental' sites lies, of course, in their very simplicity and the resulting clarity with which the lim-

ited number of activities responsible for them are represented (regardless of how intractable to interpretation these activities may be). By way of contrast, more substantial sites like Plateau Parrain suggest complex palimpsests that mix diverse activities which likely entailed longer durations of time and even successive reoccupations of the terrain by larger groups. Their very richness militates against the discernment of the multiple, often superimposed, activity patterns they presumably incorporate.

1.3.5 Le Châtenet and Lacaud

Although by no means as distinctive as Le Cerisier, two additional sites have been found in the uplands beyond Plateau Parrain that well illustrate the virtues of elemental sites. One is Le Châtenet (commune de Saint-Front-de-Pradoux), which lies 2 km to the northwest and 80 m above the flood plain (Gaussen and Moissat 1990). Salvage excavations here in 1988 revealed an amorphous but spatially delimited scatter of artifacts whose greatest concentration occupies a roughly rectangular area covering some 8 m². Its assemblage of 229 tools is dominated by crude burins on flakes, but it also includes a strong proportion (30%) of typical raclettes indicating an Early Magdalenian (stage I) industry probably akin to that found at La Croix de Fer.

Contrary to the rule among Neuvic sites, where intentionally shaped tools are far outnumbered by perfectly suitable blades and flakes that were never subjected to retouching, the Le Châtenet assemblage represents a much more exhaustive use of raw material. The nuclei have been reduced to minimum size, and almost none of the debitage constitutes serviceable blanks for tool manufacture. An even greater contrast is provided by the site's quartz and dolomite, which are relatively abundant but which appear in the form of intentionally fractured fragments that exhibit no signs of heating and that appear indiscriminately mixed among the flint artifacts. The edges of many of these fragments presumably served as crude cutting tools, although only one of them satisfies the standard definition of a chopper. The only complete cobble bears signs of having served as a hammerstone.

The second upland site contributes a further note of contrast. This is Lacaud, which is located 1 km to the north in the same commune some 130 m above the flood plain (Gaussen and Moissat 1985). Here, again, the occupation is sharply restricted, in this case to a well-delineated oval zone occupying some 28 m². Rocks appropriate to stone features are absent, and equally uncharacteristically, quantities of large but seemingly unused nodules of red ocher appear. Unlike Le Châtenet, flint is abundant. The assemblage of 136 retouched tools represents an Early Magdalenian industry and includes fairly well-made endscrapers, numerous crude burins

on flakes, and—presumably reflecting a specific activity conducted at the site—an abundance of elevated but crude bec and nosed scraper forms.

1.4 Valley sites

The Neuvic sites located on or near the valley floor exhibit equally great contrasts and novelty. Here too the tool assemblages involved usually resemble conventional shelter industries but in some instances remain distinctively apart.

1.4.1 Le Mas de Sourzac

Typical is Le Mas de Sourzac (commune de Sourzac), whose occupation extends over at least a hectare and yields a Middle Magdalenian industry similar to the one that dominates Plateau Parrain. Two exposures dug in 1966 and 1968, yielding assemblages of 45 and 85 tools respectively, revealed loosely organized, more or less rectangular pavements. Their original disposition is a matter of guesswork, because the couche has been disrupted by plowing.

Comparably large archaeological terrains bearing essentially the same Middle Magdalenian industry are so ubiquitous to the valley floor as to suggest this industry represents the dominant period of occupation of the sector, constituting what might be termed the *Magdalénien neuvicois*. (It probably accounts for most of the unnamed sites indicated by dots on the map in figure 1.1.) Unfortunately, the intensive cultivation and erosion to which the flood plain has been subjected appears to have left few of their archaeological horizons intact—or at least, as in the case of Le Mas de Sourzac (and Solvicux itself), free from major disturbance.

1.4.2 La Côte

Valley floor sites also can be distinctive. Particularly interesting from the industrial point of view is La Côte (commune de Neuvic) where the beginning of the Upper Paleolithic sequence is represented in the form of a Chatelperronian (Castelperronian) industry (Gaussen and Texier 1974). The site may once have been rich, given that 104 tools were recovered just from the vertical stratigraphic section left by the road cut that brought it to light. Much of the zone of

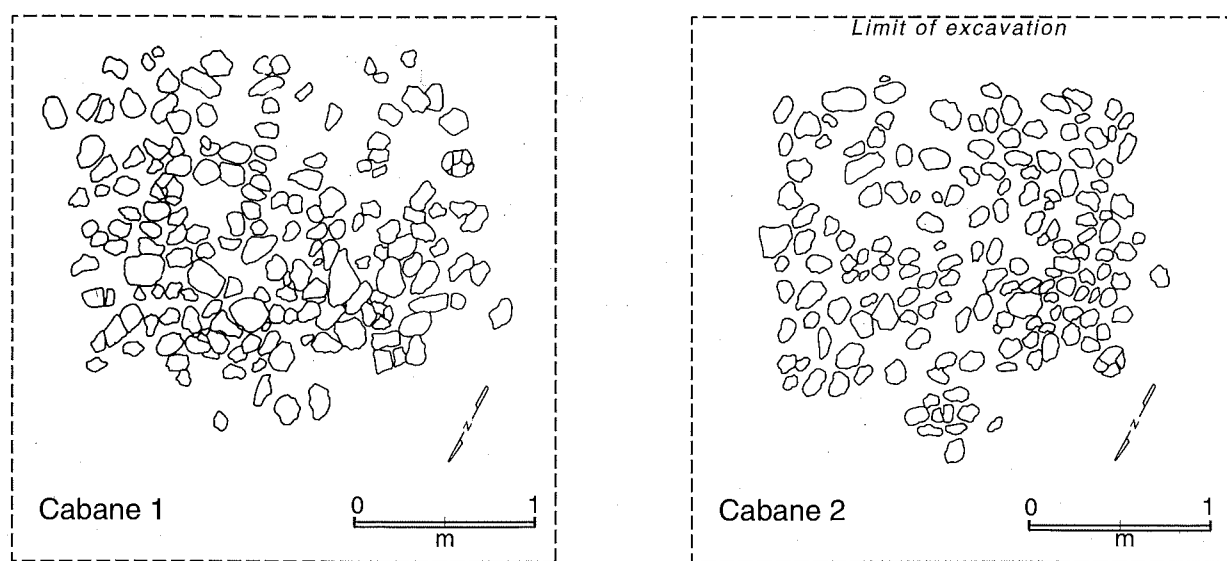


Figure 1.6. Le Breuil rock plans. (After Gaussen 1980)

occupation seems to have been destroyed; the remainder of it is now inaccessible to excavation, and nothing is known of its horizontal organization and possible rock structures. This is unfortunate because La Côte is the only Upper Paleolithic Neuvic site other than Solvieux whose archaeological deposits extend deep below the plow zone.

1.4.3 Le Breuil

Le Breuil (commune de Neuvic) is a particularly striking valley floor site that furnishes a unique ensemble of stone structures and flint artifacts. Here four small rectangular *cabane* pavages about 2 m² each are disposed at approximately 15 m intervals in a more or less straight line. Two of them, cabanes 1 and 2 (figure 1.6), are perfectly intact, while the other two are heavily disturbed by vine cultivation. Particularly noteworthy is the paucity of flint artifacts, which comprise only a handful of pieces on each pavage. Equally noteworthy, the intervals between the pavages seem to be devoid of artifactual material altogether. Unfortunately, the terrain now houses a private residence and is closed to further exploration. The tool assemblage from Le Breuil is too small to be assigned with precision to an established industry, but its typological range is consistent with stage I, the *raclette* phase, of the Early Magdalenian.

1.5 Solvieux

For sheer bulk and complexity, Solvieux stands alone. In part this is because of the intensity of excavations there, which—whether measured in terms of work expended or material recovered—considerably exceeds that of all the other Neuvic sites combined. Limitations of time and labor have necessarily restricted Gaussen's attention at the other Neuvic sites to archaeological horizons that lie close enough to the plow zone that they can be prospected and exposed directly from the surface. At Solvieux, however, we have been able to go deep, and five large-scale field campaigns directed by the writer between 1967 and 1974 saw 2500 m³ of deposit excavated. As mentioned in the preface, this effort produced a kilometer of dressed stratigraphic sections, nearly 2000 m² of horizontally exposed archaeological levels, and some 4000 retouched stone tools. That this work still left more than 80% of the site's estimated archaeological resources in the ground indicates bulk and complexity in a more literal sense as well. For Solvieux is not a site but a terrain incorporating several overlapping sites, a complex of diverse settlements distributed among a succession of buried topographies forming the transition from the lower valley slope to the flood plain. It is a deposit that can attain several meters in depth, that can rival a major rock shelter in its stratigraphic

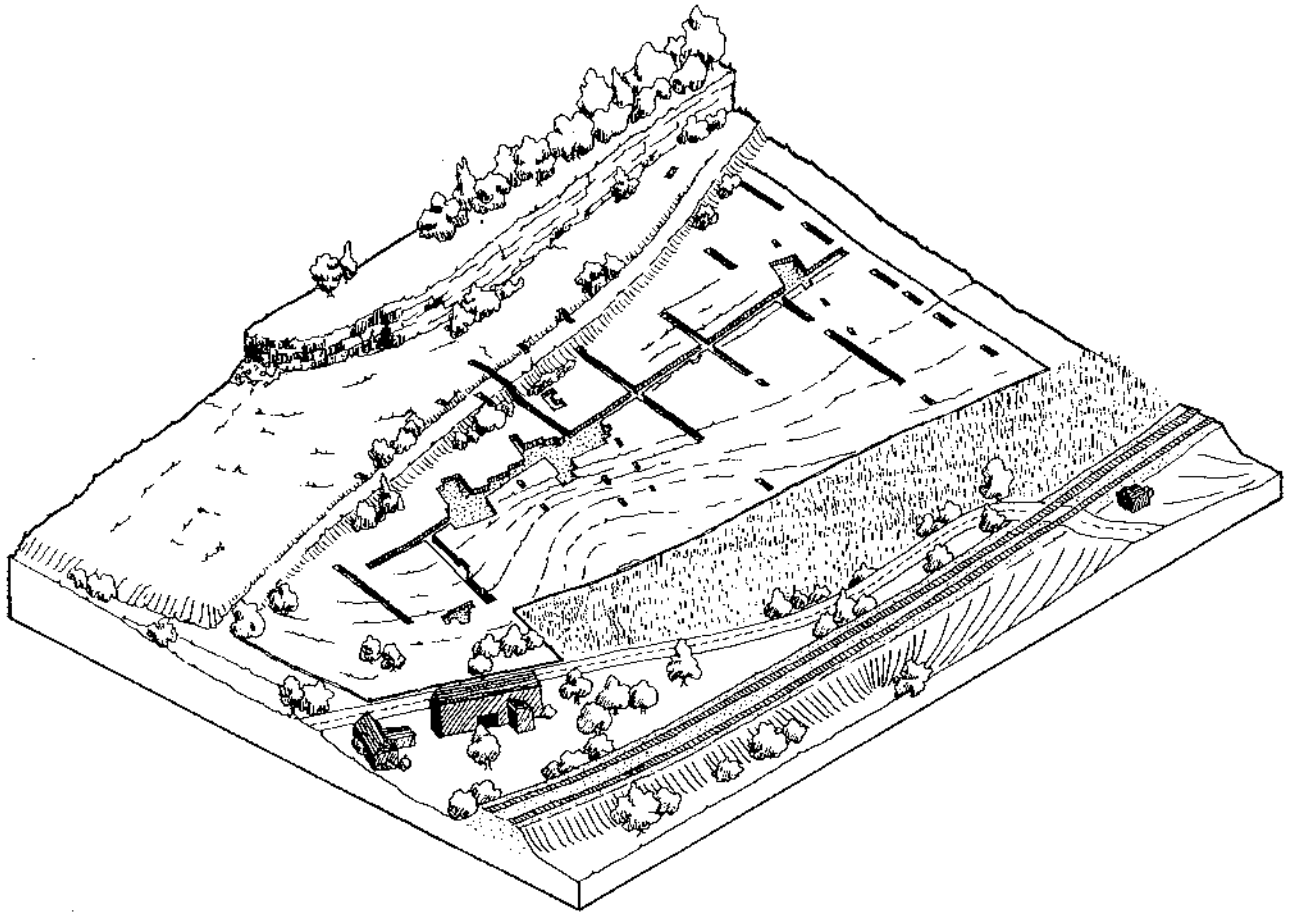


Figure 1.7. Isometric view of Solvieux

complexity, and that varies markedly in composition from one point to the next over 2 hectares.

1.5.1 The site

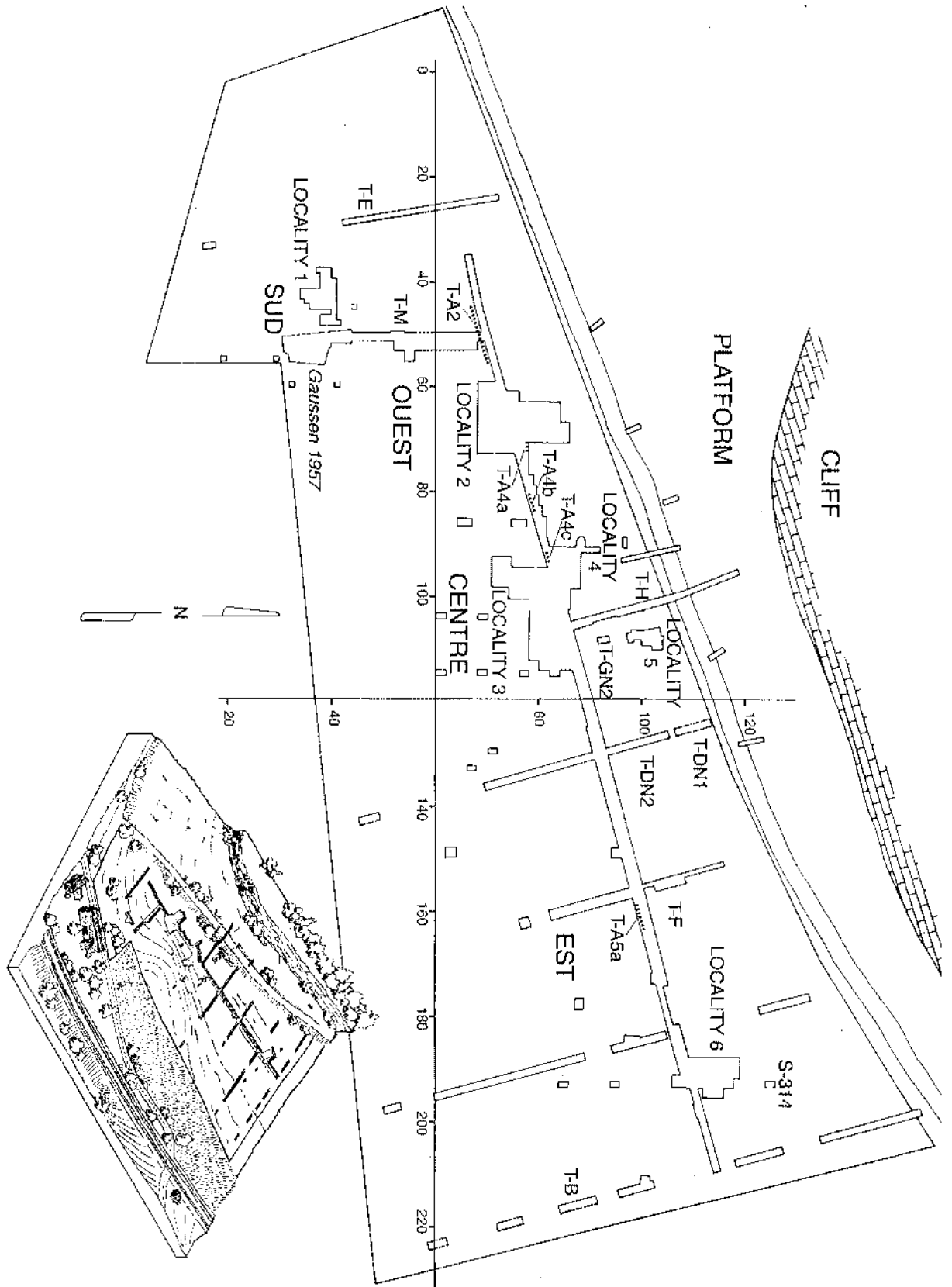
Solvieux overlooks the Isle River from its northern valley slope, just upriver from the present confluence of the Isle with a minor stream tributary named the Beauronne. It lies in the commune of Saint-Louis-en-l'Isle, just west of the village of that name. Much basic information about the site and its setting can be gained from the isometric depiction (figure 1.7), site plan (figure 1.8), and contour map (figure 1.9), as well as photographs of the terrain (figures 1.10 through 1.12). Solvieux is a field covering somewhat more than 2 hectares that slopes upward in a northwesterly direction from a departmental road toward a low cliff that defines the escarpment of an overlooking plateau. Forming an intermediate

step between the field and the cliff is a broad elevated platform whose edge defines the northern boundary of the site proper. South of the field a group of centuries-old farm buildings lies between the road and a gravel railroad embankment that carries the railroad tracks of the Perigueux-Bordeaux line. Beyond this lies the flood plain of the Isle River, which in its current bed loops upward toward Solvieux from the village of Sourzac to meet the Beauronne 200 m southwest of the site.

The site, as indicated by the boundaries drawn in figure 1.8, is a somewhat arbitrary construct. These boundaries were defined when the terrain was initially rented from its proprietor, more with reference to the land parcels that were available for the project's operations than to the actual horizontal distribution of Solvieux's intact archaeological horizons (which were then largely unknown). These

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Figure 1.8. Solvieux general site plan



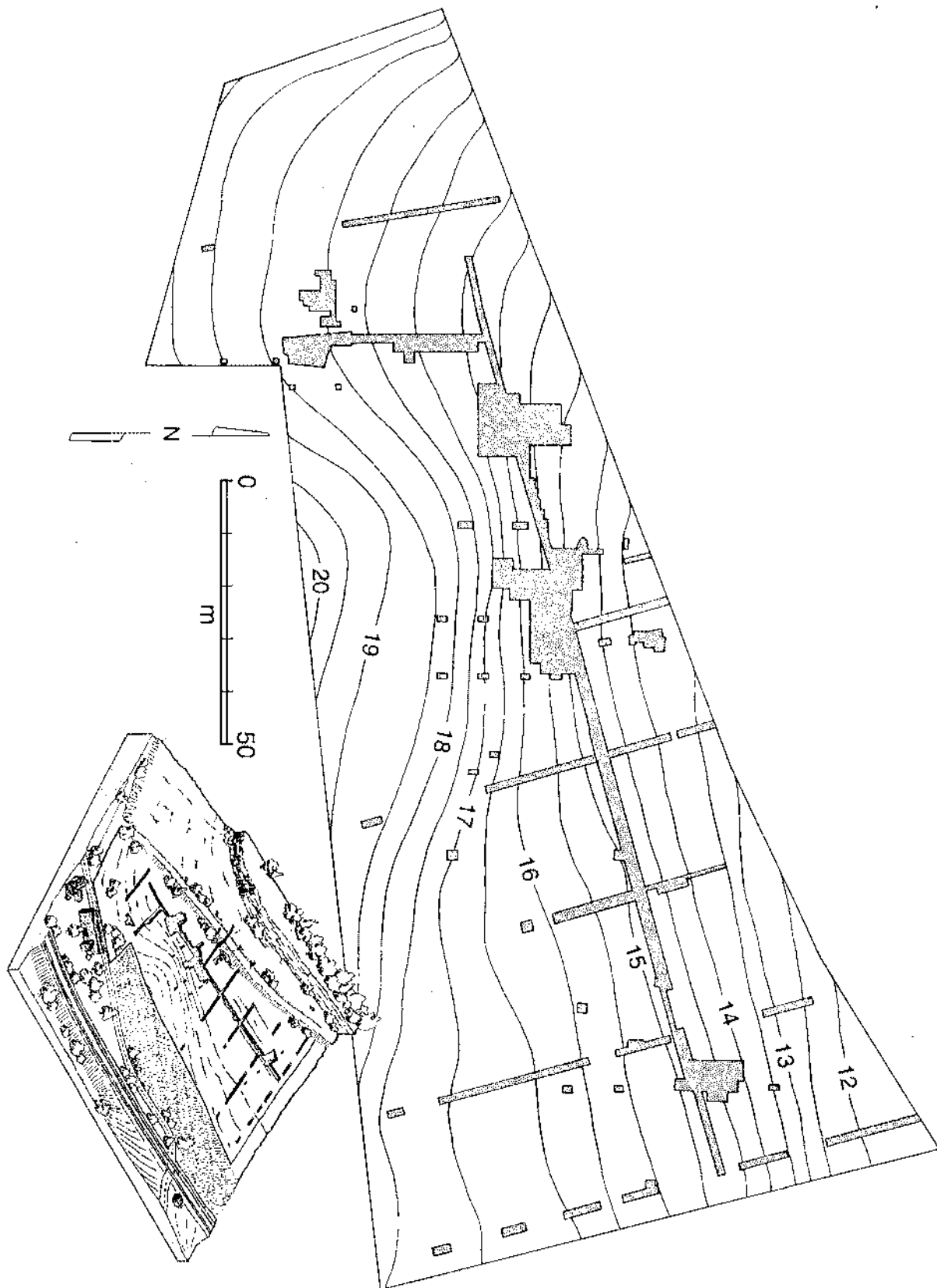


Figure 1.9. Solvieux contour plan. The contour lines are indicated in 0.5 m intervals extending below a datum overlying the cliff, the highest point of the terrain.



Figure 1.10. Solvieux Centre viewed from the south. The plow zone has been removed preliminary to beginning the locality 3 exposure; the platform and cliff lie beyond.

stop well short of the western and southern boundaries, but may extend some distance beyond the eastern one into a vineyard inaccessible to archaeological exploration. Only the northern boundary is entirely realistic, because it coincides with the margin of the platform whose edge marks the northern limit of Solvieux's fill deposits. Some Mousterian materials do, in fact, continue beyond this boundary to the surface of the platform. But, as we shall see, they have only very modest archaeological value, and they bear no direct stratigraphic relationship to the Upper Paleolithic horizons buried in the field below.

The terrain subdivides into three broad areal divisions: Solvieux Ouest, Solvieux Centre, and Solvieux Est. The transition from Ouest to Centre falls between the excavation units identified on the figure 1.8 site plan as localities 2 and 3/4, and that from Centre to Est falls between locality 3/4 and trench D. These sectors in fact represent quasi-distinct archaeological sites, partly by nature and

partly by default. For each possesses a considerable degree of autonomy in its archaeological content and precise stratigraphic correlations are in any case difficult to draw from one to the next. Upper and lower, that is, northern and southern zones, are recognized within each division. In this case, the dividing line is trench A, the principal stratigraphic artery that traverses the site from west to east in the middle latitudes of its intact archaeological deposits. The lower latitudes are essentially sterile archaeologically except in the southwestern part of the site in, and to the north of, locality 1. Following Gaussen's usage, this part of lower Solvieux Ouest can be referred to as Solvieux Sud.

Figure 1.13 schematically depicts the basic components of Solvieux's physical structure. The limestone that frames the site dates to the Maestrichtian stage of Late Cretaceous times. It is visible today in the cliff, and it also defines the horizontal surface of the platform that extends outward from the base of the cliff. It disappears at the margin of



Figure 1.11. Solvieux Ouest viewed from the cliff. Beyond the platform locality 2 appears under the large digging shelter, with trench M to the west. Beyond lies the burned out laboratory, the railroad embankment, and, in the distance, the Isle River.

the platform, where it plunges abruptly to form the northern edge of the bedrock step that contains Solvieux's fill deposits. While testing indicates that it lies more than 4 m below ground surface at this point, its precise configuration is impossible to establish because it is covered by a talus slope of brecciated limestone detritus cascading from the lower edge of the platform. But it shortly must level off again to form the base of the step, beyond which it continues its southward movement so nearly horizontally that it is intercepted by the sloping surface of the field in the area of the road and farm buildings.

The current surface descends about 6 m in its reach from the base of the platform to the road. Gentle and regular in the eastern sector of the field, this descent is somewhat more abrupt along the western margin, as well as in a broad basin that dominates the central portion of the terrain. The field has been intensively cultivated, and a clearly demarcated plow zone appears throughout. Beneath this zone lie

two major formations of fill deposits. The lower one comprises stream terrace gravels and fluvial sands, which are essentially sterile archaeologically. It is the upper one that contains Solvieux's archaeological wealth. This deposit is a colluvium of sands, silts, clays, and gravels whose makeup attests to several distinct episodes of deposition, erosion, and weathering. The numerous archaeological levels, or couches, found within it consist of stratigraphically bedded concentrations of stone tools, debitage, and rock features whose constituent cobblestones in Solvieux terminology are designated "couche rocks." While there is much that is reminiscent of the other Neuvic sites in the content and disposition of these couches, there is also much that is novel.

1.5.2 Archaeological couches

More than a score of archaeological horizons have been encountered at Solvieux ranging from Mousterian to Magdalenian times (figure 1.14). A few of these are too poorly known to be identified



Figure 1.12. Solvieux Est viewed from the cliff, showing the platform in the foreground and deblais heaps for trenches A and C on the site's main slope. The village of Saint-Louis-en-l'Isle is visible in the left background.

industrially. Some that are identifiable consist only of remnants of occupations that were largely lost to erosion during the Pleistocene. These include the Mousterian itself (couche C), as well as both Aurignacian (couche D) and Solutrean (couche S) horizons. The latter two are of special significance because their presence elsewhere in the Neuvic sector is attested to only by isolated finds of diagnostic tools. The bulk of Solvieux's archaeological levels make up the principal horizons and secondary lenses of seven major archaeological couches. Their placement in the Upper Paleolithic sequence of the Perigord is shown in figures 1.2 and 11.1.

Couches I and II: Middle Magdalenian

The youngest levels are couches I and II, which represent Middle Magdalenian occupations resembling Plateau Parrain and the several valley floor stations attributed to this industry. Once extensive, they have been reduced by plowing and erosion to an island of archaeological deposit extending over a few thou-

sand square meters around locality 1 in Solvieux Sud. Even here they have been heavily damaged by post-Pleistocene occupations and the plow. Gaus-sen's original excavations (1980:57–102), as well as our own, reveal fairly heavily, if not contiguously, paved surfaces similar to those at Le Mas de Sourzac. Assemblages of 294 and 258 tools, respectively, were recovered for couches I and II from a 28 m² exposure in locality 1. These together make up an industry quite comparable to that collected by Gaus-sen's original excavations just to the east. Chapter 8 provides a detailed analysis of its typological make-up, while its significance to Magdalenian systematics is discussed in § 11.2.

Couche A: Early Magdalenian

Couche A is a massive Early Magdalenian (stage I), or Badegoulian, occupation that dominates the middle latitudes of Solvieux Centre. It is best known from its principal horizon exposed over 197 m² in locality 3, which yielded an assemblage of 2197

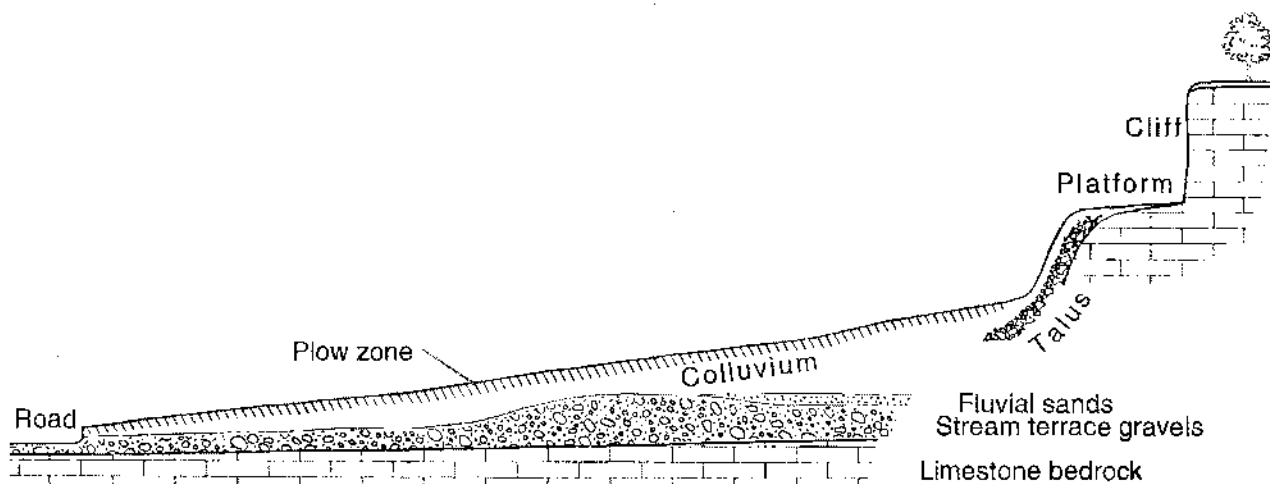


Figure 1.13. Highly schematicized north-south section of Solvieux's physical structure

stone tools. The industry is reasonably well made on robust blades and is comparable to Magdalenian I assemblages from the regional type-site of Laugerie-Haute, save for its exceptionally rich component (34%) of the diagnostic tools with steeply retouched edges known as *racettes*. It is detailed in chapter 7, while § 11.1 reviews its implications for the evolution of the Magdalenian industrial tradition. The occupation incorporates 2000 *couche* rocks, which are disposed in a variety of somewhat ill-defined features. These rocks are accompanied by altogether different structures made up of extremely large blocks that individually may weigh more than 50 kg. Special finds yielded by *couche* A include two handled lamps and a large slab engraved in the same art style as that seen at Lascaux and Gabillou.

Couches III, B, and M: Raysses Perigordian

Dating appreciably earlier is a vast zone of settlement that stretches across the entire middle and upper reaches of Solvieux and yields an industry characterized by an abundance of Raysses (or Basaler) burins. Although they possess very similar typological inventories, the specific local manifestations of this settlement in different sectors of the site exhibit different (if usually modest) proportions of Gravettian backed blades, as well as marked differences in the morphology of tool blanks. Conventional regional systematics assigns this industry to stage Vc of the Perigordian tradition. In the contro-

versal view of the researchers who published the highly significant collections from the rock shelter of Abri Pataud, however, the industry belongs to the later phase of a distinct, semi-autonomous tradition they have labeled the Noaillian. (We have much to say about this controversy later [see § 11.3]). It will serve our purposes meanwhile to use the term Raysses Perigordian—or, where it proves convenient, simply Rayssian—when referring to the relevant *couches* at Solvieux. These designations should not be taken too seriously. They are simply convenient labels, neutral terms that beg the larger issue of the culture-historical genealogy of the Solvieux industries but leave no doubt about their general character and place in the regional archaeological succession.

Three principal quasi-contemporary areal units are recognized in Solvieux's Rayssian deposits, whose tool samples are summarized in chapter 9. *Couche* III dominates in Solvieux Ouest and is best represented by an assemblage of 783 tools recovered from locality 2. *Couche* B in the Centre sector is represented by an assemblage of 190 tools from locality 4. In Solvieux Est the industry takes the form of *couche* M, best known from an assemblage of 471 tools recovered from locality 6. None of these horizons yields Noailles burins in any but very modest frequencies, but *couches* III and B possess inferior lenses which seemingly do and which inform on the interesting chronological role played by

	OUEST	CENTRE	EST
Middle Magdalenian	I, II		
Early Magdalenian		A	
Solutrean		S	
Raysse Perigordian	III	B	H, M
Noailles burin horizon	IIIb	Bb	
Unknown industry	sub-III	L, Y	
Aurignacian	D		
Beaurnonian	IV		
Mousterian		C	

Figure 1.14. Checklist of Solvieux's archaeological couches by sector

this special form. Although artifactually fairly dense, these Raysse Perigordian horizons show little obvious spatial organization. Cobblestones dispose themselves in fairly light scatters that are punctuated locally by denser, if still amorphous, rock concentrations and by an occasional large block.

Couche IV: Beaurnonian

Solvieux's most intriguing occupation, couche IV, occupies the bank of an ancient stream channel now deeply buried in upper Solvieux Ouest. Its stratigraphic position suggests it may date close to the

beginning of the Upper Paleolithic sequence, somewhere in the early Aurignacian/Chatelperronian time range. Its industry, reviewed in chapter 10, is characterized by an unusual and seemingly primitive method of blade production and a tool inventory that is unique to Solvieux. Nearly half of the assemblage is composed of "Solvieux truncations," a diverse class of steeply truncated pieces that began their careers as narrow, pointed forms but that were radically altered by subsequent breakage and rejuvenation into end products that range in form from atypical becs through heavily undercut truncations to shouldered endscrapers. A notable proportion of the industry's strong burin component also seems to derive from reworked Solvieux truncations, while many of the burins that remain are atypical but highly standardized quasi-transversal forms whose design blurs the conventional typological distinction between dihedral and truncation burins. The rest of the industry consists of a handful of atypical endscrapers and a considerable number of curved bladelets bearing abrupt inverse retouch.

The couche IV industry is named the Beaurnonian because the buried channel with which it is associated presumably marks a former course of the Beaurnonne, a stream that today flows immediately to the west of Solvieux and enters the Isle River just downstream from the site. The Beaurnonian must be attributed to either a hitherto unrecognized industrial tradition or an activity complex peculiar to open air occupation or to both (§ 11.4). It is principally known from locality 2, where its main horizon has yielded an assemblage of 556 tools. Because of the considerable bulk of archaeological horizons that must be excavated before this deep lying occupation is reached, its exposure is disappointingly small. At this depth in the deposit, however, limestone and even small amounts of organic material have escaped dissolution, and there have come to light the Neuvic group's only examples of what appear to be hearths.

1.5.3 History of work at Solvieux

As its place-name suggests, Solvieux (literally 'old ground') has for centuries been recognized for its artifactual wealth. The collections made by antiquarians of the past presumably came from the scattered Neolithic, Bronze Age, and Gallo-Roman

remains that the plow transects at many points on the terrain. Solvieux's Paleolithic resources were appreciated only much more recently (see Gaussen 1980:23). Only after World War II were they first mentioned in print, by a flint collector named Louis Peyrille (1948), who described a collection of tools he had gathered 10 years earlier at a place he mistakenly identified as Beaufort (which actually lies a few hundred meters southwest of Solvieux fronting Plateau Parrain). In 1952 he returned with the then regional Director of Antiquities, Severin Blanc, to make a considerably larger collection. Their joint publication correctly refers to the terrain as Solvieux (Peyrille and Blanc 1952).

While rightly arguing that the tools dated to Upper Paleolithic times, neither they nor more knowledgeable prehistorians of the day, such as Henri Breuil (1960:130) and Denis Peyrony (1949:43), felt certain about Solvieux's placement in the regional archaeological sequence. This is not altogether surprising because the available collections had all been made in Solvieux Sud, which is dominated by Middle Magdalenian industries that lack obviously diagnostic *fossile directeur* stone tool types (apart from diminutive backed bladelets that are rarely recovered in surface surveys). What is more telling is that the real nature of the site itself went unappreciated. Reflecting the traditional mistrust of open air sites, researchers usually assumed that the archaeological deposits at Solvieux were no more than artifactual debris washed down from a destroyed rock shelter that once existed in the overlying cliff.

In 1956 Blanc pointed out the site to Gaussen, whose developing interest in archaeology had recently prompted his acquiring the engraved cave of Gabillou. That same year formal excavation began, which proved that Solvieux's archaeological deposits were, indeed, the intact remains of open air occupations. Gaussen's efforts concentrated upon a 40 m² exposure in what is now locality 1 in Solvieux Sud, disclosing a large, if diffuse, cobblestone pavage bearing a rich industry that he correctly identified as Middle Magdalenian. A subsequent test trench that Bordes and some of his Institut associates helped Gaussen extend northward from this exposure revealed that two distinct couches are actually incorporated into the pavage and that be-

neath it lies a third that could tentatively be assigned to the Upper Perigordian. (These three horizons constitute what are designated as couches I, II, and III, respectively, in this volume.) Although modest in comparison to what was to follow, this work and the surface exploration it prompted elsewhere on the terrain allowed Gaussen to conclude that Solvieux is one of the largest and potentially richest Upper Paleolithic sites in Western Europe. He then turned his attention to exploring other sites in the Middle Isle Valley, with the results we have seen.

The Solvieux project began to take shape in 1966, when, thanks to the offices of Professor Hal-lam L. Movius, Jr., the writer was introduced to Gaussen and made a brief reconnaissance of the Middle Isle Valley. Arrangements made at this time led to Solvieux being excavated as a collaborative project under the writer's direction between the University of California, Los Angeles (UCLA), and the Institut du Quaternaire, Université de Bordeaux. Were it thought important, an exhaustive history of the excavations could be reconstructed from the details furnished in piecemeal fashion in the next two chapters. It should suffice here to furnish only a brief overview. Figures 1.7 and 1.8 show the placement of the various localities and trenches that will be mentioned.

Excavation began in June 1967, with a crew of seven laboring over a 3-month summer campaign. Work focused upon Solvieux Sud (the only part of the site initially available for excavation), concentrating upon the Middle Magdalenian levels (couches I and II) in a large exposure lying immediately west of the one dug by Gaussen in locality 1. Subsequent testing elsewhere on the terrain led to the discovery of a vast Early Magdalenian settlement in Solvieux Centre (couche A), a small pavement of which was exposed in what was to become locality 3. The succeeding year's campaign saw a considerably more ambitious program pursued by a crew of 12. During the first month several test pits and segments of five major stratigraphic trenches were dug, in part by a mechanical backhoe, with the twofold purpose of determining the nature and disposition of archaeological couches over the site as a whole and of obtaining representative deep stratigraphic sections of its deposits. It was at this time

that Drs. Jean-Pierre Texier and Henri Laville of the Institut began their investigations of Solvieux's geology. The remaining 2 months of the season saw the large exposure of couche A that dominates locality 3.

Fieldwork was severely curtailed during 1969 and 1970 because of financial uncertainties. The director made solo field excursions of 5 week's length during both years. This work involved preparing a deep stratigraphic profile (trench A2) for a site visit by the 1969 congress of the International Quaternary Association (INQUA) and exploring hitherto untouched sectors of the site. This testing focused upon middle and upper Solvieux Ouest, laying the groundwork for future work in trench M and locality 2, and leading to the typological definition of couches III (Raysse Perigordian) and IV (Beaurnonian).

The next year brought catastrophe. In April 1971 a local miscreant set the Solvieux laboratory afire. The laboratory had occupied part of a centuries-old farm building whose interior was consumed by the flames and whose roof collapsed, bringing down more than a ton of tile and rubble. Few retouched stone tools, documents, excavation records, or laboratory instruments were destroyed, as nearly all of these were housed during the off-season at UCLA or at Gaussen's own laboratory in Neuviç. But a grievous loss was suffered with the destruction of all debitage collections from Solvieux—of which tens of thousands of unmarked pieces were awaiting analysis in several hundred paper bags stored in the site laboratory. In addition, over 100 flint nuclei housed in metal trays exploded like popcorn from the heat, and nearly all of the project's store of excavation equipment and supplies were destroyed.

The arsonist was jailed, and the immediate logistic problems created by the fire were quickly settled. Despite considerable financial difficulties, the ensuing field season achieved substantial results, with a crew of more than 20 members working for 3 months. Our attention had partly to be diverted toward replacing some of the data lost in the fire, because of which excavation was renewed in locality 3. The major effort was directed as originally

planned toward trench M and the potentially rich locality 2 in northern Solvieux Ouest, where the most important assemblages for couches III and IV were to be obtained.

Conditions during the following year allowed for only a 5-week field campaign by a crew of six. It involved two principal tasks. One was the excavation of a continuous section of trench A between localities 2 and 3 to clarify their stratigraphic relationships. The other involved obtaining detailed stratigraphic profiles and representative tool samples in a series of trenches (D, G, H, J, I, and P) that had been dug along the northern zone of Solvieux Centre the previous year but could only be cursorily examined at the time because of the danger of wall collapse. Apart from filling in areal knowledge of the site, this work was prompted by rumors of a road construction project that might involve all or much of upper Solvieux.

The single most productive campaign took place in 1973, with a crew of 30 laboring for 12 weeks. Locality 2 was more than doubled in size, work that among other things brought to light the complex configuration of the Beaurnonian (couche IV) occupation surface and a minor, but intact, lens of Aurignacian (couche D). The broad and deep locality 4 was excavated immediately to the north of locality 3. It revealed a northern extension of the Magdalenian I couche A and Solvieux Centre's variant of the Raysse Perigordian (couche B), the latter accompanied by an inferior lens (Bb) yielding several Noailles burins. Much attention was also devoted to the northern sector of Solvieux Centre, including the expansion of the previous years' test pits into the exposure known as locality 5. The results of this work, pursued in the hope of finding a substantial Solutrean occupation (couche S), were disappointing. The season ended on an alarming note with the unannounced appearance of highway engineers to lay out the right-of-way for a road that was shortly to transect the northernmost zone of the site. Its construction could not be halted, but negotiations led to the road being engineered in such a manner as to traverse the site on an artificial embankment that would cover, but not intrude upon, the archaeological deposits.

The following year's campaign occupied a crew of 25 who, because of continued financial restrictions, worked only 2 months rather than the usual 3. Because it was to be the last season, considerable energy was devoted to test excavations designed to clarify several unresolved stratigraphic problems that remained in Solvieux Ouest and Centre. The bulk of the effort concentrated in Solvieux Est, however, culminating in the large exposure known as locality 6. It was here that the principal tool sample

and a horizontal plan were obtained for the Raysse Perigordian couche M occupation that dominates the eastern half of the site.

The writer has returned several times to work with Gaussen at other Neuvic stations and to study the comparative sample of data underlying the Solvieux analysis. But the site itself has not been touched except by surface collectors and one clandestine excavator who was brought to justice. Solvieux sleeps again under cultivation.

2

Digging Solvieux

The specific makeup of Solvieux's stratigraphy and cultural deposits is detailed in chapters 3 and 4. Here we lay the foundation for that review by summarizing in more general terms the nature of the site's archaeological and natural deposits and the methods we used to exploit them.

2.1 The field problem

The built-in logic of Solvieux's deposits presents a challenge to archaeological strategy and logistics that has seldom been encountered—at least on a comparable scale—by Paleolithic research in Western Europe. Assuming that Solvieux would simply constitute a large-scale version of the kind of site that Gaussen dealt with elsewhere in the Neuvic sector, we expected relatively simple deposits of clearly defined occupation levels, each lying accessibly near the ground surface, with many of them presenting relatively obvious horizontal organization highlighted by well-defined cobblestone structures. Sondaging could therefore proceed by means of the test pit and metal probe directly through the plow zone, allowing subsurface features to be outlined and their artifactual wealth assessed in a rapid, straightforward fashion. Systematic horizontal excavation of large exposures would follow in areas the testing revealed to have high archaeological potential.

Reality proved otherwise. Solvieux turned out to be a voluminous, multileveled site, or more accurately, a terrain incorporating several adjacent sites,

each possessing different buried topographies and different, if partially overlapping, stratigraphies. Much of its archaeology lies 2 and even 3 m below the surface. Because the disposition and content of its more superficial cultural levels offer no hints as to what may lie lower down, the testing methods used with considerable success at other Neuvic sites proved of little avail. New means of testing had to be devised that allowed one to grapple with stratigraphies that might be as deep and complex as shelter deposits but which, in addition, had to be followed horizontally for scores, and possibly hundreds, of meters. In terms of sheer volume alone, no project in Western Europe with which we were acquainted faced a similar task of archaeological exploration in comparable deposits. The task also called for new sampling strategies, because—for reasons we will examine—what one sees in passing through archaeological levels vertically is altogether different from what one sees in testing them horizontally over a broad area from above.

Solvieux also required innovative strategies for excavating large exposures of occupation surface. For one thing, the logistics of working deep lying deposits entail special problems in measurement and photography, shelter and drainage, and the removal of *déblais*, that is, backdirt. But much more important is the elemental fact that a deeper occupation cannot be exposed horizontally until those lying over it have been removed. One often faces the choice, therefore, of expending considerable effort upon higher archaeological levels that may not be

particularly valuable in order to reach a potentially promising lower one or of gaining knowledge of one's lower levels only serendipitously as a result of horizontal digging strategies designed with the higher ones primarily in mind. In making such decisions, one must be aware of two factors that make for a frustrating combination: by virtue of their position, lower levels have greater archaeological potential than higher ones because they are more likely to be undisturbed; at the same time, however, it is more difficult to obtain an accurate picture of them from preliminary testing. In short, lower levels promise greater returns than higher levels, but they also pose greater risks to a project's time and resources.

There is, in addition, the taphonomic question of the stratigraphic integrity of archaeological levels in deposits like those at Solvieux. Post-Pleistocene settlement and cultivation have caused much damage, and—even aside from the massive effects of erosion—there has been significant disturbance by solifluction and cryoturbation, animal tramping, and the less dramatic, though considerably more profound, alteration of archaeological deposits by illuviation as well as by subsidence resulting from the washing away of their finer sediments. Moreover, even though the level to which they belong may retain much of its integrity as a stratigraphic unit, individual artifacts can promenade vertically. The consequences of these taphonomic factors may be minimal in many of the Neuvic sites, whose single occupations can suffer considerable vertical displacement and yet still display their overall horizontal organization when mapped on a plan. But at Solvieux the archaeological horizons are multiple and often close lying, as a result of which any significant amount of vertical movement easily leads to the mutual contamination and even stratigraphic merging of once-distinct levels. Segregating their artifactual contents successfully, let alone reconstructing their original horizontal organizations, is always difficult and frequently impossible.

In sum, our attempts to gain control over Solvieux's occupations have often met with frustration. Not all of them happen to have received horizontal exposure in what seems to be an especially interesting and informative sector. Some exhibit major signs of disturbance, and many also raise issues of taphonomy and stratigraphic integrity that

are irksome to the extreme. Their interpretation is also rendered more difficult because they can be vast areally, extending over thousands of square meters of quasi-contemporary occupation, and because they are less highly structured horizontally than some of the archaeological horizons at other Neuvic sites.

The consequence of these special aspects of Solvieux's structure has been a preoccupation not just with the site's archaeological levels as such but also with its deposits in the broadest sense. This is why natural levels will receive as much attention in the pages that follow as cultural ones. It also accounts for the amount of discussion devoted to archaeological field techniques and logistics.

2.2 Archaeological deposits

A detailed picture of Solvieux's cultural levels will emerge in chapter 4, and only the salient points require mention here. As has been noted, the levels take the form of depositional concentrations of flint tools, debitage, and couche rocks (figure 2.1). They tend to have low visibility because they are devoid of organic materials like bone and hearth debris and because they rarely occupy sedimentological contexts that are peculiar to themselves and consequently stand out against the background soil and gravel members of the colluvial zone itself. Their flint component does not depart significantly from the norms established by the other Neuvic sites in the way it presents itself in the ground. The composition of the waste flakes and industrial debris accompanying the tools indicates that the latter were fashioned and used in the general area where they are found discarded. Moreover, virtually all of the varieties of flint employed in their manufacture derive from local limestone and gravel sources. Nothing suggests then that the lithic industries represent anything other than expedient technologies.

Couches undergo considerable taphonomic modification because of both cultural and geomorphologic processes. Still, given their age and depth, they are probably less disturbed than might be suspected by an archaeologist who lacked firsthand experience of them. And many natural agencies that are often assumed to have played a major role in disrupting archaeological levels in the open air have in



Figure 2.1. Surface of couche II in locality 2. The mixture of rocks, flint tools, and debitage makes up a typical archaeological horizon at Solvieux.

reality very little effect. For example, one might imagine that any cubic meter of deposit near ground surface would have been tunneled on tens of thousands of occasions since the close of the Pleistocene alone by burrowing animals such as moles and rabbits. Observation of the animals' actual behavior, however, as well as the testimony of the often perfectly intact archaeological levels themselves, indicates they, in fact, avoid artifact concentrations of any density. Tree roots also skirt, rather than pass through, dense horizons. The heavy forests that more than once must have grown at Solvieux seem to have imposed only minimal damage, and then not from their growth but as a result of their uprooting. Gaussen provides an extremely useful discussion of these and related aspects of open air taphonomy (1980:35–44).

A word is in order regarding some archaeological and stratigraphic terminology. At this point in the discussion we use the term “tool” (*outil*) in its conventional typological sense, that is, by restricting it to the retouched pieces that fall into the standardized ‘morphological’ artifact types employed in analyzing Upper Paleolithic assemblages and defining the stone tool industries to which they are assigned. Later we distinguish between tools and the “pieces” that bear them, but the distinction is irrelevant to the

needs of these earlier chapters. We follow American usage in extending the term “debitage” to refer generically to all other chipped flint that accompanies these tools—nuclei, unused tool blanks, waste flakes, burin spalls, and other small chipping debris. That many of these last bear edges that exhibit the stigmata of having been employed opportunistically as implements does not qualify them as tools in the above ‘typological’ sense. The distinction is followed because such forms have little or no diagnostic value for defining Upper Paleolithic industries in current regional systematics, and they consequently do not receive analytic attention here comparable to that given the standardized retouched pieces.

The term “couche” is employed in two somewhat different ways that are easily distinguished by usage and context. In one, it is simply synonymous with archaeological level in the generic sense; in the other, it is used to designate given levels (for example, couche A). In this second sense, the term has an abstract quality lacking in the first, given that it refers to an archaeological unit that both occupies a specified stratigraphic position and is characterized by a distinct artifact inventory. Here, it normally corresponds then to the manifestation in the ground of what conventional systematics regards as a distinct lithic industry, and it consequently may

comprise not simply a single level but an ensemble of levels that share the same industry. At Solvieux it so happens that these ensembles always consist of a principal level accompanied by one or two satellite lenses that lie stratigraphically contiguous to it and in fact often merge with it. When couches are considered in vertical perspective, they and their ancillary lenses are often referred to as archaeological "horizons."

Couches are designated by labels that do not necessarily provide a trustworthy guide to their inherent stratigraphic or horizontal relations. Most couches in Solvieux Ouest happen to receive Roman numerals, and most in Solvieux Centre and Est

receive capital letters. And couches I through IV in the former sector do happen to come in descending stratigraphic order. But in some cases, a couche's name identifies its industry (for example, couche S yielded Solutrean tools); and in other cases, it is the historical vestige of a supposedly temporary label used in field notes (for example, couche M was the 'main' couche encountered in early sondages in Solvieux Est). Even whimsy has played a role: couche D first appeared in notes as 'Dean's couchette' in honor of its excavator. Satellite lenses are distinguished from the principal member of the couche to which they belong by lowercase letters (for example, couche IIIa).

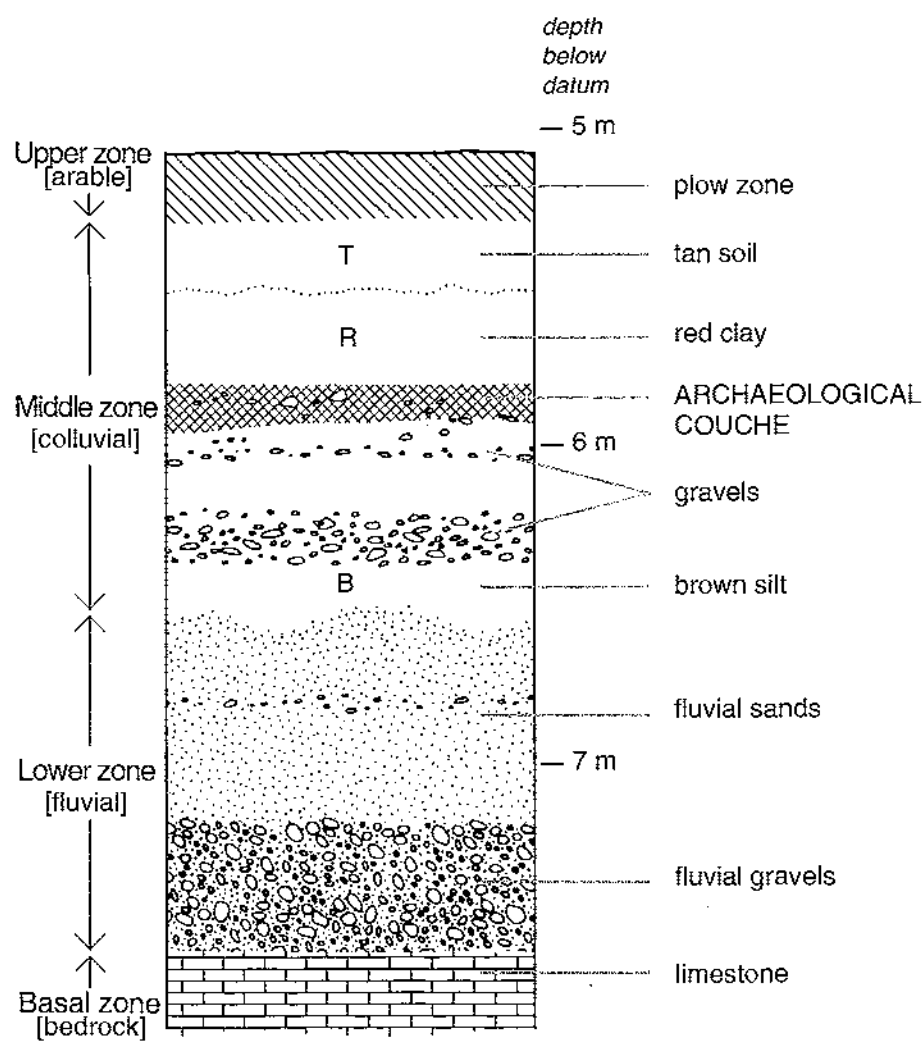


Figure 2.2. Schematic profile of Solvieux's stratigraphic zones

2.3 Natural deposits

For purposes of stratigraphic description, Solvieux's deposits can be characterized in terms of four principal zones: Upper (arable), Middle (colluvial), Lower (fluvial), and Basal (bedrock). These zones are virtually ubiquitous to the site and hence provide a common frame of reference for its deposits as a whole (see figure 1.13). In figure 2.2 they are depicted as they would appear in an ideal stratigraphic section dug from the plow zone to bedrock. Once the zones' general natures are understood, dealing with any specific geological section will simply call for a description of their local sedimentary aspect and consideration of how this aspect has been augmented, abridged, and modified in a manner different from the analogous zones observed in specific sections elsewhere on the site.

2.3.1 Basal and Lower zones

The nature and configuration of Solvieux's bedrock has already been described (§ 1.5.1). Intervening between it and the colluvial Middle zone is the fluvial component. This Lower zone contains two principal members. One is a gravel terrace composed of flint and quartz elements along with a considerable amount of weathered limestone and a small (4%) miscellaneous component that includes schists, diorite, and granitics. These gravels were deposited by the Isle River in Rissian times and contain only isolated finds of rolled and heavily patinated flint artifacts, presumably attributable to the Acheulian (Texier 1982:92–93); one is illustrated in plate 34k (see § 9.2.11). The terrace ranges from 1 to 2 m in thickness and exhibits much lateral variability. As is indicated in figure 1.13, it tends to be relatively thin in the northern portion of the site; but it increases in thickness and elevation somewhat south of trench A, only to thin again progressively (perhaps actually beveled by erosion) in sloping toward the southern margin, before reaching which it is truncated by the plow zone. (This is particularly well illustrated by the trench M stratigraphic section depicted in figure 3.5.) To the south of trench A, where they lie relatively close to the surface, the terrace gravels are charged with illuviated clay that colors them dark reddish-brown; to the north, where they are buried deeper and hence are less heavily altered, they are

lighter in color and their matrix is sandier. A thin layer of gray clay derived from decomposing limestone often intervenes between them and bedrock.

The second member of the Lower formation consists of one or more layers of coarse fluvial sands overlying the terrace gravels. They are archaeologically sterile. In the northern latitudes of the site these sands may be thick and subdivided into two distinct members: a brownish upper member enriched with illuviated clay and a lower one that is grayish and much less weathered. Light and discontinuous gravel lines often appear near the top of the upper member. South of trench A this formation tends to be reduced by erosion to local lenses and pockets of sand that occupy topographic depressions in the surface of the terrace gravels.

2.3.2 Middle zone

On both archaeological and geomorphologic grounds, the Middle zone is obviously a Later Wurm formation that sits unconformably upon the Rissian Lower zone. It is this very complex mixture of colluvial deposits that incorporates Solvieux's intact archaeological couches, and it consequently dominates most of the figures illustrating Solvieux's deposits in this and the following chapters. Its matrix is a fine sand, more or less enriched by clay and silt, and as a rule heavily altered postdepositionally by weathering. Its medium fraction consists of numerous gravel lines, and even coarser elements can appear in the form of isolated blocks. This colluvium was primarily laid down by slope-wash and solifluction, its component materials derived from such varied sources in and above the site as still older colluvial deposits, river gravel terraces, and the Tertiary detritus that mantles the overlying plateau. Aeolian deposition also seems to have been involved (Texier 1980:286).

Vertical differences in its fine fraction subdivide the Middle zone into distinct members that may conveniently be referred to as "soils" for descriptive purposes. Pedogenesis in the form of a textural B horizon ordinarily dominates at least its upper portion, which constitutes a dark reddish-brown clayey sand that is quite plastic when wet and extremely hard when dry. This member dominates the Middle zone throughout the site and is designated

by excavators as the "red clay". Where the zone is relatively thin, this red clay comprises its entire vertical extent. But where the zone is thick, a fairly distinct lower member appears in the form of a less weathered and considerably siltier sand. This "brown silt", presumably a C soil horizon, ranges locally from yellowish-brown to grayish-brown in color and assumes a compact granular texture that makes it easy to excavate whether wet or dry. Locally it can be underlain by additional Middle zone sediments in which the color and texture of the red clay appear anew. Finally, in lower Solvieux Ouest and again throughout Solvieux Est, the red clay is overlain by a "tan soil" of loamy sand, with which it has a highly irregular line of juncture.

The Middle zone incorporates extremely complex gravel ensembles, ranging from relatively fine pea gravels to stratigraphic members whose constituents are of pebble or cobble size (see figures 2.16, 3.7). At some points the gravels are thin and scattered, whereas at others they concentrate into fairly dense beds; but they are everywhere composed of individual lines that exhibit great lateral variability and that, as a rule, continue as integral units over only very short distances. All of the zone's gravel lines possess essentially one and the same mineralogical composition in which quartzite elements and nodules of black flint are fairly evenly mixed and all other rocks are exceedingly rare.

Because of the leaching at work in these acidic soils, neither organic remains, such as charcoal or bone nor limestone fragments are ordinarily preserved in the Middle zone. Its juncture with the Arable zone, which by contrast is rich in limestone fragments, is fairly clear-cut. But its point of contact with the Lower zone can be complex. Usually, there is an abrupt transition from a sandy or clayey member of the Middle zone to the fluvial sands of the Lower zone or, where these are absent, directly to the underlying terrace gravels. In some parts of the site the transition takes the form of a mixed ensemble of interstratifying colluvial gravels and fluvial sands; in still others, one or more gravel lines belonging to the Middle zone may become confused with gravels belonging to the surface of the terrace itself (see figure 4.17).

Complex interfacing is also seen along the northern border of the site. Here the Middle zone

encounters the massive limestone talus slope that descends from the platform and presumably fills much of the step leading from the essentially horizontal bedrock that underlies the site to the vertical cliff that originally mounted in the vicinity of the modern platform. This slope detritus presumably dates to Earlier Wurm times, and the poorly defined archaeological industry it contains is consequently attributed to the Mousterian (figures 2.3, 3.15). Associated with the above are "calc" members—Middle zone sediments enriched with calcium carbonates from the neighboring detritus (figure 2.4). Immediately adjacent to the slope deposit these calcs form a consolidated breccia that is homogeneously



Figure 2.3. Slope detritus descending from platform in trench H at northern margin of site, being mapped by Jean-Pierre Texier. Behind him the deposit is so dense and brecciated as to defy excavation by hand.

charged with limestone gravels and possesses a distinct upper border in the form of a cemented limy crust. In passing away from the talus, however, the sediments progressively regain their customary texture even though retaining a distinct whitish cast. Finally, only a thin white line continues along the member's upper margin, which, in turn, becomes highly convoluted, fades, and ultimately disappears.

Another special feature encountered in the Middle zone is cryoturbation, that is, in-place distortion of sediments due to frost heaving. When viewed in vertical section, it assumes the characteristic form of a contorted line of color change punctuated by intermittent patches of carbonate accumulation; if sectioned horizontally, it appears as whitish rings of carbonate outlining the upthrust blocks of sediment. Cryoturbation can profoundly contort an occupation surface, creating major vertical displacements among artifacts that originally lay side by side.

Unfortunately, the most common special features encountered in the Middle zone apart from the archaeological couches themselves are intrusions, particularly in Solvieux Ouest (see figures 3.4, 4.17). Younger ones are easily detected because

their limestone elements have not yet leached away and because their fill is darker and looser in texture than the surrounding sediments. These intrusions often contain calcined bone fragments and represent the disposal of diseased farm animals within the last century or so. Older intrusions can be more difficult to detect, because they are often artifactually poor and because their fill is so heavily altered by illuviation as to assume the texture and color of surrounding sediments. Detecting these intrusions is particularly important because they frequently contain Paleolithic flint artifacts that have been reintroduced into the site as part of their fill (hence, out of context); of course, these artifacts must be cleanly segregated from flint representing intact couches.

2.3.3 Arable zone

The plow zone is coterminous with a dark yellowish-brown loam averaging 20 to 25 cm thick. Apart from its distinctive color and composition, this zone is clearly distinguished from underlying sediments in possessing a more or less homogeneous component of rounded quartzite pebbles and large amounts of chalky elements of decomposing limestone. It



Figure 2.4. Calc zone in locality 5 in northern Solvieux Centre. Couche S overlies the calc zone; couche B begins inside it but emerges from its upper margin to the right in the section. The surface of the slope detritus appears on the floor to the left.

contains pottery dating from Neolithic to modern times as well as numerous secondarily deposited Paleolithic and Neolithic flint artifacts that are usually heavily patinated and bear rust-stained spots and scratches left by the plow.

2.4 Physical changes

Solvieux's terrain has undergone many changes both during and since the Paleolithic. The modern cliff displays the obvious stigmata of quarrying. Indications on the surface of the platform suggest that its face lay an additional 10 m or more toward the south in fairly recent history, and it may, of course, have extended still farther in prehistoric times. The platform, now denuded save for a thin soil of weathered limestone, may often have borne heavy accumulations of sediments that served as the immediate source of much of the material that ultimately found its way into the colluvial Middle zone of the higher latitudes of the site proper lying below. There is also evidence suggesting that the platform may once have housed a fairly important Middle Paleolithic installation that was destroyed by erosion before Upper Paleolithic occupation began at the site.

Of more immediate importance are changes within the site proper. For one thing, there has clearly been a substantial loss of its more superficial deposits, likely owing to both cultivation and erosion. Although Neolithic and Bronze Age pits intrude into the Paleolithic horizons in considerable numbers, nowhere is there any evidence of the occupation surfaces from which these pits were dug. Very likely then no substantial expanses of intact post-Pleistocene soils exist below the plow zone at Solvieux.

In many areas the Paleolithic deposits themselves have been lost. Along much of northern Solvieux, for example, the plow zone truncates the higher lying archaeological horizons well short of what must have been their original northernmost extension. The obliquity of their bedding with respect to the current surface of the field suggests that, at least in late Pleistocene times, the ground slope of northern Solvieux rose approximately to the elevation of the platform rather than, as is now the case, 2 m or more below it. Along the southern and

western margins of the site, the loss of Pleistocene deposits has been particularly grievous. Here not only are the higher archaeological horizons truncated, but the entire colluvial zone ultimately disappears as the plow intersects the terrace gravels and, finally, bedrock itself. At least some of this damage, in particular that represented by the great central basin that intrudes upon the southern portion of the site, may have resulted from gravel borrowing when the railroad embankment immediately below Solvieux was constructed in the 1830s.

Of course, major changes took place long before the Pleistocene came to an end. Significant disturbance and destruction of archaeological deposits by natural agencies occurred frequently during the course of Solvieux's occupation. Its topographic relief and situation also changed dramatically. In upper Solvieux Ouest, for example, the earliest occupation (*couche* IV) lies 2 m below the plow zone on a land surface whose contour is much different from those that supported subsequent occupations. Unlike them, it is directly associated with a buried stream channel (presumably attributable, as we have seen, to the Beauronne).

The original southern margin of Solvieux may have been a riverbank directly overlooking the Isle. Relevant data are difficult to obtain because the archaeological horizons and, ultimately, the Middle zone colluvium that incorporates them are truncated by the present ground surface in this sector, far short, presumably, of what must have been their original southerly reaches. It is by no means clear just how the Isle flowed with respect to the site in late Pleistocene times. Yet it is suggestive that pits excavated to a depth of 4 m reveal that the bedrock again falls away abruptly a few meters south of the large barn below the road and that the fill removed from these pits consists of a debris of fairly recent origin in which Paleolithic flint artifacts are found mixed indiscriminately with potsherds dating to historic times. This evidence for what may be a former river channel finds an intriguing echo in local folklore, which maintains that the land lying between Solvieux and the modern riverbed was in medieval times an island whose northern edge was defined even as late as the beginning of the last century by the remnant of a dry channel that once constituted the main course of the Isle. It was supposedly filled

in by the extensive earth moving entailed in constructing the railroad embankment.

Solvieux continues to change. The above description is out of date because it concerns the terrain as it was during the archaeological present, that is, at the time when the project's operations mostly took place. The construction in spring 1974 of a new right-of-way of Departmental Route 3 that traverses northern Solvieux drastically altered the entire configuration of the upper part of the site. The road is restricted to the platform, but its supporting embankment encroaches upon the field below. It was engineered so as to bury, rather than cut into, the archaeological deposits in the sectors involved, even though our explorations prior to its construction satisfied us that these sectors would deserve only very low priority for future excavation. The archaeological consequences of the road are therefore minimal, save for how it may complicate the logistics of future work at the site. But it does deprive modern visitors to Solvieux of the pleasing and relatively undisturbed setting of cliff, platform, and field in which we worked.

2.5 The excavations

Figure 1.8 constitutes the basic plan of Solvieux's excavations. The site's three areal divisions—Ouest, Centre, and Est—have already been defined. The excavations within them receive three different labels according to their form and purpose: locality, trench, and sondage. A locality is where reasonably intensive excavation has taken place in the form a horizontal exposure (*décapage*), that is, a locale whose cultural deposits have been removed by a succession of cuts designed to reveal broad areas of occupation surface. Trenches and sondages comprise more restricted excavations designed either to evaluate hitherto unexplored locales or to establish the details of their stratigraphy, or both. In theory, a sondage is an isolated test pit, whereas a trench is either a trench in the literal sense or a succession of aligned test pits. This distinction is blurred in practice, however, because the form that exploratory excavations ultimately assume can rarely be predicted at the time such terms are assigned. Some of our excavations labeled as trenches were in fact abandoned before they

had evolved into anything more than elongated test pits.

A word is in order about the designations used for these different kinds of excavations. Trenches are designated by capital letters (for example, trench A, or simply T-A). Numbers may be added to indicate distinct segments of trenches (for example, trench A4—or simply T-A4—that segment of trench A that lies between localities 2 and 4). Lowercase letters may be added to designate specific stratigraphic sections within these trenches (for example, trench A4b or T-A4b). A locality and the exposure that defines it are designated by arabic numbers (for example, locality 2—or simply L-2 in figures). Sondages also receive numbers (for example, sondage 23—or simply S-23 in figures).

2.5.1 Grid system and measurement

All localities and sondages are laid out with reference to a grid system whose point of origin lies beyond the southwestern extremity of the site (see figure 1.8). All grid references are therefore positive and may be identified simply in terms of the number of meters they lie to the north and east of this datum. Thus, the horizontal coordinates of a stake placed at the southeast corner of locality 2 would be N68 and E72. The term latitude, by the way, may be conveniently employed with reference to the north-south dimension, and longitude to the east-west dimension.

The system is conceived as a grid delimiting squares that are 2 m on a side instead of the conventional single square meter. The rationale for this is that four contiguous square meters constitute a more meaningful unit of excavation in the open air, being the maximum area of horizontal exposure one excavator can comfortably control and large enough to accommodate additional workers as they are required (see figure 4.4). The 2 x 2 m square calls for special conventions of measuring and recording. Within a given square artifacts are plotted on two axes of 200 cm in length rather than the usual 100 cm. In addition, it is useful both for purposes of measurement and excavation to recognize within a square four 1 m² quadrants, each of which subdivides into four 0.5 m² subquadrants. This amplified Solvieux square has not, however, been an unqualified success. It is admirably adapted to large-scale

Figure 2.5. Excavating couches B and A in two contiguous squares of locality 4. Digging, measuring, and recording as a team, experienced excavators can remove up to a cubic meter of archaeological deposit in a day.



excavation of broad exposures by skilled workers (figures 2.5, 4.4), but it is too much of a challenge for the less experienced, and its use risks proportionally more serious consequences in case of errors of measurement and recording.

Horizontal measurement within the grid system simply calls for rulers and string lines. Vertical measurements are taken as depths from a datum plane established somewhat above the top of the cliff, the highest point of the site's terrain. This plane (that is, zero depth) lies 61.69 m above sea level and is established with reference to a government benchmark set in the foundation of the gatekeeper's house at the railroad crossing immediately south of the site (*passage de niveau no. 36*). Concrete benchmarks set in the ground at several points of the terrain bring all areas of excavation within range for accurately laying grid stakes and making transit sightings (figure 2.6).

Most trenches lie somewhat obliquely oriented to the localities and other excavations laid out in terms of the grid system. This is because the grid is established in the conventional manner with reference to magnetic north, whereas the general slope

and disposition of the terrain and its deposits are biased toward a northwest-southeast axis. The horizontal coordinates of any point on such a trench must therefore be made with reference to a special system of numbered stakes that are posted alongside it at 1 m intervals.

2.5.2 Field methods

The special considerations taken into account in designing the excavation strategy at Solvieux have already been discussed (§ 1.5.2), and the successes and failures of that strategy are made evident in chapters 3 and 4. Here our sole concern is the tactics by means of which this strategy was implemented in the field. Only the main points are summarized. A more comprehensive treatment of their technical side may be found in an unpublished Master's thesis by William Breece (1977), who served as field foreman during the project's last two seasons. Field methods fall into the two rather different realms of horizontal and vertical excavation, that is, exposing occupation surfaces on the one hand and defining natural and cultural stratigraphy on the other. Although horizontal excavation



Figure 2.6. Concrete benchmark in Solvieux Centre. The base of a surveyor's rod placed on the projecting spike would lie 72 m north and 100 m east of the southwest corner of the grid system and 6.30 m below the site's zero datum.



Figure 2.7. The large semi-portable digging shelter shown poised over locality 3. In figure 1.11 it appears covering locality 2.

necessarily follows vertical testing, its procedures are simpler and therefore best reviewed first.

Horizontal excavation

Pursuing broad exposures of the occupation surface of archaeological couches whose stratigraphic disposition is already known is a relatively straightforward business. The regime used at Solvieux is, for the most part, novel only in the sense that it blends techniques borrowed from both Old and New World

archaeology. As we have seen, the standard frame of horizontal excavation within a locality is a grid square measuring 2 m on a side. Within a locality these squares are normally excavated in checkerboard fashion to enhance vertical control, allowing the worker to maintain intimate contact with close lying stratigraphic sections even though concentrating upon horizontal excavation. The checkerboard also facilitates the logistics of puddling water in the square to maintain the moisture of the deposits.



Figure 2.8. A light digging shelter, quickly built and quickly dismantled. This one straddles locality 4 at an early stage of its excavation.



Figure 2.9. Some of the light equipment used at Solvieux. Essential are the digging knife (figure 2.10), the hand-mattock, and the toilet brush. Solvieux's deposits are so charged with flint and gravel that the Marshalltown trowel is relegated to the task of clearing loose debails.

Solvieux's clayey sediments are extremely hard when dry and must be wetted to a cheesy condition for digging. Apart from the often daily watering that may be required in a dry season, any given square must be soaked for several days prior to the beginning of its excavation by a total volume of water roughly equivalent to the volume of deposit to be removed.

A semiportable shelter tall enough to accommodate the camera tripod and sufficiently large to cover an 8 x 14 m area allows the excavation of an exposure to proceed under almost all weather conditions encountered in Perigord summers (figure 2.7). Smaller shelters of canvas, rope, and saplings that can be quickly built and quickly dismantled have proven, however, to be more practicable for all but the largest exposures (figures 2.8, 3.12).

The tools and equipment employed by an excavator are illustrated in figure 2.9. Key items are the hand-mattock, used primarily for removing sterile deposits, and the digging knife, employed for all operations that call for reasonably fine control (figure 2.10). The latter is a broad-bladed butcher's knife that has been modified in such a manner as to serve as both a knife and a small trowel. This tool serves admirably in deposits like Solvieux's which are at once too charged with gravels to be worked by the conventional archaeologist's trowel and too unconsolidated to respond to the rock-shelter excavator's hook-like *crochet*. In the hands of a good excavator, the Solvieux knife is a highly versatile instrument, but its use requires considerable ambidexterity because only one of its edges describes the angled curve required for troweling. The small trowels illustrated also work in such deposits, but they are poorly balanced, weak, and difficult to obtain; it was their inadequacies, in fact, that revealed the need for a special digging knife. The classic Marshalltown trowel is relegated at Solvieux to the role of clearing loose debris during excavation.

As a rule, the provenance of each tool and debitage blade or flake is individually recorded in Cartesian coordinates to the nearest cubic centimeter, the depth being taken from a line-leveled string stretched from a datum stake at the center of the pit. The debris is collected in subquadrant units and, where conditions permit, washed through a succession of screens to isolate the spalls and chip-

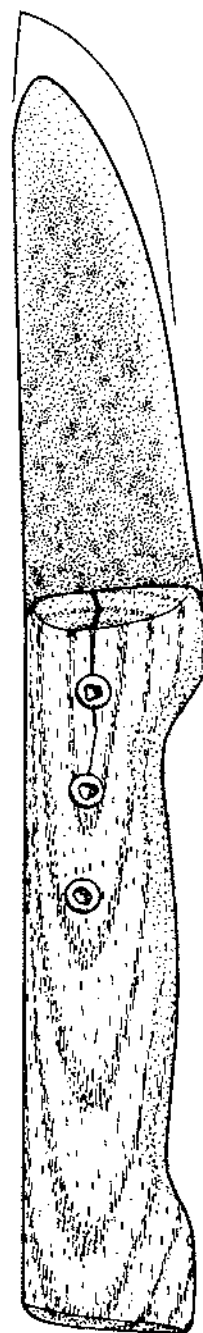


Figure 2.10. The Solvieux digging knife (three-quarters actual size)

ping debris that might otherwise be overlooked. Occasionally, when excavating within the vertical zone of concentration of a reasonably dense and stratigraphically well-defined couche, the deposit may be lifted in the form of subquadrant blocks

50 cm square and 7 cm thick whose lithic contents are then extracted in the ensemble by screen-washing and catalogued as a lot unit. The dimensions of these blocks have been determined by statistical sampling considerations and because they promote rapid yet controlled excavation.

In either procedure, all couche rocks are left in place to be recorded individually (figures 2.11, 2.12). They are then photographed in situ according to a highly successful procedure developed by Paul Aiello, a long-term associate of the project. His elegantly simple technique involves a 4 x 5 press camera mounted, along with a backup 35 mm camera, on an aluminum plate suspended from a 6 m tripod (figure 2.13). The resulting photographs are printed on a 1:10 scale with the grid system superimposed; from these prints rock plans can be traced and, in

turn, converted into larger mosaic plans that constitute the base maps for horizontal distribution analysis of artifacts and rock features (see, for example, figure 4.2).

A complex regime of notebooks, forms, catalogues, and other recording devices was designed to handle the complex cataloguing operation entailed by such large-scale excavation. These are described by Breece (1977). But they are of only antiquarian interest now, because any comparable field project today would be much better served by a computer-based system operating directly on the site.

Apart from its role in cataloguing, a computerized system would eliminate the labor involved in producing scatterplots, which are among the most important documents generated in horizontal excavation (figure 2.14). These diagrams chart the



Figure 2.11. Exposing couche A in locality 3. Flint tools and debitage are recorded and removed as they come to light; couche rocks are left in place and, once the square is brought down to the same level, are photographed to make the composite rock plan (see figure 4.2).

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Top right

Figure 2.12. Exposing the salamander gravels in locality 2. The overlying couche III complex has been removed; two of the post-Paleolithic intrusions that interrupt deposits in the northern half of the locality can be seen.

Bottom right

Figure 2.13. Apparatus for vertical photography involving a 35 mm and 4 x 5 press camera suspended from a 6 m tripod. Here Paul Aeilleo draws a crowd while working at a very early phase of the locality 3 excavation. Solvieux Est lies in the background.



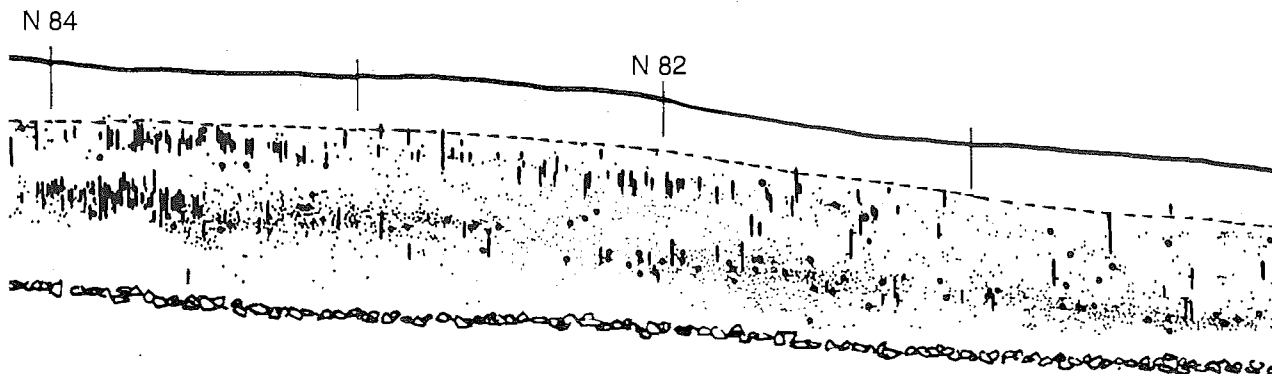


Figure 2.14. Scatterplot. The dots represent individual pieces of debitage and flint tools; the lines indicate the placement and vertical thickness of individual couche rocks. This scatterplot, centered on the E64 line of locality 2, depicts the principal couche III horizon and the Illa lens that overlies it in the northeastern quadrant of the locality (see figure 3.9). At the bottom appears the salamander gravel tongue.

vertical distributions of artifacts that fall within 0.5 m on either side of every north-south and east-west gridline traversing a locality. By collapsing onto a single plane the contents of each meter-wide pathway through a locality's deposit, scatterplots simultaneously provide a graphic depiction of a couche's artifactual wealth and an artificially enhanced picture of its stratigraphic disposition. Particularly when couche rocks are added to the chart and diagnostic tools identified, scatterplots often allow for artifact assemblages to be cleanly segregated in instances where their respective horizons are close lying and too weak to present themselves clearly as distinct stratigraphic units when they are observed in the ground. When necessary, lines can be drawn on scatterplots connecting the dots representing those tools and pieces of debitage that can be successfully refitted. This not only helps in segregation but also allows one to assess the direction and degree to which flint has migrated vertically during the course of a couche's depositional history.

Vertical excavation

Though often onerous, horizontal excavation requires more persistence than skill. Vertical excavation is another matter. Establishing natural stratigraphy, discovering archaeological horizons (that is, couches and their members regarded in vertical perspective), and assessing their potential for horizontal excavation constitute a more demanding business and one not reducible to formula. Particu-

larly in this realm there come into play those subjective, experience-based procedures that make up the lore and skill of the journeyman field archaeologist. Here falls the ability to feel changes in the texture of the fine fraction when it is not visible to the eye, to sense the presence of an archaeological horizon from a few pieces of flint, and to trace a weak occupation surface that has been cryoturbated or that interstratifies with complex lines of soliflucted gravel. That such artisanal skill and knowledge often outweigh method as such was made repeatedly clear as each successive campaign saw the discovery of archaeological horizons in locales where similar testing methods used by less experienced excavators in previous years had revealed little or nothing of interest.

Craftlore is no easier to write down than it is to teach in the lecture hall, however, and our focus here must remain upon techniques and tactics. To begin with, knowledge of subsurface deposits at a site like Solvieux can only be gained by wrestling with them directly. Physical methods of exploration such as archaeomagnetic prospecting are not feasible because of the heavy concentration of stones in the Arable zone and the many soliflucted gravel lines below it that interstratify with the archaeological couches. Where the couches lie close to the surface, sondaging may proceed rapidly by penetrating the plow zone at many points over the target area with a pickaxe and then proceeding with a combination of digging and testing with a metal probe. The probe

may range in size and shape from the knitting needle and épée, both in daily use, to special large instruments (see Gaussen 1980: figure 3). Approaching a couche from the top maximizes the chance of finding it, but it must be kept in mind that even a rich couche consists mostly of empty space, particularly if it is highly structured horizontally. It has been our experience at Solvieux and elsewhere in the Neuvic area that, even when exploring a terrain known to incorporate one or more couches, the likelihood that any single sondage will clearly reveal one is only between 5 and 10%.

The problem becomes magnified greatly in the situation usually encountered at Solvieux, where the deposits go deep, are spatially vast, and undergo abrupt changes in character within short distances. Here the limitations of sondaging by hand quickly become evident. Reasonably careful manual excavation of a deep test pit will rarely remove 1 m³ of deposit per day, and the norm is considerably less. Moreover, given the logistics of excavation and safety considerations, a test pit designed to penetrate much more than 2 m into the ground must be appreciably larger than 1 m² at the top. The next chapter will reveal that, at least in retrospect, a surprisingly large amount of test pitting and trenching has, in fact, been accomplished by hand at Solvieux.

Nonetheless, it became apparent early in the project that adequate stratigraphic knowledge of such a vast site could only be obtained by using a power backhoe (figure 2.15). The decision was difficult to implement because of the great respect given Paleolithic deposits in France and because of the realization that even modestly testing Solvieux would result in the destruction of more deposit than has been recovered from all of the other Neuvic sites combined. Damage was minimized initially by digging test trenches in such a way that the backhoe descended below the plow zone only at intervals several meters apart. But these were subsequently re-excavated once it became clear that the marked horizontal variation possessed by Solvieux's deposits required that trenches furnish continuous stratigraphic sections.

Once committed to backhoe trenching, regrets over destroyed deposits are soon pushed aside by more pressing considerations, in particular the danger of trench collapse. This can happen, without



Figure 2.15. Trenching with a backhoe in northern Solvieux Centre

warning and with frightening speed, particularly where a trench extends from plow zone to bedrock. (Trench F in Solvieux Est collapsed within minutes of its completion by the backhoe; the thick deposits of its Middle zone had absorbed much water during a wet spring, and the underlying sands and gravels of the Lower zone gave way under their weight in a wave of collapse that passed up the trench at the pace of a brisk jog.) Precautionary measures may involve timber revetments and even allowing trenches to lie fallow for an entire season while their stability is tested by time. In any case, trenching is only the first step in obtaining a useful stratigraphic section, for the backhoe itself does not provide what is needed, that is, a clean section in which artifacts are clearly revealed in their proper arrangements against a vertical background of gravel lines and successive formations of fine fraction. Instead, it leaves nothing but an undifferentiated wall from which many artifacts and gravels have been scraped

away and into which the rest have been simultaneously buried and covered by a smear of clay. In short, while a wall is provided by the backhoe, the vertical section must still be created by hand.

Here lies the most challenging and least appreciated aspect of stratigraphic testing, and simultaneously the reason why most deep open air sites have probably gone unnoticed: even the most meticulously dressed vertical section reveals extremely little of the archaeological horizons it traverses. A simple issue in sampling is involved: how many artifacts on even a relatively crowded occupation surface are likely to be transected by a straight line (that is, the vertical stratigraphic section) drawn at random across that surface? The answer is surprisingly few, as can be informally demonstrated by observing how few stars a ruler's edge actually touches when it is casually dropped on a chart of the heavens. The mathematics of the problem have been reviewed by Gaussen (1980:29–31), who provides a fairly startling example. If the ensemble of the territory of France contained 1 million rock features (approximately one per kilometer), each covering 15 m² and containing 500 flint artifacts (totaling 500 million pieces in all), a stratigraphic section dug the length of France from Perpignan to Dunkirk would intersect no more than 4 of the features and recover no more than 20 pieces of flint. And the standard retouched tools would have to bear the extremely generous proportion of 1:20 to debitage in these sites for it to be likely that even one of the artifacts removed would be a tool. It is not hard to translate this example to a scale appropriate for Solvieux, except that the proportion of tools to debitage (excluding small chipping debris) is in reality more likely in the neighborhood of 50:1.

Apart from requiring vigilance for the smallest piece of flint, the problem calls for a special technique of preparing sections. In this the excavator does not simply dress the wall, but instead systematically excavates its entire vertical face back a distance of 10 to 20 cm with the digging knife. The free hand is held beneath the knife, letting the fine fraction slip between the fingers but catching all flint and gravels, which are then reinserted into their respective positions in the wall as the face retreats. If done properly, the result is an artificially enhanced section whose face incorporates materials

that were actually drawn from a fairly wide vertical cut (figures 2.16, 2.17). Needless to say, the technique calls for a skilled excavator; a novice attempting the task will tend either to randomize the existing stratigraphy or to create a more highly patterned one than actually exists.

Where this does not suffice, recourse is made to a scatterplot technique similar to that used in the grid square. Here a vertical zone from 0.5 to 1 m in thickness is excavated along the trench wall in a succession of horizontal cuts wherein all the relevant materials are measured in the usual fashion in Cartesian coordinates. The results are then projected on the chart so that the vertical and lateral (that is, parallel-to-the-section) dimensions are indicated but the perpendicular one collapsed. This procedure again provides artificial enhancement of stratigraphic relationships but with great precision and much greater perpendicular depth than the hand technique allows.

2.6 Stratigraphic correlation

Once any number of individual sections have been made and their individual stratigraphic columns defined, there remains the task of bringing them into alignment and correlating their archaeological horizons. Ideally, this should be pursued, at least initially, in terms of the natural deposits, both in the hope of obtaining microstratigraphic control over colluvial sediments comparable to that now exercised in rock shelter fills and of gaining a geomorphologic picture of the succession of land surfaces that would have been available for human occupation at various times in the site's history. Unfortunately, however, natural deposits in the open air pose special problems for stratigraphic correlation.

To begin with, as we have seen, the archaeological couches consist exclusively of artifactual materials projected against a background of purely natural sediments. There are no special sedimentological components that are specific to the couches and that consequently may be traced as stratigraphic horizons independently of the flint and couche rocks themselves. Although gravel members constitute the most obvious and areally extensive stratigraphic features of Solvieux's deposits, they cannot be viewed as marker beds that can always be trusted to

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Figure 2.16. Preparing a stratigraphic section. In the foreground the trench wall has been dressed by hand, while beyond it appears as the backhoe left it. This section lies immediately east of the trench T-A4a section (see figure 3.7) and exposes the Middle zone through couches III, D, and IV.



Figure 2.17. Drawing a stratigraphic profile after the wall has been dressed and flint replaced by markers. This is the T-A4c section, subsequently excavated almost to bedrock (see figure 3.10).

bring distant blocks of sediments into alignment. For in reality they most often comprise an ensemble of discontinuous gravel lines that individually represent distinct episodes of deposition and erosion. Over any appreciable distance it thus is difficult, if not impossible, to confirm that what appears to be one and the same gravel member in fact represents one and the same land surface. The problem is exacerbated because gravel members cannot be correlated on the basis of their internal makeup for the simple reason that all gravel lines in Solvieux's colluvium share one and the same mineralogical composition. In sum, even when gravels from two sections some distance apart exhibit identical physical aspects and play identical stratigraphic roles, it can only safely be said that they are analogous rather than truly homologous. In the next chapter, specific examples of stratigraphic deception by gravels show that such caution is justified.

Finally, the fine fraction sediments can be even more untrustworthy, because they concern soils whose depositional history has largely been masked by postdepositional alteration. We will see numerous examples of demonstrably continuous archaeological horizons that occupy rather different sedimentological contexts at different points of their passage, as well as equally numerous instances of altogether different horizons that occupy what appears to be one and the same context.

All of this means that the burden of stratigraphic correlation in the field must be placed rather sooner and more heavily than one might wish upon the archaeological horizons themselves. Archaeological correlation over short distances poses few difficulties if the horizons happen to be well bedded and artifactually rich. The only obstacle usually encountered in this instance arises from the sampling problem, given that the number of actual tools, especially the diagnostic ones used to identify *couches*' industries, brought to light even upon artificially enhanced sections may be very small. For this reason, correlation may initially rest more upon the specific flint varieties and surface aspects of all the flint present than upon the tools themselves.

But the issues become subtler in attempting to make precise correlations over horizons that seemingly extend for scores or even hundreds of meters. In this case, even if sampling is sufficiently ade-

quate to indicate that a single type of industry is involved, how do we distinguish between a specific occupation by a specific group of people and repeated (perhaps only partially overlapping) occupations by several successive groups? In other words, when does an areally broad horizon represent what might fairly be considered a meaningful episode of settlement at a precise point in culture history and when does it represent some sort of compound that mingles two or more settlements that are contemporary only in the much broader perspective of sedimentological history?

The problem has no solution in a site where anything approaching total exposure of vast occupation surfaces is a practical impossibility and where no surface in any case presents itself within anything approaching the self-evident clarity often seen in the post-Pleistocene archaeological record. Practical means of testing the problem do come to mind, but none is really satisfactory. For example, one might attempt fitting together flint and debitage from widely separated points on a given surface, arguing altogether correctly that those that joined had to be truly contemporary. Given the apparently expedient nature of the technology involved, however, it is unreasonable to assume that distant points would be related by significant numbers of successful refittings even if only a single large settlement was concerned. Were such refittings actually made, the results would demonstrate only the possible areal extent of a given installation's zone of activities and not whether one installation alone was actually involved.

More straightforward appeals to areal variations among the lithic typological data are hampered by the facts that no single surface at Solvieux has been continuously excavated over a truly vast area and that our exposures provide only relatively (if not absolutely) small tool samples taken at considerable distances from one another. Typological results can usually be argued on both sides of the question, in any event. For example, that an extensive surface yields typologically homogeneous tool assemblages wherever it is sampled might argue as much for recurring passages of culturally similar groups as for the massive installation of a single one. At the same time, areal differences in typology over that same surface would as easily lend themselves to

interpretation as activity variations among a single group of occupants as cultural variations among many. It will be seen that our own prejudices in arguments of this kind favor not tool typology as such but instead certain attributes of their technology, most specifically techniques of blank production and choice of raw materials. These are more likely to exhibit some degree of specificity within the artifacts left by a given settlement and yet cross-cut whatever areally segregated activities they may have pursued.

This is not to say that detailed stratigraphic correlation has proven impossible at Solvieux. That it is possible is shown clearly in the next chapter. Nonetheless, the chapter's length and complexity will demonstrate that, because of the factors reviewed above, correlation cannot be reduced to a formula. It must be dealt with on a case-by-case basis, as much according to a logic imposed by the specific nature of the deposits involved as by any formal method superimposed by the stratigrapher.

3

Natural and Cultural Stratigraphy

We now review in detail Solvieux's deposits as they present themselves in the ground, building upon the concepts, terms, and information introduced in the last chapter. This chapter concerns stratigraphy as such, treating the archaeological data only piecemeal and in essentially vertical terms. In chapter 4 the couches are described in more comprehensive fashion, emphasizing their horizontal disposition and organization. As mentioned in the preface, the sedimentological research conducted over the course of the project is considered to have been rendered obsolete by the passage of time. What follows then depicts Solvieux's deposits largely as they appear to the writer, a field archaeologist informed neither by laboratory analyses nor more than an artisanal acquaintance with sedimentology. It is far more descriptive than interpretive. Much of the credit for what is valuable in it (and none of the blame for what is not) is owing to Jean-Pierre Texier, whose counsel and generous sharing of field records contributed greatly to our understanding.

Solvieux is a formidable site, and any account that does justice to its deposits must also be formidable. Deposits like these have not been wrestled with on such a scale before in the Perigord. It is necessary then to review their nature in detail and to explain the challenge they pose to archaeology. The latter is as important as the former, because, as should be clear by now, the shape assumed by an archaeological excavation is dictated at least as much by the built-in logic of the deposits it attacks as by the logic of whatever theoretical stance hap-

pens to be guiding it. What follows is lengthy, and no doubt tedious, but it is necessary to understanding what we did and did not achieve at Solvieux. It should also help guide those who undertake to achieve more at similar sites in the future.

3.1 Stratigraphic summary

To help readers get their bearings, we begin with a brief overview of Solvieux's stratigraphy. The archaeological horizons were briefly introduced in § 1.5.2. Figure 3.1 depicts in highly schematic form the quite different stratigraphic situations in which they appear in the site's three sectors.

3.1.1 General

Solvieux's archaeology is contained within, and is essentially coextensive with, the Middle zone colluvial deposits that overlie the sands and gravels of the fluvial terrace cut into the limestone cliff above the site. Much of the site's immense archaeological wealth must have been lost long ago to erosion and cultivation. Along Solvieux's western margin and throughout nearly its entire lower half, the plow zone directly intersects gravel or bedrock. In the still great expanse where it remains intact, the Middle zone itself seems to have lost at least its higher sediments. All of its more superficial lying Paleolithic horizons are truncated by the plow zone in their northern reaches; moreover, all but the deepest of Solvieux Ouest's archaeological couches are heavily damaged by pits of one sort or another dug from

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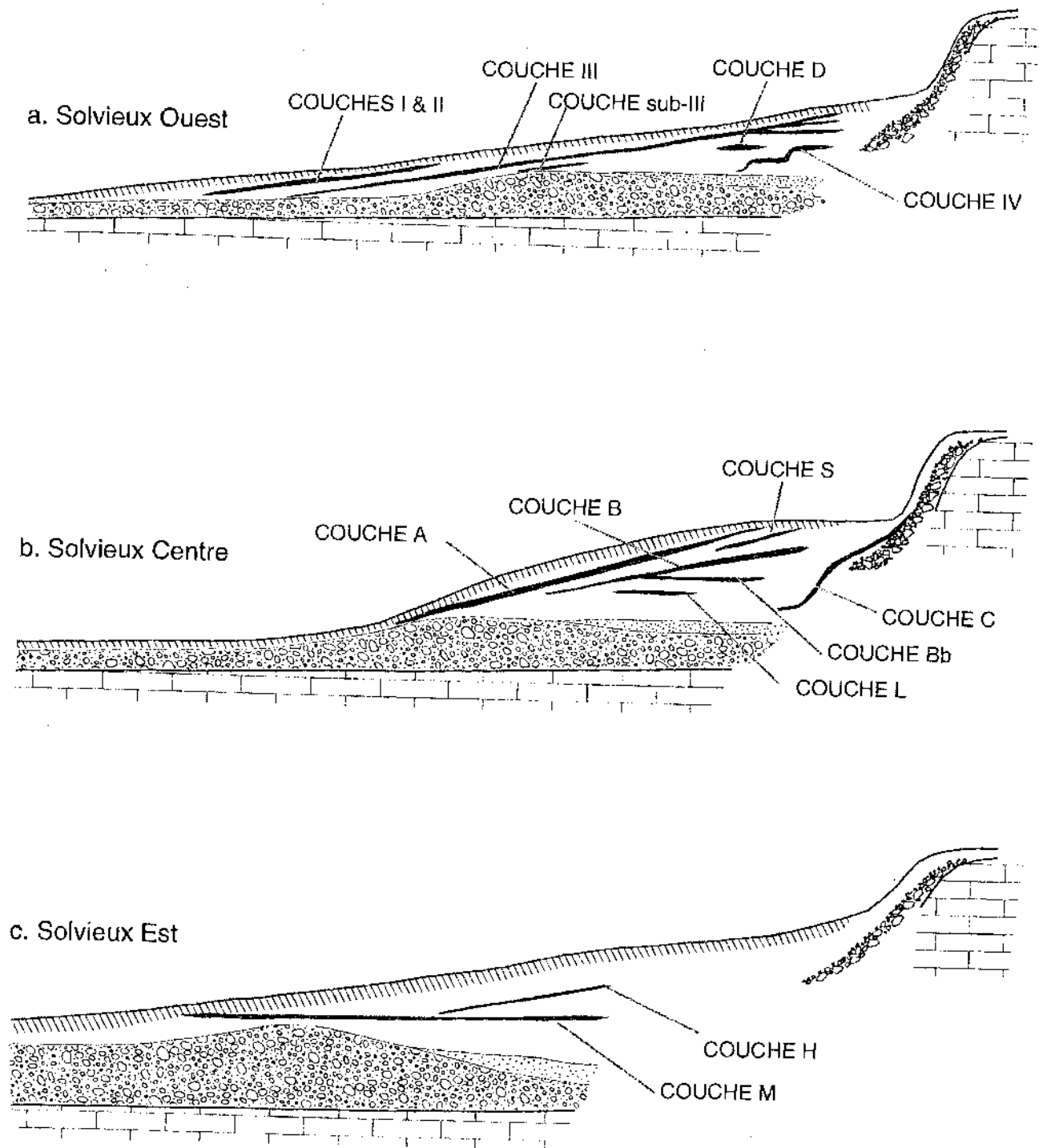


Figure 3.1. Schematics of Solvieux's archaeological stratigraphy by sector

Neolithic and Bronze Age settlements that have long since disappeared.

The depositional history of the Middle zone must be very complex. This is particularly evident in upper Solvieux, where the zone is thick, has many archaeological horizons, and is differentiated sedimentologically by distinct illuviated soils, gravel lenses, carbonaceous lines (calcs), and, in Solvieux Ouest, cryoturbation and a stream channel. But much of this complexity is squeezed out, so to speak, as the Middle zone thins and simplifies in proceeding south, its members either disappearing altogether or converging into broader, more blurred units. This loss and contraction of sediments is accompanied by a commensurate loss and consolidation of archaeological deposits. Along trench A and to the south of it in lower Solvieux these usually take the form of a single broad *couche* which is dominated by a single industry but which can incorporate individual tools diagnostic of other industries that appear stratigraphically segregated to the north. (It bears noting in this connection that trench A, the project's key west-east stratigraphic artery, was positioned at too southerly a latitude to reveal clearly this basic difference between Solvieux's upper and lower reaches—an unforeseen error that hindered our thinking about the site and how it should be dug.)

3.1.2 Solvieux Ouest

It is tempting to speculate that the lost upper sediments of Solvieux's Middle zone once incorporated one or more occupations datable to Late and Final Magdalenian times, which apparently saw the most intensive Upper Paleolithic settlement of the Perigord (§ 11.2.1). In any event, the zone's most recent intact archaeological horizons, *couches* I and II, represent major Middle Magdalenian occupations that have been reduced by plowing and erosion to the immediate area of locality 1 in Solvieux Sud and trench M extending north of it. Relatively rich if damaged in the locality, these horizons merge and impoverish in mounting northward, disappearing into the plow zone—along with the tan soil that incorporates them—before reaching the northern end of the trench.

The situation in upper Solvieux Ouest is much more complicated. Dominant here is *couche* III, the

sector's representative of the vast expanse of quasi-contemporary Raysse Perigordian occupations that stretches across the entire middle and upper reaches of the site. At the latitude of trench A, *couche* III comprises a single horizon, which weakens and grows more diffuse as it passes down trench M below *couches* I and II toward Solvieux Sud. To the north of trench A in locality 2, on the other hand, *couche* III subdivides into three distinct horizons, the lowermost of which (2-IIIc) appears to be particularly characterized by Noailles burins.

Immediately below this last horizon in east central locality 2 lies *couche* D, which yields an evolved Aurignacian industry. Presumably, it is only a remnant of a more extensive occupation that was largely destroyed by the erosion responsible for the southward squeezing out of deposits that begins at the midpoint of the locality. Conceivably it finds an echo in lower Solvieux Ouest in the sub-III archaeological horizon occupying what may be an analogous stratigraphic position along a 10 m stretch in the middle reach of trench M.

The basement archaeological complex of upper Solvieux Ouest is *couche* IV, whose unique Beauronnian industry presumably dates to near the beginning of Upper Paleolithic times. It occupies a topography quite different from those of the sector's later occupations. In the latitude of trench A it extends along the northern flank of a stream channel, where in places it is distorted by cryoturbation. The *couche*, accompanied by one or more ancillary lenses, is particularly dense in locality 2, where it mounts an abrupt slope overlooking the stream bank and continues northward in a more diffuse condition until losing itself in the heavily breccified deposits that extend from the platform detritus. Neither the southern bank of the channel nor more southerly remnants of *couche* IV have ever come to light. The *couche* continues a few meters east of locality 2 in trench A before abruptly jumping upward and becoming lost in the gravels immediately underlying *couche* III. It may continue further, however, in the unexcavated deposits lying between localities 2 and 4 to the north of the trench.

3.1.3 Solvieux Centre

The archaeological situation in Solvieux Centre is quite different. The middle latitudes of the sector are

dominated by couche A, a massive Early Magdalenian (Badegoulian) occupation. It is best represented in locality 3, Solvieux's largest exposure, where it is accompanied by one or more satellite lenses collectively named couche 3-A. The plow zone now begins to encroach upon couche A along the southern margin of the locality, but the couche once may have continued far to the south. It thins out rapidly in passing northward into locality 4 and becomes lost in the plow zone several meters short of the platform. Scattered pockets of raclettes hint that couche A once extended deep into upper Solvieux Ouest, but, if so, it would have occupied higher sediments of the Middle zone that disappeared long ago. (Now, of course, it is the much older Raysse Perigordian couche III that occupies the higher parts of the zone there.) There is little solid artifactual evidence that this Early Magdalenian occupation ever existed in Solvieux Est.

The Raysse Perigordian in Solvieux Centre takes the form of couche B, which on neither stratigraphic nor typological grounds seems to be a direct continuation of Ouest's couche III. It dominates locality 4, where it underlies couche A; a scattering of Raysse burins in locality 3 suggests that remnants of it may be incorporated with the latter couche toward the south. Couche B continues to the north of locality 4 as a recognizable, if diffuse, horizon until it is truncated by the plow zone immediately under the platform. Of special interest is a tributary lower lens, couche Bb, which is intercepted by the downward slope of the main couche B horizon in the southern half of locality 4. Couche Bb possesses no Raysse burins, while north of their juncture couche B possesses no Noailles burins. The two burin types may be stratigraphically segregated in a similar fashion in locality 3 in couches III and IIIb to the north of the point where they merge. This is but one of the many respects in which Solvieux's Raysse Perigordian horizons are of central concern to the ongoing debate over the meaning of industrial variability in Upper Perigordian times (§ 11.3).

Northern Solvieux Centre contains additional archaeological horizons of interest. Particularly intriguing is couche S, which is visible as a distinct line of flint to the north of locality 4, intercalating between couches A and B. In the slightly enlarged test excavation labeled locality 5, it yielded two typ-

ical Solutrean points, and it was presumably the source of several other leaf points that have appeared in both the plow zone and in couche A toward the south. The bulk of couche S was presumably lost to erosion during the subsequent history of the Middle zone. One or more additional Upper Paleolithic horizons lie deep below couche B along the northern border of the site, but their specific industrial association is unknown. Finally, scattered in the surface of the limestone detritus that descends from the platform and contains the northern margin of the Middle zone is a highly breccified horizon, couche C, tentatively assigned to the Mousterian. It appears to be secondarily deposited material derived from some sort of occupation in the vicinity of what is now the platform and cliff face.

3.1.4 Solvieux Est

Solvieux Est, which comprises nearly the entire eastern half of the site, contrasts with what we have seen so far (figure 3.1). In view of its areal extent and thickness (interestingly, it is topped everywhere by a tan soil like that enclosing couches I and II in Solvieux Ouest), the Middle zone here seems comparatively poor archaeologically. As described above, cultural horizons are seemingly ubiquitous both vertically and areally to the colluvium of Solvieux Ouest and Centre; but here it appears to provide more 'room' than Solvieux's Upper Paleolithic inhabitants ever took advantage of. Only one principal horizon is found, couche M, which is the sector's representative of the Raysse Perigordian. It is particularly rich and tightly bedded in locality 6, immediately to the south of which it is joined by couche H, a downward sloping, much weaker horizon of what is probably the same industry. Although couche M extends into the vineyard lying east of the site, it continues only a short distance into lower Solvieux Est before fading away. Couche M occupies an analogous, though apparently not identical, stratigraphic position as couche B in Solvieux Centre—to which, as well as to couche III of Solvieux Ouest, it offers specific typological and technological contrasts of considerable significance to the question of Upper Perigordian variability.

As the Ouest, Centre, and Est sectors obviously constitute quasi-independent sites in their own right, they are the logical divisions in which to organize

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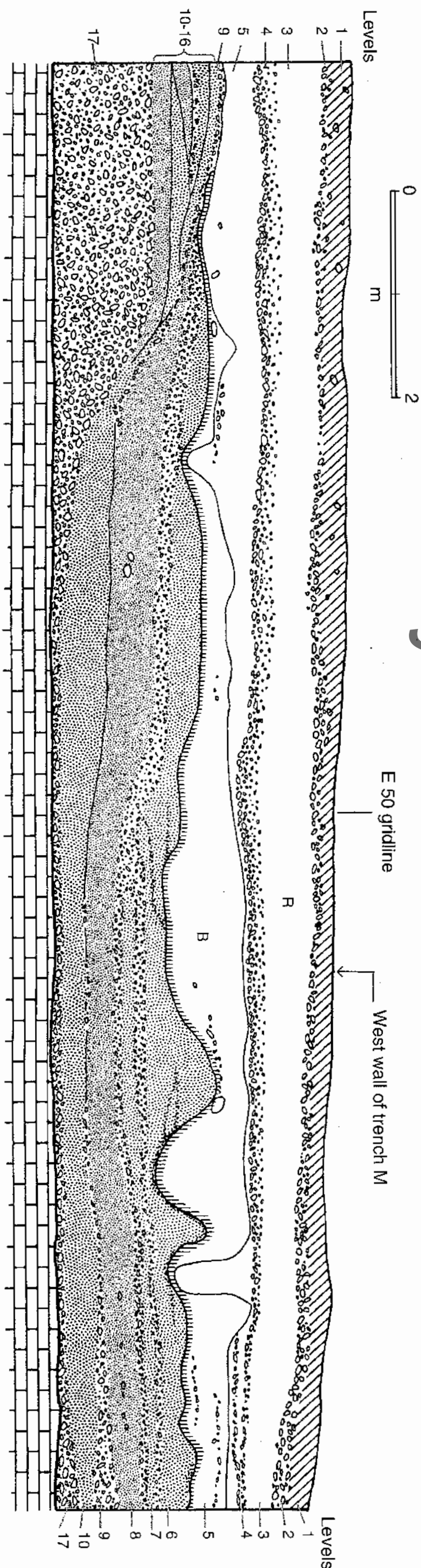


Figure 3.2. Stratigraphy of trench A2 section. (After Texier and Laville 1968)

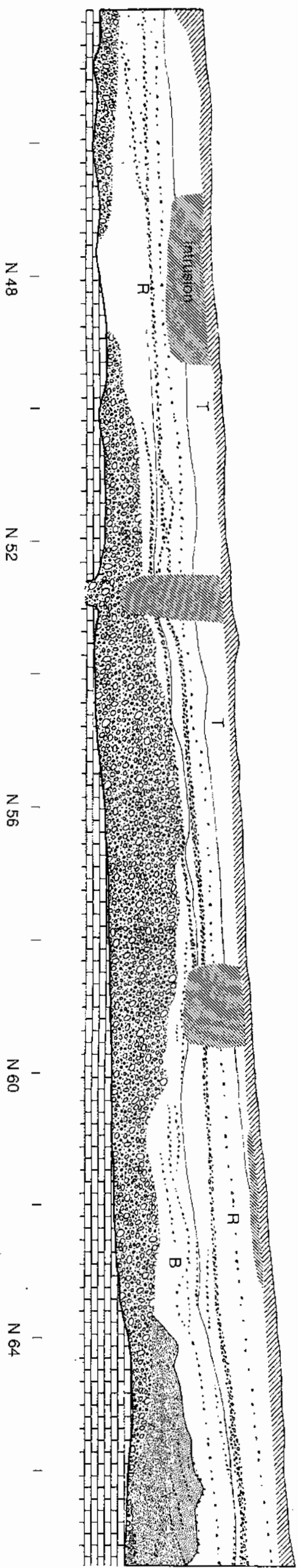


Figure 3.3. Stratigraphy of trench M. Level designations indicate stratigraphic analogs to the T-A2 section shown in figure 3.2.

the following detailed review of Solvieux's natural and cultural stratigraphy.

3.2 Solvieux Ouest

Some digging took place during every field season in the varied and complex deposits lying west of the midpoint of trench A4. The excavations are shown on the general site plan (see figure 1.8), with principal archaeological horizons indicated in figure 3.1a. As we have seen, locality 1 in Solvieux Sud is dominated by the Middle Magdalenian couches I and II, which gradually diminish as they mount northward and disappear into the plow zone before reaching the northern end of trench M. The Raysse Perigordian couche III appears only sparsely in lower Solvieux Ouest but gains importance as it proceeds northward; it is richly represented in locality 2. In the middle reach of trench M it is underlain by a sub-III horizon of unknown industrial affiliation. The unique Beauronnian (couche IV) industry exists only in upper Solvieux Ouest, where it is associated with a deep stream channel. The especially thick Middle zone of the northern half of locality 2 incorporates primary horizons as well as secondary lenses of both couches III and IV, in addition to the minor Aurignacian horizon, couche D. Our survey begins with the trench A2 type-section, which provides the principal frame of reference for Solvieux Ouest's stratigraphy; we then turn to trench M and locality 1 before tackling the formidable sediments of locality 2. The trench A1 segment and all of trench E are ignored, because they are archaeologically sterile and provide no sedimentological information that is not better documented elsewhere in Solvieux Ouest.

3.2.1 Trench A2

The surface-to-bedrock section constituting trench A2 was originally excavated by a backhoe during the second field season. Its southern face was reworked the next year for the site visit of the INQUA Congress, at which time a detailed profile was drawn and T-A2 was established as one of the site's principal geological type-sections (figure 3.2). It is a useful point of departure, as it links the quite different stratigraphies of upper and lower Solvieux Ouest. The stratigraphic units making up the zones

in this section are labeled according to a system of numbered sedimentary levels defined in a preliminary geological memorandum by Texier and Laville (1972) upon which the following summary is based.

Both members of the Lower zone are represented. Resting on limestone bedrock is the fluvial gravel terrace (level 17), overlain by a complex of water-laid sands and gravels (levels 16 through 11). This complex appears only in the eastern part of the type-section. In the central and western parts it was presumably destroyed during the cutting of the stream channel that carried away its sediments and encroached deeply into the underlying terrace. This channel in all likelihood belonged to the Beauronne, a stream that now flows some 100 m to the west of the site.

There follows a mixed formation (levels 10 through 6) of which levels 10, 8, and 6 are fluvial sands, presumably attributable to the Beauronne, and 9 and 7 are colluvial gravel lines. In the central and western parts of the section this ensemble fills the channel, sitting directly and unconformably upon level 17; in the eastern part it rests upon the level 16 through 11 complex. The Beauronnian couche IV industry appears in and immediately above the level 9 gravel line. It is relatively rich in flint in the eastern part of the section, impoverishing toward the west as level 9 plunges into the channel. It dies out before reaching the point where trench M intersects the section.

The Middle zone proper comprises levels 5 through 3 and is horizontally bedded across the entire section, bearing witness to an altogether different topographic situation. Level 4, which bisects this zone, is a fairly narrow and dense bed of gravel. It in reality comprises several gravel lines that converge at the latitude of trench A but that tend elsewhere to be more differentiated vertically. Level 3 above it is the red clay soil that constitutes the upper member of the Middle zone everywhere in northern Solvieux Ouest. The Raysse Perigordian couche III is represented by a somewhat dispersed horizon of flint occupying the lower portion of level 3 and mixing with the level 4 gravels; toward the western extremity of the section it weakens and restricts itself more clearly to lower level 3. Level 5 is the brown silt soil, less clayey and reddish except in

those places (as, for example, in the eastern part of the section) where it has been strongly illuviated from above. Its juncture with level 6, heavily contorted by cryoturbation, is marked by a more or less continuous line of carbonate accumulation.

The Arable formation is made up of a plow zone in its typical form (level 1) and an underlying stony unit (level 2) of quartzite and limestone that plowing somehow seems to have accumulated in this part of the terrain.

3.2.2 Trench M

Trench M extends northward from locality 1 to trench A, which it intersects near the center of the T-A2 type-section. It has a long and sad history, beginning as a line of sondages placed along the E50 gridline and ultimately excavated by hand into a continuous trench. This excavation proved unsatisfactory because of intrusions and the extreme dryness of the deposits. A new trench was excavated by a backhoe immediately to the west, allowing a continuous fresh section to be troweled on the E48.5 line (figure 3.3). Subsequent work included a series of grid square excavations extending from N54/E50 to N66/E50 (figure 3.4) and a re-excavation of the wall in the southern part of its section between N52 and N56. A constant source of frustration through all

this work (and the reason why renewed digging was called for at scenes of earlier excavation) are intrusions, which are so large and ubiquitous as to make it impossible to obtain uninterrupted vertical sections or horizontal exposures of any magnitude in lower Solvieux Ouest (figure 3.5).

The stratigraphic profile of Trench M shown in figure 3.3 is a composite of profiles drawn by Texier and Laville (1972) and by the writer. The surface of the gravel terrace is irregular, rising as it proceeds south as far as N56 and then descending again, a pattern that seems to repeat itself all the way across the site at comparable latitudes. In the vicinity of N48 it is lacking altogether, and bedrock immediately underlies the Middle zone. The fluvial sands and level 9 gravel lines (levels 17 through 11) that overlie the terrace in the eastern reach of the T-A2 type-section are represented in trench M only by scattered pockets of sand occupying depressions in the terrace surface. This is not surprising, as they are also missing in that part of the T-A2 section, the channel, where the two trenches intersect. The mixed ensemble made up by levels 10 through 6 is found only in the upper few meters of the trench. Its most interesting unit, the level 9 gravel line that in T-A2 bears couche IV, appears only in the northernmost meter. No flint has been recovered here, which



Figure 3.4. Northern half of trench M in Solvieux Ouest. Workers are standing on terrace gravels at the top of the Lower zone, their debris piling up on the bedrock exposed by an earlier version of the trench excavated immediately alongside.

is to be expected because we see the horizon dying out in T-A2 well east of the longitude of trench M.

The Middle zone, which for most of the length of the trench sits directly upon the terrace gravels, is more complicated here than in T-A2. The northern extremity of trench M possesses three subdivisions that are clearly equivalent to levels 3, 4, and 5 of the T-A2 section, that is, the red clay upper soil, a concentrated and dense gravel layer, and the brown silt lower soil. But in moving southward this fairly simple situation breaks down, with the result that it becomes increasingly difficult to make precise stratigraphic correlations over any significant distance within the Middle zone. The main gravel layer becomes more diffuse, and at the same time several subsidiary lines appear—starting, stopping, and joining in no apparent systematic fashion (and often obscured by intrusions). Simultaneously, the distinction between the two soil members becomes progressively blurred at the expense of the brown silt: as the Middle zone thins toward the south, squeezed as it were between the rising surface of the terrace and descending ground surface, the fine fraction of the entire formation progressively takes on the aspect of the red clay.

Couche III here occupies a 25 cm-thick zone overlapping more or less evenly the uppermost portion of the level 4 gravel ensemble and the overlying red clay. It weakens markedly toward the southern end of the trench. A distinct sub-III archaeological horizon extends between N50 and N59 at the very base of the Middle zone, associating with a gravel line that often becomes confused with the surface of the underlying terrace. The horizon is poor in flint, and we never succeeded in identifying its industry.

A special upper member of the Middle zone, the tan soil, overlies the red clay in much of trench M. In the lowermost part of the trench this member is 0.40 m thick, but it gradually thins toward the north, disappearing into (more accurately, being truncated by) the plow zone at the latitude of N62. It is a yellowish-brown loamy sand, much less clayey than the underlying red clay, with which it has a highly irregular line of juncture (it is visible in the portion of the trench wall lying to the right of the ladder in figure 3.4). The tan soil subdivides into two distinct members upon drying: an upper one that changes lit-

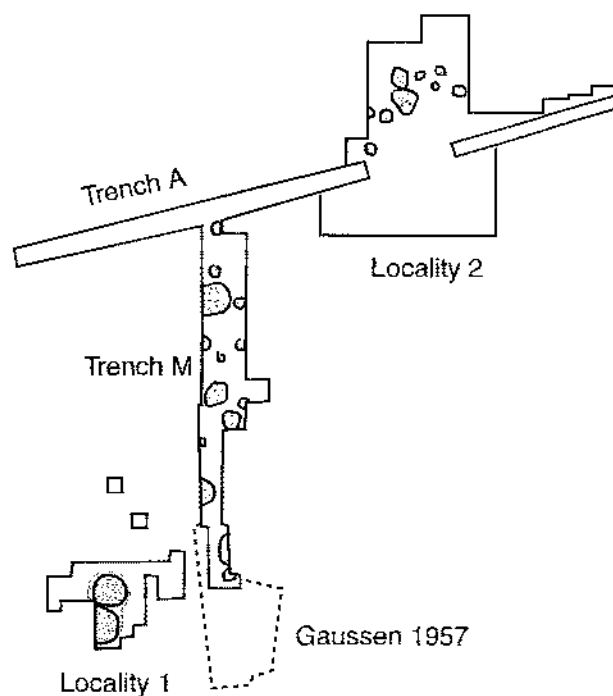


Figure 3.5. Plan of intrusions in Solvieux Ouest

tle at all in color, and a lower one that assumes a distinctive grayish aspect. Flints belonging to couches I and II scatter over a broad vertical zone extending from the lower grayish member of the tan soil into the upper portion of the red clay. Except in the southern extremity of the trench, where they become rich and in places associate with two distinct lines of couche rocks, these horizons cannot be distinguished from each other or even cleanly segregated as an ensemble from the underlying couche III.

Eight typical Magdalenian raclettes have turned up over the years in trench M excavations between N54 and N64. They came to light as isolated finds mixed with couche III flint in the red clay, well below the tan soil and never in contexts that suggested the presence of a stratigraphically distinct archaeological lens. They are presumably remnants of an Early Magdalenian deposit analogous to couche A of Solvieux Centre that was lost to erosion before Middle Magdalenian times. The Arable zone here consists simply of the plow zone unaccompanied by an underlying stony layer comparable to level 2 of the T-A2 type-section. It assumes this form nearly everywhere else on the site.

3.2.3 Locality 1

Positioned in the heart of Solvieux Sud and stratigraphically continuous with trench M, locality 1 has been the scene of important horizontal excavations. Two neighboring exposures are involved, one of 40 m² dug in 1956 by Gaussen (1980:57–101) and a somewhat larger one excavated during the first season of our project. Additional grid squares were added in subsequent years to increase artifact sample sizes and to illuminate stratigraphic questions raised by the tan soil and the obscuring effects of the intrusions that to some degree interrupt every square in the locality. The last are particularly damaging in our original exposure, having destroyed or at least contaminated the Paleolithic couches in most of the grid squares lying at its heart (see figure 3.5).

Where they are intact in locality 1, however, couches I and II are sufficiently rich in flint and cobbles to exhibit fairly obvious bedding, and their sedimentological contexts can be defined with considerably more assurance than trench M allows. Couche I occupies the lower, grayish zone of the tan soil, as well as its irregular juncture with the underlying red clay; couche II lies at a slightly lower elevation but still fairly high in the red clay, its upper surface separated from the lower surface of the first couche by only 5 cm. As Gaussen found, the two are often impossible to distinguish during the course of excavation. But we found that the surface of couche II is often signaled when digging by the appearance of a virtual pavement of extremely large flakes of what is called sidewalk flint (§ 6.2.5), a variety that is essentially absent in couche I. Moreover, in at least the less disturbed grid squares, the two couches often exhibit fairly distinct vertical distributions on scatterplots, on the basis of which their component flint assemblages can be segregated in the laboratory—so long as one is willing to exclude from either of them flint tools deriving from the 5-cm-thick intermediate zone where their distributions seemingly overlap.

The tan soil poses an interesting question of depositional history. It is difficult to observe clearly because almost everywhere it exhibits major signs of disturbance in the form of animal burrows, intrusions, scattered but frequent pot sherds, limestone elements, flint bearing plow marks, and even traces of charcoal. Gaussen maintains that its two mem-

bers are depositionally distinct, because he observed Paleolithic materials only in the lower grayish one and pottery only in the upper one (1980:62). We, however, found pottery, along with much other intrusive post-Paleolithic material, throughout the vertical extent of the tan soil. If such material is better represented in its upper member than its lower, it is simply as a function of relative depth and the concomitantly reduced likelihood of disturbance from above. The two members may therefore simply be pedogenetic horizons superimposed upon a block of sediments whose original depositional history, like that of the other members of the Middle zone, remains obscure. It should be noted in any case that the pedogenetic activity represented by the tan soil must have taken place fairly recently in geological perspective, as both of its members sometimes appear to traverse and totally obscure the upper portions of deep pit intrusions that date no earlier than Neolithic or Bronze Age times.

Couche III is known only from a few square meters excavated along the northern edge of locality 1. It is represented by scattered flints and very occasional couche rocks vertically dispersed over some 15 to 35 cm in the lower red clay immediately above the terrace gravels.

The locality straddles what might be regarded as a depositional island in lower Solvieux Ouest. Extensive pick-and-shovel sondaging has shown that the falloff of surface elevation, which the contour map depicts taking place within a few meters of its eastern, southern, and western margins, is accompanied by a commensurate loss of deposits. In each of these directions the Middle zone quickly disappears, and the plow intercepts the Lower zone gravels directly. It actually cuts into bedrock before reaching the southern boundary of the site, which no doubt accounts for a good part of the limestone elements diffused throughout the plow zone.

3.2.4 Locality 2

Locality 2 is a large exposure (176 m²) in northern Solvieux Ouest, traversed obliquely at midlatitude by the third (T-A3) segment of trench A running southwest to northeast (see figure 2.7). Over the central portion of the locality this trench was dug only just beneath the plow zone, allowing lower deposits to be excavated according to grid squares

in the normal fashion. The locality has had a complex history of excavations that left it dug to different depths in different areas, revealing a stratigraphy comparable to that of a major rock shelter with respect to its complexity and lateral variability. Figure 3.6 provides the basic plan of locality 2 and indicates the placement of its principal stratigraphic profiles and of several deep intrusions similar to those encountered elsewhere in Solvieux Ouest. We begin by framing the locality within the stratigraphy of trench A. The stratigraphy of the T-A2 section with which we are already familiar continues virtually unchanged to the western margin of the locality. Our point of departure is therefore the T-A4a section, which lies about 13 m farther on its eastern margin.

Trench A4a section

Figure 3.7 depicts a 2 m wide profile of the north wall of trench A just as it departs from the eastern margin of locality 2. It should be noted that this and essentially all the stratigraphic figures that follow are schematized only to the extent required for purposes of standardization and by the fact that most of them are composites that amalgamate excavators' notes, photographs, scatterplots, and formal profiles drawn in the field. The elevations and thicknesses indicated for the sedimentological zones and their respective members are precisely indicated, and the shading used to represent the archaeological couches accurately expresses their disposition. The different depositional units are indicated in terms of the conventions of illustration established in figure 2.2.

A convenient anchor for attaching the stratigraphy of T-A4a to T-A2 is couche IV, which can be traced without difficulty over the intervening deposits. Here it is a rich and continuous concentration of flint, occupying a sandy matrix incorporated within a tight ensemble of gravel lines that is considerably denser than the analogous level 9 gravel line in T-A2. This ensemble defines the lower limit of the Middle zone proper. Sitting on bedrock at the base of the section is a thick deposit of terrace gravels equivalent to level 17 in T-A2. The remainder of the Lower zone is made up of a complex, but archaeologically sterile, mixture of fluvial sands and

gravels that is at least broadly analogous to the levels 16-10 ensemble at the eastern end of T-A2. Much of this segment of the profile appears in the photograph reproduced in figure 4.17.

Above the couche IV gravels the Middle zone is analogous to the levels 3-5 complex of the T-A2 section, but here the matrix consists entirely of red clay, and instead of comprising a single dense layer, the gravels array themselves into more discontinuous, vertically separated lines. Three reasonably clear lines are discernible, each of which associates with a distinct archaeological horizon (see figure 2.16). Above and mixed in with the uppermost is the rich couche III, which—like couche IV below it—is stratigraphically continuous over intervening sections with its counterpart horizon in T-A2. But the lower two horizons are much weaker and are areally restricted to just the immediately adjacent portion of locality 2. They are, in descending order, couche D, attributed to the Aurignacian, and couche IVa, a localized upper lens of the Beauronnian.

At the base of the plow zone lies a relatively modern intrusion in the form of a narrow path paved with limestone gravels that continues at this latitude all the way to locality 4 in Solvieux Centre. It bears no relation to the level 2 coarse gravel encountered at the base of the plow zone in T-A2.

North-south profiles of locality 2

The stratigraphy traversing locality 2 perpendicular to trench A is considerably more complicated than the T-A4a section suggests. It is illustrated by two north-south profiles drawn on the E70 and E64 lines respectively (figures 3.8, 3.9). Continuous transverse sections of such length and vertical scope were never actually available for inspection in the field because the locality was dug in piecemeal fashion over three seasons and few of the dressed sections visible at any one time were uninterrupted by intrusions.

It is again couches III and IV that provide basic continuity to the stratigraphy. The former covers the entire width and length of the locality, lying roughly parallel to the Arable zone and rarely appearing more than 0.40 m below it. Couche IV also occupies the full width of the locality but describes a distinctive north-south profile involving two abrupt *chutes*

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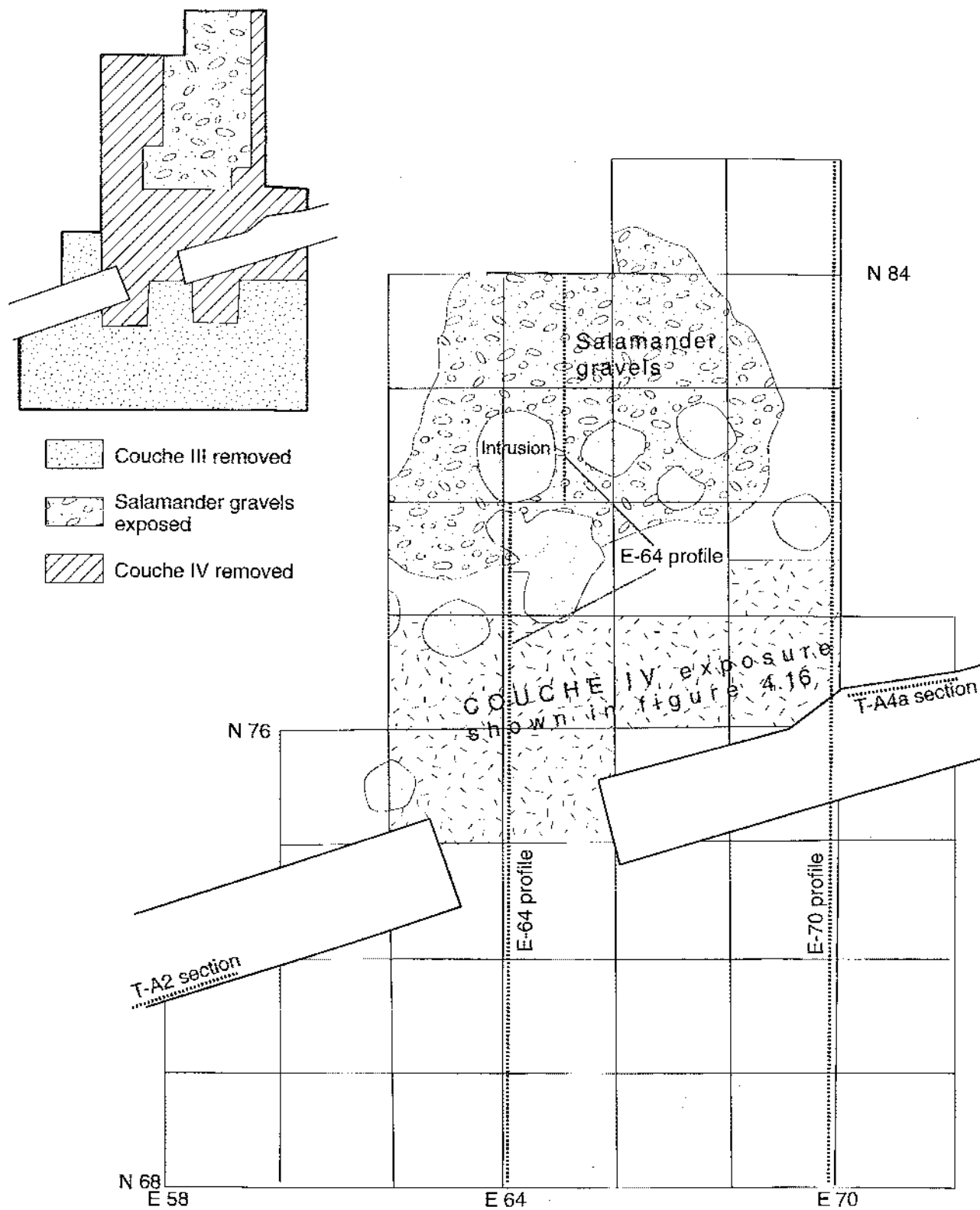


Figure 3.6. Plan of locality 2

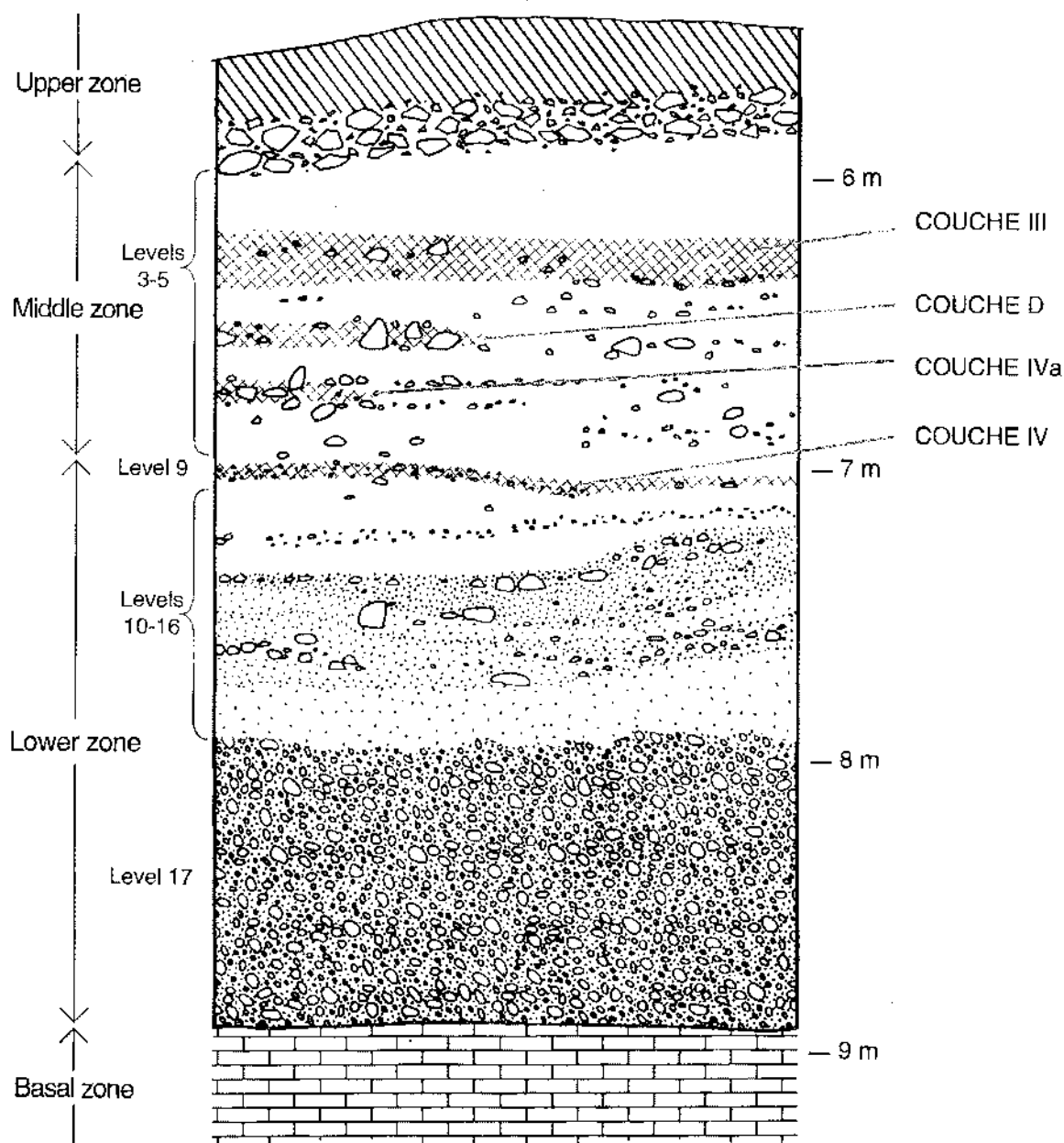


Figure 3.7. Profile of trench A4a section. Level designations indicate stratigraphic analogs to T-A2 section (figure 3.2).

or inclines: an upper one in the vicinity of latitude N79 and a lower one some 4 m toward the south, at the base of which the couche disappears. The stratigraphic contexts of couches III and IV vary markedly in the upper and lower portions of the locality. It will therefore be convenient to review the northern and southern halves of the locality separately, regarding trench A as the dividing line.

Southern half

Despite the localized appearance of couches D and IV in locality 2, the deposits in its southern half are like those of the T-A2 section, and the same level designations apply. Couche III comprises a single archaeological horizon lying within the red clay (level 3) of the Middle zone immediately above a fairly dense gravel bed (level 4). As is indicated both

by the T-A4a section and the north-south profiles, this bed in fact comprises several distinct lines that have rapidly converged in proceeding south with a commensurate loss of both fine fraction and archaeological content. The red clay reappears beneath this bed in the form assumed by the highly illuviated level 5 in the eastern end of T-A2.

Below the red clay the southern half of the locality exhibits a north-south stratigraphy that exactly repeats the east-west one seen in analogous portions of T-A2. Thus, along the northern margin of this half the lower red clay soil sits immediately upon the couche IV gravel ensemble, just as level 5 sits upon level 9 in the eastern extremity of the T-A2 section. Then immediately to the south the couche IV ensemble abruptly pitches downward in its lower chute, cutting through a mixed unit of underlying fluvial sands and colluvial gravels (presumably analogous to levels 10 through 15 of T-A2) and then through the Lower zone sands into the gravel terrace (levels 16 and 17). The result is a channel similar in form and placement to that seen in T-A2. Flint artifacts cease abruptly at the bottom of this lower chute. At the top of the channel a thin ensemble of sands and gravels intervenes between couche IV and the overlying level 5 in precisely the same manner that levels 6 through 8 appear in the corresponding part of the T-A2 section. Again, the line of juncture between level 5 and these subjoined strata is an undulating product of cryoturbation along which carbonates have accumulated. These deposits in the area of the lower chute and the channel are most clearly indicated on the E64 profile (figure 3.9; see also figure 4.17).

Deep sondages not depicted on the transverse profiles indicate that deposits similar to those seen in the northern extremity of trench M are encountered south of the lower chute. Neither the channel nor couche IV reappear (nor indeed any other archaeological horizon below couche III). In retrospect, it would have been of value, if only for purposes of this stratigraphic review, to have conducted further excavations in this sector, at least enough to enable one of the north-south profiles to extend all the way to the southern margin of the locality. But at the time the lack of deep archaeological remains here discouraged such an effort. Shortly thereafter the southern half became buried under debris pro-

duced by excavating the northern half, and new and more pressing questions demanded our attention.

Northern half

Several novel stratigraphic features are encountered here, and we must abandon the level designations that hitherto have proven useful. To begin with, the upper portion of the Middle zone presents couche III in a considerably broader and more complicated stratigraphic context. In the northern third of the locality a distinct couche IIIa lens is visible above the principal horizon in the eastern half of the locality, seemingly merging with it somewhere between N80 and N70. This lens could not be successfully distinguished from the main horizon in the western half of the exposure. Both horizons occupy the standard red clay in which the couche is found throughout Solvieux Ouest. Here, however, no underlying gravel analogous to level 3 appears in the southern half of the locality; instead, the principal horizon directly overlies the brown silt member. This soil is particularly obvious in the northern third of the locality, where it attains a maximum thickness of 0.25 m; it is comparable in texture and form to level 5 in the T-A2 section and northern trench M.

A second and even more marked sedimentological transition follows wherein the less altered brown silt is replaced by a soil in which all the properties of the red clay reappear. Over much of the northern third of the locality, but not extending far enough east to appear on the E70 profile, this second break is marked by a distinctive and voluminous tongue of gravel known to excavators as the 'salamander' gravels (see figure 2.12). (Another whimsical appellation: because of its circular intrusions, this oval gravel tongue bore a fanciful resemblance during its initial excavation to the skull of the renowned eighteenth century fossil man of Altdorf, in reality a Carboniferous amphibian.) It bears stressing that whereas this tongue underlies couche III in the north, it definitely does not continue as far as, or merge with, the dense gravel bed (level 4) that underlies the couche in the southern portion of the locality. Moreover, the sedimentological break with which it is associated is not visible south of the latitude where the salamander itself stops (approximately N79); beyond this point, as we have seen, the red clay forms a homogeneous matrix for the entire

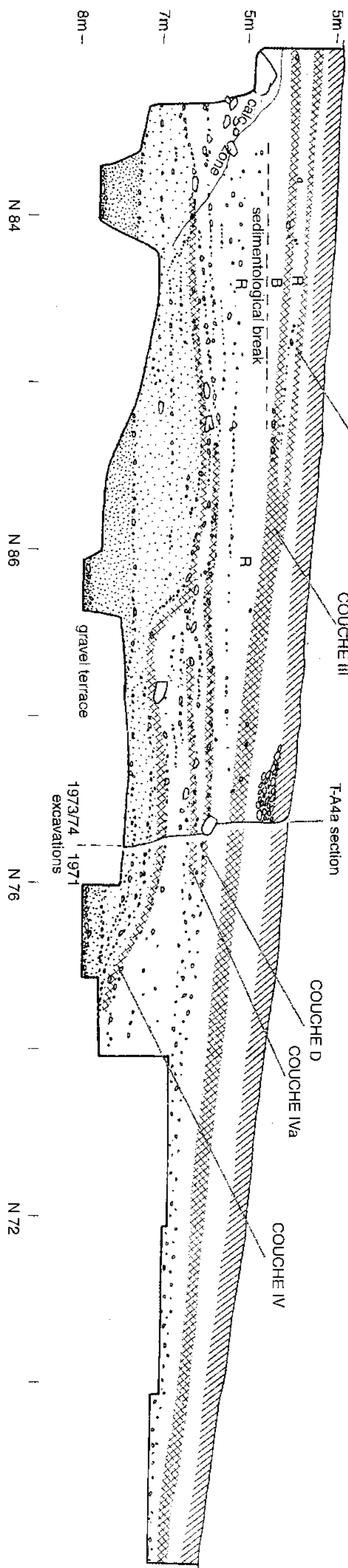


Figure 3.8. North-south profile of locality 2 on E70 gridline.

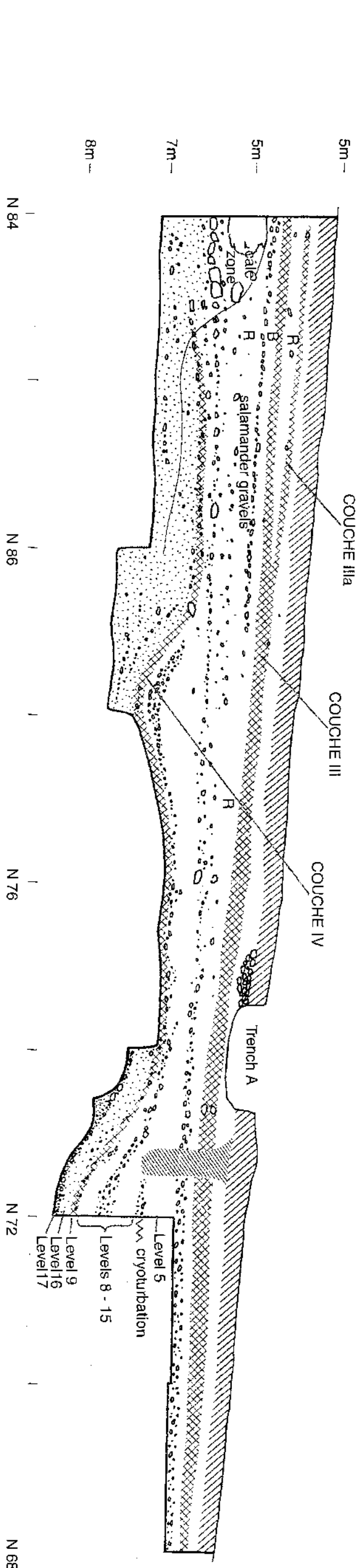


Figure 3.9. North-south profile of locality 2 on E64 gridline. Level designations indicate stratigraphic analogs to T-A2 section (see figure 3.2).

level 3–5 ensemble. All this indicates that, in descending southward toward trench A, the Middle zone deposits of locality 2 have undergone much loss of sediments and consequent stratigraphic merging. This sedimentary loss and consolidation seems to be born out by the archaeological evidence, given the manner in which the IIIa lens merges with the main horizon of couche III a brief distance south of the latitude where the salamander gravels stop.

The lower half of the Middle zone is equally complex. Between the level of the salamander gravels and the principal couche IV horizon in the northern third of locality 2 a complicated ensemble of gravel lines occupies a weathered, clay-rich matrix. This ensemble shows no marked difference from the red clay except that it becomes progressively charged with limestone elements toward the north (about which more below). Although the ensemble as a whole is continuous, its constituent gravel lines are individually short lived. The weak but distinct Aurignacian horizon, couche D, appears in this ensemble in the eastern half of the locality between N76 and N81.5; the T-A4a section suggests it may continue another meter or so into unexcavated deposits beyond the eastern margin of the locality. Couche D sits upon a distinct gravel line of its own whose horizontal extent appears to be coterminous with that of the horizon itself. At some points the couche seems to dispose itself as two distinct lenses: a continuous one directly on the gravel line and a second discontinuous one 3 cm below.

As the main couche IV horizon plunges in its descent at the upper chute, the lower Middle zone ensemble expands and seemingly incorporates new sediments. These sediments include a weak but distinct lens of the Beauronnian industry designated couche IVa. Like couche D, this lens lies in the east central portion of the locality, but over an even more restricted horizontal surface; it appears on the E70 profile between N76 and N79. At the latitude of the lower chute, however, both of these horizons disappear as the ensemble's gravels concentrate into a progressively narrower vertical space and assume the form of the fairly dense gravel bed that underlies couche III in the southern half of the locality.

The main couche IV horizon and the gravel complex with which it associates can be traced

nearly to the northern margin of the locality. It is particularly dense on the sloping face of the upper chute and the horizontal step beneath it (see figures 3.8, 4.19). Its passage here is marked by what seems to be a charcoal-stained line deriving from the carbon-charged sediment associated with possible hearthstone features—the only instances of organic material being preserved at any Neuvic group site.

The Lower zone is complex but archaeologically sterile. The E70 section was excavated deeply enough to reveal the terrace gravels and sands, which here occupy the same elevations as in the T-A4a section. Overlying these is a complex group of water-laid sands and gravels comparable to those interrupted by the lower chute in the southern half of the locality. But the somewhat higher ensemble of banded fine fluvial sediments and occasional gravel lines truncated by the upper chute here probably consists of deposits that are present in neither the southern half nor in the T-A2 section.

North of the upper chute the lower two-thirds of the locality's deposits become progressively modified by calcareous concretions and incorporate correspondingly more limestone elements. This calc member is due to the proximity of the massive slope deposit of limestone detritus cascading from the platform and against which the Middle zone abuts in the northern extremity of the locality. The detritus consists of reasonably discrete gravels and blocks of limestone in a breccified gravel matrix and can be defined with relatively little difficulty. The calc member lying in front of this detritus is transected at many points by both the main couche IV horizon and occasional gravel lines, which makes it reasonable to conclude that such calc lines constitute post-depositional alteration of already existing deposits (see figure 2.4).

Transition to Solvieux Centre

The only direct means of tracing the stratigraphic passage from Solvieux Ouest to Centre is the T-A4 segment, which connects locality 2 to the twin localities 3 and 4. This portion of trench A was originally dug by a backhoe as a line of individual deep sondages which, following a good deal of relatively unproductive hand excavation, was redug as a continuous trench. Most of its northern wall was then excavated in stepwise fashion to bring it into

alignment with the grid system and to recover important tool samples. Unfortunately, too little new deposit was exploited to achieve the latter aim.

The results obtained by all this effort in T-A4 were only marginally satisfactory. This was due partly to the extreme hardness of its deposit, which was attacked in a dry summer and, being excavated in vertical sections, could not be soaked with water in the fashion of horizontal exposures. Moreover, the placement of the trench was unfortunate, because it follows here—as in the vicinity of locality 2—a latitude at which the deposits are simultaneously undergoing considerable merging and transition from north to south. (It will be seen that the stratigraphic differences between localities 4 and 3 on either side of the trench in Solvieux Centre are even more marked than those we have distinguished in the two halves of locality 2 in Solvieux Ouest.) Nonetheless, a fairly obvious and consistent picture has emerged that can be conveniently summarized by comparing three stratigraphic profiles (figure 3.10): the T-A4a profile already examined on the north side of the trench just as it emerges from locality 2, the T-A4b profile depicting a stratigraphic section on the south wall of the trench approximately midway between localities 2 and 3, and the T-A4c profile depicting the south wall of the trench just before it meets the western margin of locality 3. The location of these profiles is indicated on the general site plan (figure 1.8).

In all three profiles the plow zone is underlain by the red clay, which is followed by a gravel ensemble approximately 0.40 m thick. Several distinct lines are visible within the ensemble, but none seems to continue over any great distance, and the fine fraction is essentially the same as the red clay. Then, in contrast to T-A4a, the Lower zone in T-A4b and T-A4c follows in immediate and unambiguous fashion in the form of a thick formation of bedded fluvial sands near the top of which light and discontinuous gravel lines appear.

Each of the three profiles is distinctive archaeologically. Although T-A4b at midroad in the trench continues to show couche III lying at the base of the red clay, couche IV here lies relatively high in the gravel bed only 20 to 30 cm below couche III. This disposition contrasts dramatically with T-A4a to the west, where couche IV lies 70 cm below couche III

and associates with a distinctive sedimentary ensemble in which Middle and Lower zone facies seem to be intermixed. What has happened is that this ensemble becomes ill-defined approximately 3 m east of the T-A4a section, and the couche IV line of flint makes an abrupt jump upward into the gravel bed to the position it occupies in T-A4b. (Although excavators traced this jump on both walls of the trench, the hardness of the deposits made it impossible to observe its sedimentological context in detail; the couche simply appears to traverse the lower portion of the gravel bed—a telling proof that, whereas the bed itself may be continuous, its component lines are not.) About 2 m east of the T-A4b section couche IV disappears altogether, couche III diminishes markedly, and flints appearing at a higher position in the red clay herald the appearance of couche A. The second two trends are emphasized in progressing east. The result is that, as is seen in T-A4c, the red clay, in approaching locality 3, becomes dominated by the couche rocks and flint of couche A. Here this couche is disposed in two distinct horizons, whereas couche III is represented by a few flints scattered over the surface of the gravel unit (see figure 2.17).

Additional light is cast upon the transition from Solvieux Ouest to Centre by trench K (profile not illustrated), which consists simply of two aligned pits dug by the backhoe to the south of T-A4b. These pits show the same stratigraphy as T-A4b, except that in passing southward the Middle zone progressively wedges out under the sloping ground surface; in the more southerly of the two pits the plow zone actually intersects the terrace gravels. A fairly heavy concentration of flint, presumably attributable to couche A, occupies the red clay of the upper pit.

The T-A4 section does not provide the whole story, for we will see that a stratigraphic and industrial analog of couche III (couche B) does appear in Solvieux Centre, but that its southern margin lies at a latitude somewhat above trench A. The case for couche IV's continuation into Solvieux Centre is much weaker and rests upon the highly ambiguous lens designated couche L (§ 3.2.1). In any event, it is certain that the buried channel with which this couche IV associates in northern Solvieux Ouest does not continue any appreciable distance east of locality 2. At least at the latitude of trench A, the

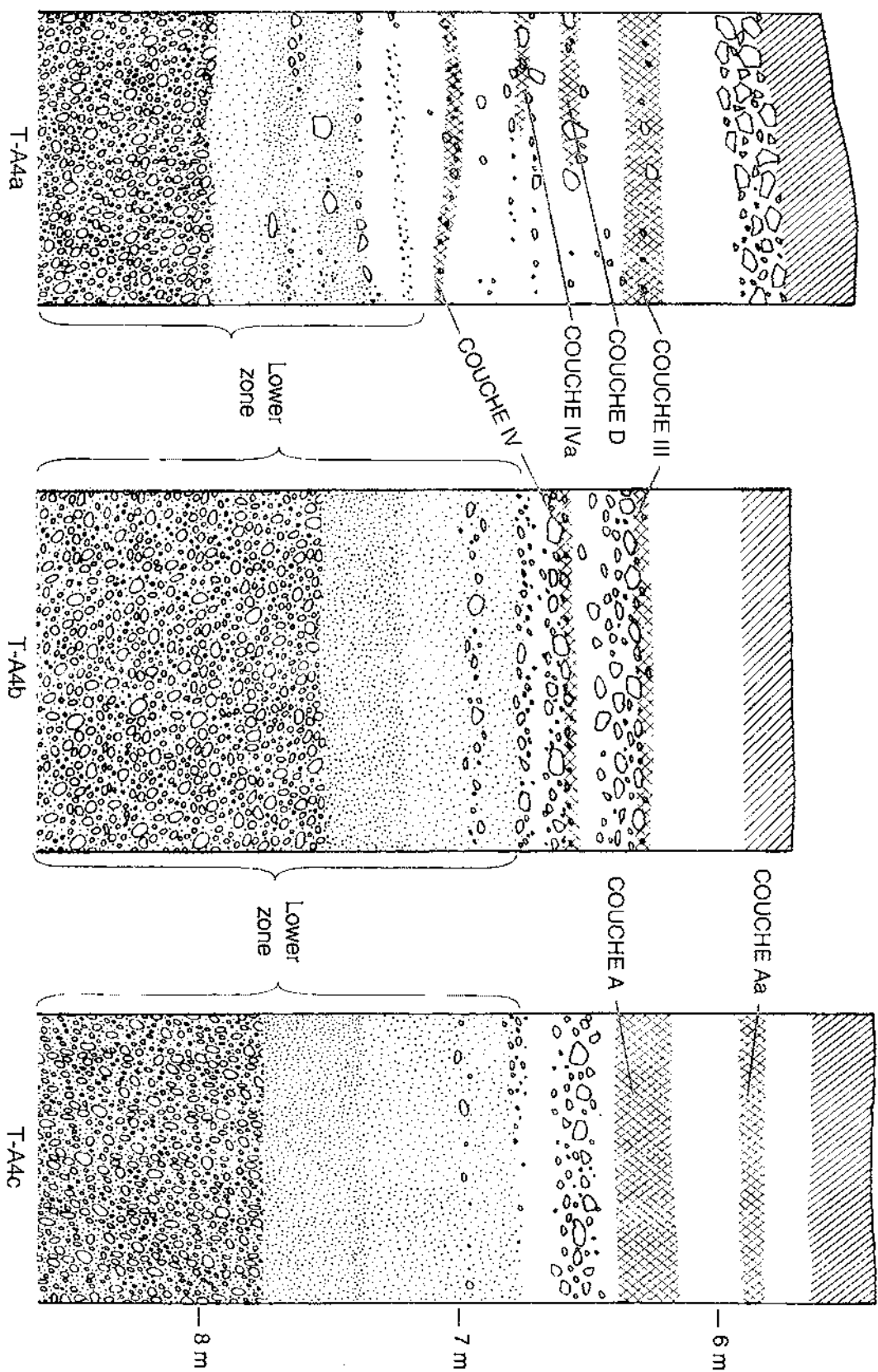


Figure 3.10. Transition from locality 2 to localities 3 and 4 as shown by profiles of the T-A4a, T-A4b, and T-A4c sections.

relatively simple and straightforward natural stratigraphy seen in the T-A4b and T-A4c sections continues all the way to the eastern border of the site.

3.3 Solvieux Centre

Two principal excavations are of concern in this sector. One comprises the twin localities 3 and 4, which were the scene of broad exposures in the middle latitudes of the sector; the other lies in northern Solvieux Centre, where a series of trenches was dug to test deposits in its upper reaches. The principal couches concerned are illustrated schematically in figure 3.1b. Here the Rayssé Perigordian recurs in the form of couche B, which extends upward from the latitude of trench B nearly as far as the northern margin of the site. It possesses a tributary lens, couche Bb, which we will see is of considerable interest to regional systematics. The extremely rich Early Magdalenian couche A occupation dominates the middle latitudes and continues northward in diminished fashion for a considerable distance before entering the plow zone. It, too, has at least one secondary lens, couche Aa. Finally, additional minor couches are to be found in upper Solvieux Centre that are only poorly known. These include a Solutrean horizon (couche S) and what appears to be a secondarily deposited Mousterian horizon (couche C); two additional couches, L and Y, have an Upper Paleolithic aspect but cannot be identified.

3.3.1 Localities 3 and 4

Locality 3 is an especially large exposure of 197 m² begun late in the first season. It continued to see important excavations during every year that a substantial field crew worked at Solvieux (see figure 2.7). Locality 4, a much smaller exposure of 46 m², began as a backhoe sondage that was not expanded into a horizontal excavation until the penultimate season (see figure 2.8). The deposits in this area are essentially variations on the stratigraphy depicted in the T-A4c section: locality 4, representing a vertical expansion of it, and locality 3, a considerable narrowing and consolidation. Two schematic profiles suffice to tell the story (figure 3.11). Although certain obvious analogies may be drawn between stratigraphy here and in Solvieux Ouest, the specific

level number designations used in the latter sector no longer apply.

Locality 4

The stratigraphy of locality 4 is fairly complex (figure 3.11a). Apart from large but happily not deep intrusions, the Arable zone contains the same limestone cobble pathway we saw in locality 2; it apparently runs continuously just to the north of trench A in the intervening area, dying out on the E99 line somewhat short of the eastern margin of locality 4. The Middle and Lower zones appear in nearly textbook fashion. The basic point of reference is a gravel bed that runs along the base of the Middle zone, sloping only slightly to the south. It has considerable lateral variability, but tends to comprise two members and to increase appreciably in density from north to south; in the most southerly 2 m of the locality it is especially dense and its surface is elevated. Above it in the southern half of the locality lies a homogeneous formation of red clay possessing only light and scattered gravel lines. But in the northern half, where the gravel bed lies well over a meter below the plow zone, the fine fraction of the Middle zone differentiates. It incorporates an upper member of red clay approximately 0.40 m thick, which is underlain by a brown silt member that gives way in turn to a more clayey one below. The lower portion of this last member forms the matrix of the gravel bed. Below the gravels lie fluvial sands, yellowish and grayish toward the north and redder (that is, more affected by illuviation) toward the south; discontinuous gravel lines appear within 10 to 15 cm of its surface.

Sediments in the northern extremity of the locality are charged with calcium carbonate and limestone elements that form a calc member similar to the one extending outward from the limestone detritus slope in northern locality 2. The leading edge of this member is convoluted and obviously transects distinct gravel lines in its downward slope. The calc dips abruptly and then apparently extends several meters to the south, for the most part below the level to which excavation was usually carried.

Four archaeological couches are present in locality 4. The richest artifactually is the Rayssé Perigordian couche 4-B, which appears in the northern two-thirds of the locality as a distinct line of flint

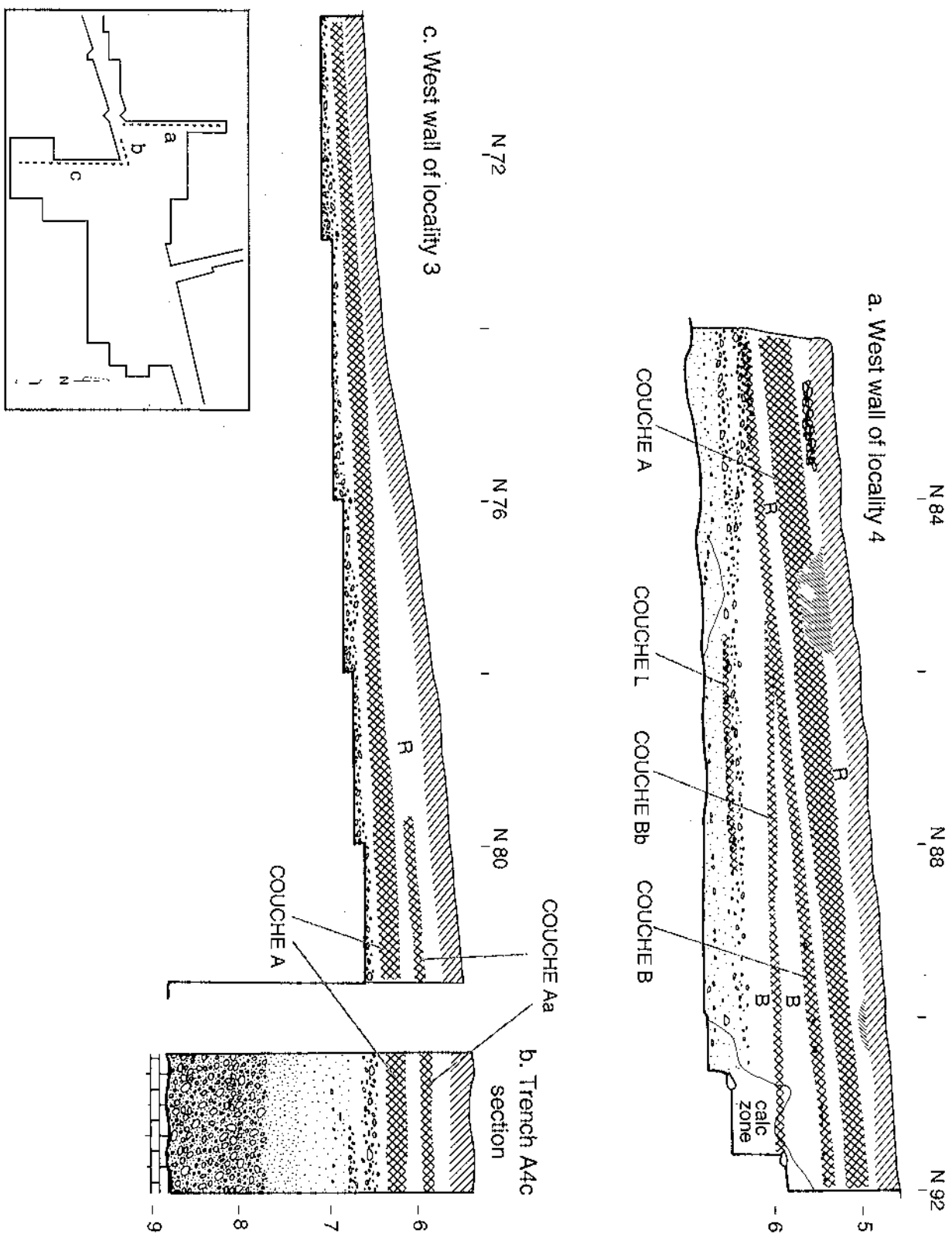


Figure 3.11. North-south profile of localities 3 and 4

and couche rocks that steeply inclines southward through the second brown silt member of the Middle zone. In the southern third it impoverishes rapidly and simultaneously descends into, and mingles with, the surface of the gravel bed that forms the base of this zone. We have seen it in this impoverished condition 2 m south of the locality in the T-A4c section (figure 3.11b). At a somewhat higher level a considerably more diffuse scatter of flint and occasional couche rocks appears that is attributable on both stratigraphic and typological grounds to couche A. Toward the eastern half of the locality this couche 4-A becomes denser and more clearly defined; couche B, on the other hand, tends to become increasingly impoverished in this direction.

Two relatively minor horizons complete the inventory. The first is couche Bb, which is restricted to the western half of the locality. Here, in contrast to the distinct southward slope of the overlying couche B, it lies quite horizontally. For most of its reach it occupies the brown silt, but it extends far enough to the north to penetrate the calc unit. Immediately south of the N86 line it is intercepted by the downward slope of couche B, with which it commingles and, in turn, begins to mix with the surface of the underlying gravel member. North of N86 the Bb lens possesses Noailles burins but no Raysse burins, whereas in the overlying couche B, which is rich in Raysse burins, no Noailles burins appear north of the point where the two horizons join. (We have seen an analogous, if less clear-cut, situation in the Raysse Perigordian couche III series in locality 2 [§ 3.2.4].) The second horizon is couche L ('low'), a horizontal and fairly concentrated horizon of flints lying at considerable depth in the lower portion of the gravel bed in west central locality 4. Forming a roughly circular distribution 2 m in diameter centered on the N86/E92 grid stake, it continues more diffusely for an additional meter or so to the northeast and southeast, and may reappear in the form of some isolated pieces found deep in the eastern squares of the locality. No retouched tools have appeared, and the industry cannot be identified.

Locality 3

Locality 3, the scene of our broadest horizontal excavation, possesses the simplest stratigraphy

encountered at Solvieux (figure 3.11c). It is dominated by a homogeneous deposit of red clay that, although progressively constricted between the surface of the gravel bed and the southward sloping plow zone, incorporates the extremely rich Early Magdalenian couche A occupation. Because of its proximity to ground surface, the couche lends itself admirably to large-scale horizontal excavation. The principal horizon of couche A is associated with massive cobblestone features and is ubiquitous to the locality, although it tends to diminish in wealth as it approaches the northern margin, as well as in the entire northeast sector of the exposure. Throughout the locality discontinuous scatters of flint can be found 10 to 20 cm above the principal horizon that are typologically indistinguishable from it. These are collectively referred to as couche Aa, even though we cannot determine whether they represent a single depositional episode. The most important of these scatters lies in the northwestern corner of the locality, in whose wall section it appears as a line of couche rocks suggesting a small rock feature. This line appears on the T-A4c profile (figure 3.11b).

Some Raysse burins appear in locality 3, suggesting that elements from couche B may extend south of trench A. But these pieces are too few in number and too dispersed horizontally to suggest the presence of an intact couche B horizon in the locality.

No archaeological materials exist in locality 3 below the gravel bed underlying couche A. Instead, one passes through a narrow sterile member of Middle zone sediments and then hits the surface of the gravel terrace, which here, as in comparable latitudes in Solvieux Ouest and Est, rises somewhat toward the south and is largely devoid of overlying sands. While it no doubt once continued much farther toward lower Solvieux Centre, couche A now lies within range of the plow at the southern margin of locality 3. This encroachment is noticeable throughout Solvieux Centre along the 7.00-m contour line and entails major destruction of the couche by the 7.50-m contour line. Throughout the lower parts of the central basin the couche is now absent and the plow zone transects the underlying fluvial terrace gravels.

3.3.2 Northern Solvieux Centre

Northern Solvieux Centre comprises locality 5, the northern segments of trench H (1 and 2) lying within the site proper, and a series of trenches mounting onto the platform, of which the northernmost segment of trench H is the most important. The work here proved to be highly frustrating because it entailed a considerable expenditure of time and effort and produced only meager results. Although its stratigraphic situation has considerable interest, the archaeological remains themselves are of modest value, and their burial under the road embankment does not constitute a major loss.

Transition from locality 3/4 to northern Solvieux Centre

Direct stratigraphic transition is provided by trench H3 and trench G-N2, both excavated by a backhoe. They are not highly informative, especially because all but a narrow vertical section at the midpoint of T-H3 had to be revetted by timbers to ensure against collapse. The stratigraphy here in any case is the

same as that we have already seen just to the west at this latitude in locality 4. Thus, the Middle zone presents a deep soil profile that divides into an upper red clay and a lower brown silt. Each possesses only light and discontinuous gravel lines, while at the base of the Middle zone a fairly heavy gravel complex appears. A wide vertical scatter of artifacts traverses the zone well above these gravels. Stone tools diagnostic of couche A dominate the upper part of the scatter, while those typical of couche B appear in the lower.

Locality 5 and northern trench H

The stratigraphic scene changes fairly markedly further to the north in trenches H1 and H2 and in locality 5, which, despite its name, is not a horizontal exposure but a series of hand-dug extensions from a group of more limited test pits originally designated trench G-N1 (figure 3.12). Considerable bone-jarring digging took place in these locales over the years, but results were disappointing. For one thing, no single stratigraphic section is particularly



Figure 3.12. Locality 5 in northern Solvieux Centre, with platform and cliff in the background. The canvas awning is easily positioned as weather and excavation dictate.

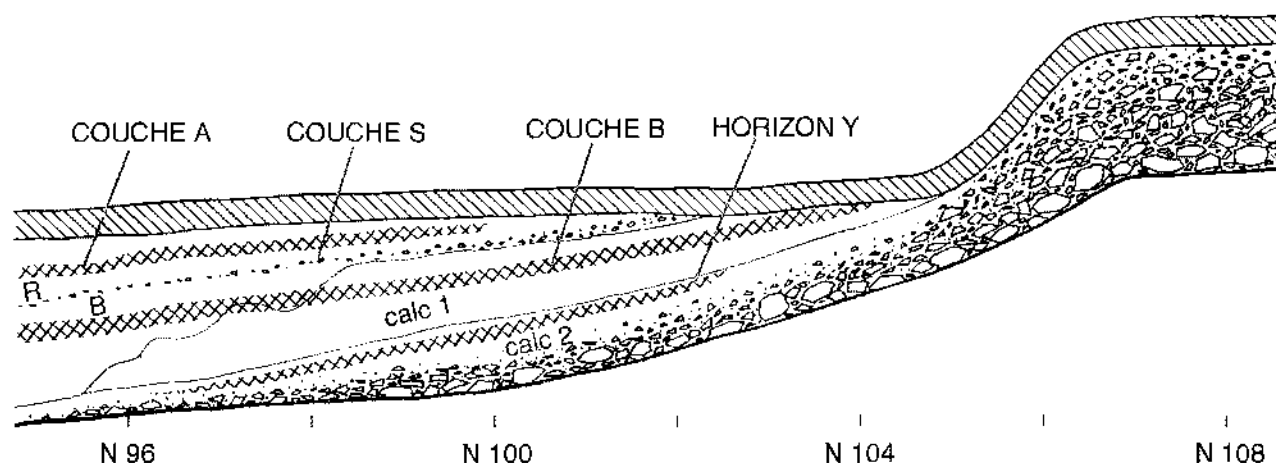


Figure 3.13. Stratigraphy of northern Solvieux Centre

valuable here, largely because excavation in the trench H segments consisted of wall dressing at different times and often under difficult conditions and because work at locality 5 was also intermittent and frustrated by a large intrusion occupying its center. For another thing, the locale's archaeological couches are artifactually weak and their sedimentary matrices often extremely hard and resistant. In the middle of the trench H section we encountered a limestone block so large that not even the backhoe could move it.

Nonetheless, the two areas are similar enough that their stratigraphy can be illustrated by a single composite profile (figure 3.13). In its lower reaches the Middle formation resembles the thick soil zone to the south, its upper portion the red clay and its lower the brown silt member, which here assumes a somewhat yellowish cast. Their zone of contact is punctuated by a distinct gravel line that rises toward the north and is truncated by the plow at the upper extremity of both excavations (at which point the red clay is squeezed out as well). This line weakens toward the south, which probably accounts for its not being observed in either locality 4 or the trench H3/trench G-N2 excavations. Its enrichment toward the north in approaching the platform is due largely to a progressive admixture of limestone elements. At the same time the brown silt beneath it becomes charged with limestone and develops into the calc 1 unit. The leading edge of calc 1 is convoluted and diffuse toward the south (just like the analogous calc

member in locality 4), but toward the north it rises and unites with the gravel line, which takes the form of a cement-like breccia capping it (see figure 2.4).

Within calc 1 distinct lines of limestone gravels can be observed. Beneath it lies a second (calc 2) unit, whose carbonaceous element is superimposed over a redder and more clayey fine fraction; this ensemble is hard enough to resist even a pickax. Within 30 cm of its surface one encounters the fairly massive limestone detritus that cascades onto the site from the platform above. This formation gradually levels off and may continue south for a considerable distance at a depth below that to which the excavations were carried. (It presumably bears no relation to the heavy gravel complex near the base of the Middle zone even farther to the south at the latitude of locality 4, for the latter weakens appreciably in passing from south to north within this locality and may die out altogether before attaining northern Solvieux Centre.) Toward the north it rises abruptly to the surface, thereby cutting off both calc 1 and calc 2, immediately above locality 5 and trench H-N1.

Couche A takes the form of a weak and diffuse scatter in the red clay and disappears along with it into the plow zone at the latitude of northern locality 5. The angle of the upward slope of the couche and the gravel line beneath it suggest that the Middle zone in northern Solvieux Centre may have once mounted to the edge of the platform itself. Couche B, richer than all the other horizons combined

(though still poorer here than in locality 4), appears on scatterplots as a concentrated line of flint lying beneath the gravel member that passes through the brown silt to the south and calc 1 to the north. Its penetration of the latter is quite obvious, which confirms our impression that the convoluted leading edge of calc 1 marks a postdepositional change in an existing deposit rather than a distinct stratigraphic break. Couches A and B occupy the same soil members in which they appear in northern locality 4, although here the two members are separated by distinct gravel lines. A weak archaeological horizon, couche S, associates with this line. It yielded no tools in trench H1 and H2, but two Solutrean points were recovered in it early on in locality 5. It was in fact this discovery and the resulting hope of finding a rich Solutrean couche that prompted our repeated attacks on northern Solvieux Centre.

Isolated flints suggest the presence of additional archaeological horizons, but they are weak and have yielded no tools whatsoever. The most interesting of these is horizon Y, which occupies the uppermost portion of calc 2 in both locality 5 and trench H-N1 and H-N2. It possesses an Upper Paleolithic blade technology that contrasts markedly with the flake technology of the Mousterian industry appearing in the neighboring limestone rubble.

The platform

The upper margin of Solvieux Centre was tested by the northernmost extension of trench H and seven additional trench segments located on the edge or surface of the platform. The platform is barren archaeologically, and bedrock lies only a few centimeters below its surface. In both the northernmost segment of trench H and the two trenches that bracket it on the west and east, however, the limestone talus incorporates a fairly rich admixture of flint flakes collectively labeled couche C and attributed to the Mousterian. These are bruised, heavily patinated, and loosely bedded, giving the impression of having been secondarily deposited from some now destroyed source above. In the talus they appear as a vertical concentration of flint approximately 0.50 m thick, while in the northern zone of the site this concentration more than doubles in thickness and apparently incorporates several stratigraphic subdivisions.

3.4 Solvieux Est

Although natural deposits in this sector differ relatively little from those of Solvieux Centre, the archaeological situation is both distinctive and remarkably homogeneous over what amounts to the entire eastern half of the site. As figure 3.1c shows, only two archaeological horizons play a significant role, couches M ('main') and H ('high'). The first is a Raysse Perigordian, while the second appears to belong to the same industry but has yielded too few diagnostic artifacts to be identified with certainty. North of trench A they are vertically well separated, couche M lying relatively horizontal and couche H sloping sharply toward the south. They merge at the latitude of trench A, to the south of which a progressively weak archaeological horizon continues within which no vertical subdivisions are visible. This straightforward archaeological stratigraphy is clearly apparent in trenches F and D (figures 3.14, 3.15) and the T-A5a section (figure 3.16).

3.4.1 Transition from Solvieux Centre

By rights this transition should be visible in trench A, which continues across Solvieux Est as the east-west artery of stratigraphic correlation. Here it was originally dug by a backhoe in the form of a line of sondages and short trench segments—excavations which, due largely to the inadequate sampling techniques of the time, seemed to furnish little of interest. These were ultimately filled in, and the entire extent of the trench east of locality 3 was redug to provide a continuous stratigraphic section (T-A5) across Solvieux's eastern sector. Results were disappointing. For one thing, the ground was so hard after a dry spring that wall cleaning failed to produce either good flint lines or many retouched tools. For another, trench A is placed here (as it is in Solvieux Centre and Ouest) too far toward the south at a latitude where the archaeological couches appear to be simultaneously merging, mixing, and weakening.

The archaeological transition between the two sectors must be fairly abrupt, however, as couche A, which so heavily dominates Solvieux Centre at the latitude of trench A, virtually disappears before trench A intersects trench D less than 20 m east of locality 3. Only two isolated raclettes have ever

come to light in Solvieux Est, and these in ambiguous contexts. One was found in sondage 21, on the eastern margin of the central basin in lower Solvieux Est, in association with a mixed assemblage that also included Raysse Perigordian elements. The other appeared on the deblois heap alongside locality 6 in the eastern extremity of the site; its original source is unknown and could even have been the plow zone. Because raclettes account for one-third of the couche A industry, their total absence in the trench A excavations in Solvieux Est is indeed telling, regardless of the small size of the assemblages recovered there.

3.4.2 Excavations

The north-south trenches B and C, along with part of D, were dug by a backhoe in the project's second year. They never elicited much interest because of their apparent archaeological poverty in comparison with the western half of the site (again in part a product of our own inadequate sampling techniques at the time). Their southern extensions below trench A were later refilled as a safety measure just after a new trench (F) dug by a backhoe in this area collapsed within minutes of its completion. The northern segments of trenches C and B were subsequently filled in during construction of the road embankment. In the meanwhile, the northernmost segment of trench D (T-DN1) became the scene of important stratigraphic work; it was ultimately extended southward by the backhoe to join trench A (T-DN2). In the project's last season our effort centered on Solvieux Est. Also at that time trench F to the east was excavated, extending from a point 20 m south of trench A (alongside its collapsed predecessor) up to the road embankment that now buried the northern margin of the site. Simultaneously, a north-south line of four sondages extending over a distance of some 30 m was excavated on the E194 gridline straddling trench A. This line gave interesting results in contrast to the sondages that had been excavated in the same neighborhood a few years before, which—due largely to their placement south of trench A—had provided only sketchy and ambiguous information. This last work led to the important horizontal exposure known as locality 6, which extends northward from trench A over a surface exceeding 70 m².

3.4.3 Trench F and trench A5a section

The most complete view of Solvieux Est's deposits is furnished by trench F, which provides a nearly continuous north-south section of stratigraphy almost precisely at the midpoint of the eastern half of the site (figure 3.14). To the north of trench A the Middle zone incorporates two distinctive gravel lines. The higher of the two is light but continuous, sloping downward to approach the lower one, which lies nearly horizontal and becomes denser in approaching trench A. Their sedimentological context is the familiar one of an upper red clay soil giving way, in the more northerly and deeper portion of the trench, to a sandier and less weathered brown silt; the latter wedges out a few meters north of trench A due to the progressive thinning of the Middle zone as it is truncated by the sloping ground surface. The upper gravel line lies within the red clay, and the lower line within the brown silt, although significantly above its bottom margin. Topping the Middle zone here (and indeed throughout the eastern half of the site) is a distinctive tan soil, altogether reminiscent of the tan soil of Solvieux Ouest except that it has no subunits. It is grayish yellow-brown and considerably loamier in texture than the red clay. The upper portion of the Lower zone is represented by a weathered sand incorporating fairly heavy but discontinuous gravel lines.

The T-A5a profile (figure 3.16) illustrates a surface-to-bedrock section of stratigraphy at the latitude of trench A slightly to the east of trench F. The tan soil is underlain by a thick deposit of red clay in which the two gravel lines lie quite close together. The Lower zone follows, comprising a thick (0.8 m) deposit of sand possessing its own gravel lines and underlain by terrace gravels. There is no need to illustrate the deposits extending south of trench A. The tan and red clay members of the Middle zone continue in trench F, overlying a fairly thick gravel complex in which two separate lines can be distinguished only at intervals. In progressing southward the fluvial sands thin rapidly and, just as in Solvieux Centre and Ouest, finally disappear altogether as the surface of the terrace rises. The plow zone and terrace gravels begin to converge only beyond the southern end of trench F, approximately along the 7.5 m contour line.

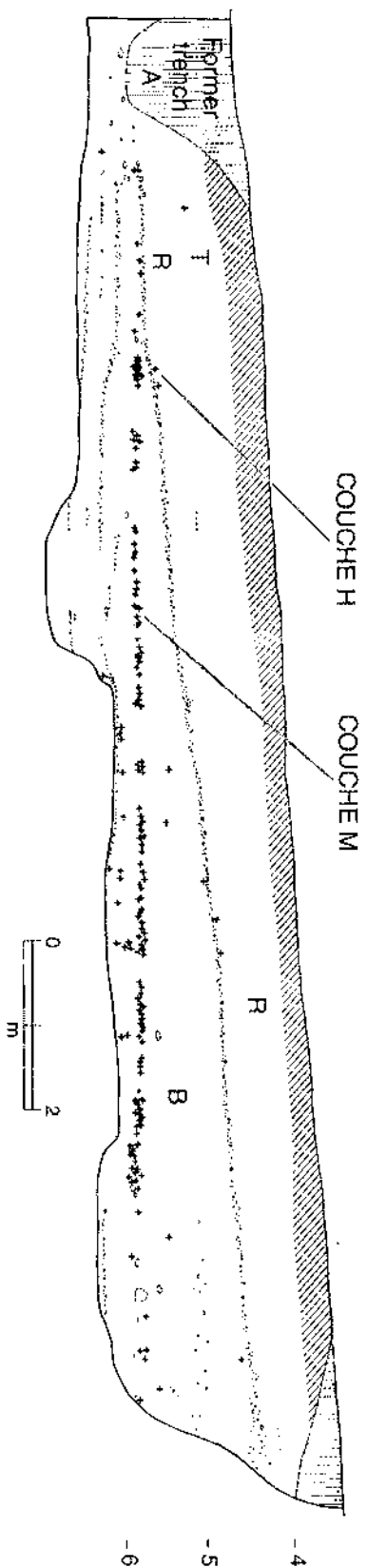


Figure 3.14. Stratigraphy of northern trench F. Crosses indicate flint artifacts appearing on the trench wall.

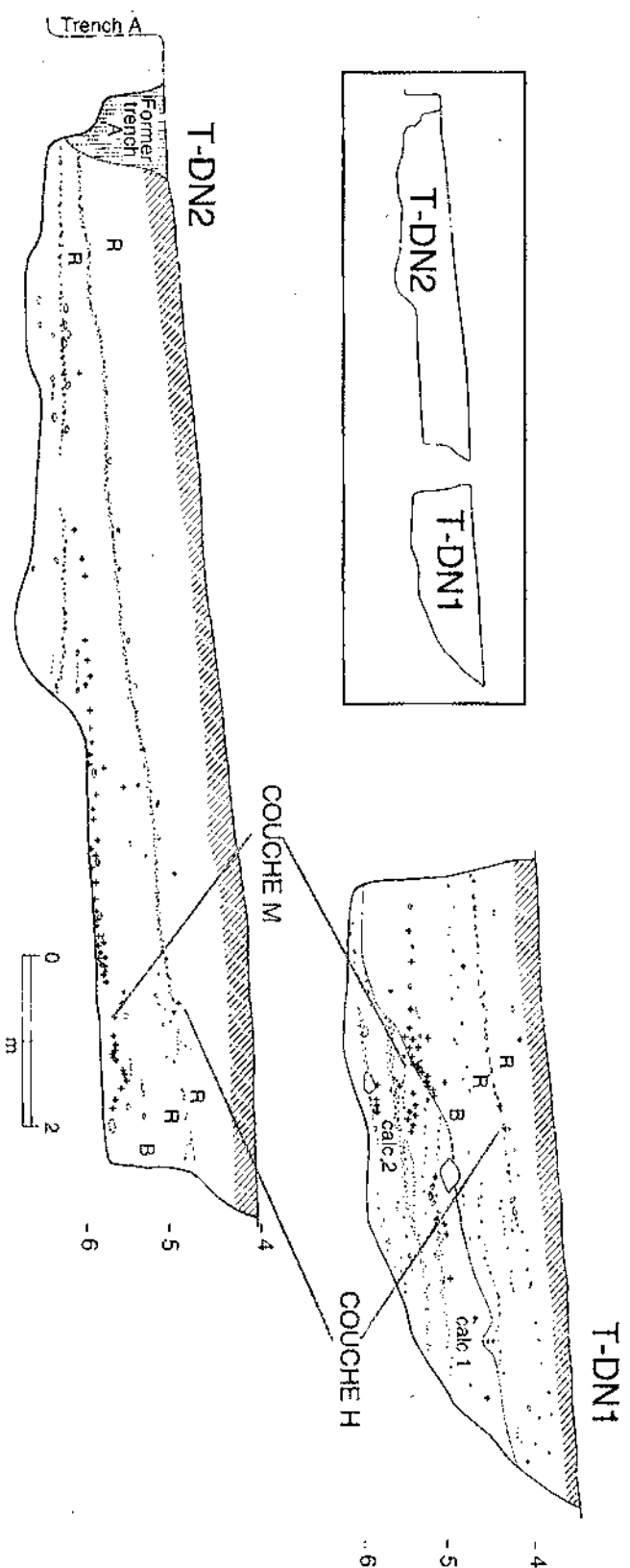


Figure 3.15. Stratigraphy of northern trench D. Crosses indicate flint artifacts appearing on the trench wall.

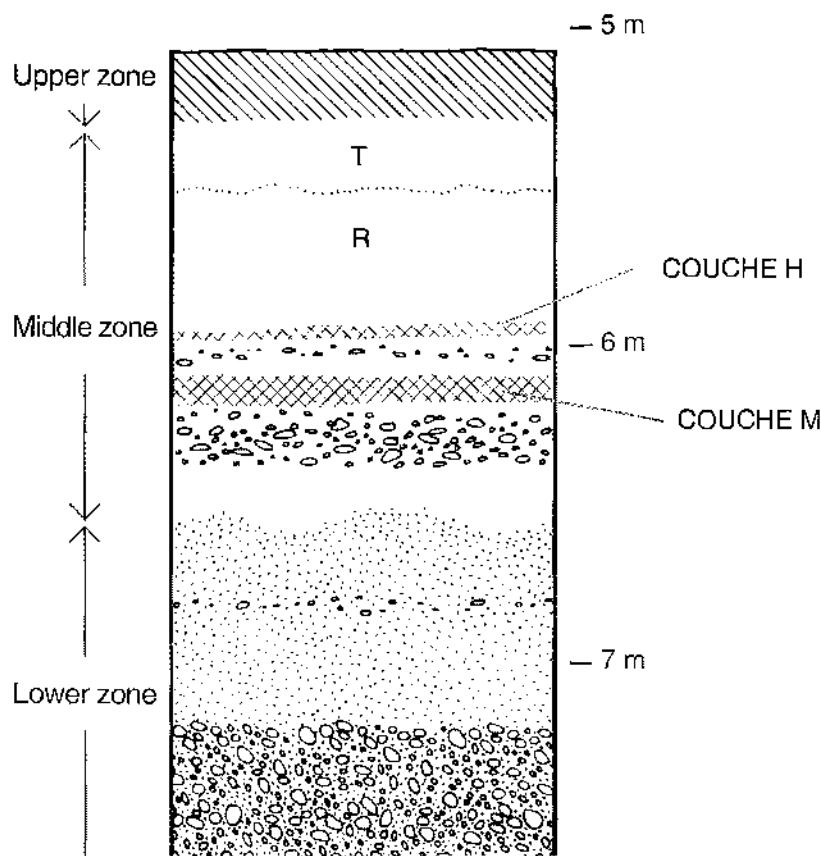


Figure 3.16. Profile of trench A5a section

The archaeological situation at this longitude, just as elsewhere in Solvieux Est, is quite simple. North of trench A, couche H associates directly with the sloping gravel line that passes through the red clay, whereas couche M lies horizontally in the brown silt some 20 cm above the lower gravel line. By the latitude of trench A the two couches have converged to within 10 cm of each other, separated only by a weak continuation of the upper gravel line. To the south only a progressively weak scatter of flint is visible, and even it disappears around 7 m north of the southern end of trench F. Given the relative importance of the two couches to the north of trench A, it is likely that this scatter belongs largely, if not entirely, to couche M. The archaeological poverty and lack of southerly extension of occupation here is noteworthy, given that lower Solvieux Est possesses roomy Middle zone deposits of a kind that house important cultural remains wherever else they appear at Solvieux.

3.4.4 Trench D

Trench D is of considerable interest both because of its proximity to Solvieux Centre and because it was the only excavation conducted relatively late in the project's history (when sampling procedures were at their best) in the northern zone of Solvieux Est before it was buried under the road embankment.

The trench DN2 segment establishes just beyond the eastern border of Solvieux Centre the cultural and natural stratigraphy that we saw to the east in trench F (figure 3.15). Trench DN1 reveals the behavior of this stratigraphy farther toward the north and simultaneously exhibits interesting comparisons to the trenches H1 and H2/locality 5 deposits of northern Solvieux Centre. Again, the Middle merges into calc 1 and calc 2 members whose composition is virtually the same as that of their counterparts to the west. The upper gravel line



Figure 3.17. Locality 6 and its excavators. Immediately above the exposure lies the new road embankment constructed over the northern margin of the site.

here seems to be different from the one in northern Solvieux Centre, however. It lies at a higher point in the deposit, traversing the red clay soil (rather than the juncture of this soil with the brown silt member) and rising well above the surface of calc 1. Moreover, as is seen in the trench DN2 section, it retains considerable strength and integrity all the way down to trench A, that is, to a latitude where no superior gravel line of any kind is visible to the west. It seems reasonable to conclude, therefore, that couche H of Solvieux Est is not represented in Solvieux Centre and that Solvieux Est, on the other hand, lacks a sedimentological equivalent of the gravel line with which Solutrean materials (couche S) are found associated in locality 5:

Still, the Raysse Perigordian couches B and M seem to occupy analogous stratigraphic positions in the two localities. Both lie in the brown silt member above the gravel complex that runs near the base of

the Middle zone. The only way they may behave in contrary fashions is with respect to calc 1. Couche B in northern Solvieux Centre simply penetrates this member in its northward course. The relationship between couche M and calc 1 in Solvieux Est is unclear, however. Whereas calc 1 contains a line of flint that seems to represent the couche's northward continuation, a second line of flint appears that also seems to continue the couche, carrying it up and over the surface of calc 1. The question of just how these two horizons relate to couche M was never resolved. The higher flint line might lead one to argue that the upper margin of the calc zone represents an actual erosion surface, that is, a clear stratigraphic break in the history of the deposit rather than postdepositional change in already existing sediments. But such seems not to be the case in locality 5 and trench H to the west, whose excavations were conducted with particular regard to the

question. And the evidence from trench D is equivocal on both archaeological and sedimentological grounds.

A minor horizon of blade debitage appearing in upper calc 2 here is seemingly analogous to horizon Y to the west. It has no counterparts to the east. An additional handful of flint suggests the presence of a distinct archaeological horizon well within the calc 2 zone itself. These pieces are too few in number and too amorphous in form to indicate even whether a Mousterian or an Upper Paleolithic industry is involved. In any event, no identifiable Mousterian elements comparable to couche C have appeared in trench D. Possibly our excavations failed to penetrate sufficiently deep or sufficiently northward to encounter them.

3.4.5 Locality 6

Although the scene of the only large horizontal excavation in Solvieux Est (figure 3.17), locality 6 adds virtually nothing new to the stratigraphic picture. For all practical purposes, it and the E194 line of sondages furnish precisely the same natural and archaeological situation observed in trench F. The only novelty is that the couche M occupation actually slopes very slightly toward the north within the exposure itself, even though the E194 line of

sondages above and below locality 2 indicate that its overall tendency is to incline gently toward the south. The couche here is as rich or richer than anywhere else, and it apparently continues beyond the eastward boundary of the site.

Again sondages south of trench A in this sector suggest a remarkable thinness of occupation in comparison with other parts of the site. The area north of locality 6 also poses interesting stratigraphic problems that must remain unsolved so long as the road embankment is in place. For one thing, its Middle zone sediments are especially thick: in sondage 314 excavation proceeded more than 3 m below ground surface through an undifferentiated block of red clay deposits without attaining its bottom. It would help in understanding Solvieux's sedimentology to know their source and to determine if all the weathering they exhibit actually took place *in situ*. Second, the configuration of the site along its northern margin in this sector remains unclear. Initial geological work in 1968 raised the possibility of a distinct gravel terrace existing here, one presumably much older than that in the site's Lower zone. In retrospect, it appears more likely to have been simply an easterly manifestation of the massive slope detritus subsequently discovered in Solvieux Centre and Ouest.

4

Archaeological Couches

We now turn to the cultural levels themselves, beginning with Solvieux's minor couches that are known from only sketchy remains—Mousterian, Aurignacian, and Solutrean. While the little that can be said about them is said here, the bulk of the chapter is devoted to Solvieux's major couches, those belonging to the Magdalenian, Perigordian, and Beauronnian traditions. At this point we are concerned with their disposition, horizontal organization, and artifactual features other than stone tools. The details of their flint industries and their significance to our understanding of the regional archaeological succession are covered in the chapters that follow. Here, as in preceding chapters, "tools" is used in the conventional sense to refer to whole artifacts; in subsequent chapters, for reasons explained later, they are termed "pieces."

4.1 The minor couches

Mention was made in the last chapter of minor lenses that have sufficient flint to establish an archaeological presence but too few, if any, tools to identify a specific industry. These lenses deserve little attention because nowhere outside of Solvieux Est are the deposits making up the Middle zone truly sterile archaeologically. Future intensive excavation in any locale should reveal new lenses that our own work either did not encounter or simply failed to observe. Note should be taken, however, of Solvieux's post-Paleolithic remains and of three of its minor Paleolithic horizons that indicate the pres-

ence of industrial traditions apart from those represented by the principal couches.

4.1.1 Post-Paleolithic

Intrusions dating to post-Paleolithic times appear throughout Solvieux. Many are relatively modern and contain calcined bones (representing the disposal of diseased farm animals), as well as sherds from a variety of glazed wares made regionally since the Middle Ages. The latter, along with fragments of Gallo-Roman tile, are ubiquitous to the plow zone. Moreover, in Solvieux Ouest in particular there appear prehistoric intrusions containing sherds attributable to both the Final Bronze Age (Chevillot and Gausson 1978) and the Chalcolithic (Patricia Phillips, personal communication). They are pervasive enough to suggest significant settlements dating to both epochs (see figure 3.5). But the intrusions are poor in content, and the occupation surfaces from which they descended were destroyed long ago by erosion and cultivation. Thus, little if any significant archaeology can be done on Solvieux's post-Paleolithic residents. They are to be remembered only for the disruption they innocently brought to the remains of their Stone Age predecessors.

4.1.2 Mousterian couche C

Couche C is the collective term for the assemblage of apparently secondarily deposited flints that appear in extreme northern Solvieux Centre and adjacent portions of the platform slope (§ 3.3.2).

Although accompanied by a large numbers of flakes, the tools comprise only three sidescrapers, which may be considered typical but are not of the Quina variety (plate 1a, c, d), along with a few denticulations (b). We assume on both typological and geomorphological grounds that the couche represents some sort of Mousterian industry dating to Earlier Wurm times. The site from which these materials derive was presumably destroyed long ago, and the artifacts by themselves inform no more about its nature than cobblestones by themselves can inform about the course of the river that shaped them. The bulk of couche C, now buried under the road embankment, could not be regarded as a promising target for intensive investigation either in its own right or in comparison to the Upper Paleolithic resources at Solvieux. Several other Mousterian localities having far greater potential have been identified in the Middle Valley of the Isle (see Texier 1989).

4.1.3 Aurignacian: couche D

Couche D, an areally restricted horizon on the eastern side of locality 2, seems to be a remnant of a once important couche (§ 3.2.4). It has no significant rock features and, given its size, is of limited interest as an occupation per se. But it is the only Aurignacian manifestation so far recognized in the Neuvic sector, and it serves at Solvieux to help define the temporal positions of the other archaeological horizons with which it is interstratifies.

Nearly half of this small sample of 16 tools are burins, comprising 2 standard dihedral burins (plate 2j, n) and 5 well-made busked burins (plate 2a–e). In the first two busked burins, the characteristic polyhedral spalling ends in a stop-notch, and in the fourth in a retouched edge. The remaining pieces comprise 8 altogether typical rounded and muzzled block carinate scrapers (plate 2f–i, k, l, m, p) and a massive bec that may once have been a muzzled scraper that continued to be used after having lost the major portion of its front (plate 2o). No retouched bladelets were found. The presence of so many busked burins in such a small sample, unaccompanied by any tools or blades bearing marginal retouch of any kind, points to a later, or evolved, phase of the Aurignacian, more or less equivalent to its stage II in traditional systematics.

According to the chronostratigraphic data for Aurignacian II industries in the Perigord (see figure 11.1), couche D could predate by several millennia the Raysse Perigordian couche III that immediately overlies it. The otherwise surprising proximity of the two couches to each other is consistent with our impression that the Middle zone deposits at this latitude in locality 2 have undergone significant loss and concentration. Couche D also serves to push the underlying Beauronnian industry of couche IV back to what must be an early phase of the Recent Wurm stadial, close at least to the beginning of Upper Paleolithic times.

Judging from the T-A4a profile, couche D continues for a meter or so to the east of locality 2. To the south it may possibly reappear in the form of the sub-III horizon encountered in the middle range of trench M (§ 3.1.2). As noted, the sub-III lens is artifactually poor and, despite considerable excavation, never yielded any diagnostic tools. But the mineralogy and physical aspect of its flints are reminiscent of those of couche D and are unlike those of the overlying couche III. The sub-III horizon is worth investigation by anyone who resumes excavations at Solvieux.

4.1.4 Solutrean: couche S

This so-called couche refers simultaneously to the members and implications of a handful of flint found associated with the gravel line separating the red clay and brown silt of locality 5 and the corresponding portions of trench H in northern Solvieux Centre (§ 3.3.2). In locality 5 this line yielded some debitage and typical specimens of a Solutrean laurel leaf point (plate 1e) and a bifacial shouldered point.¹ The horizon is not traceable toward the south as a discrete stratigraphic unit. One of the three fragments of the laurel leaf was found more than a meter from the other two, and the piece seems to have been broken during manufacture—facts that argue for its *in situ* presence in what is presumably a remnant of intact couche deposit. It is significant, however, that Gaussen over the years found four laurel leaf points in the plow zone of Solvieux Centre and that our own excavations in locality 3 recovered two more lying within the vertical flint distribution of couche A (§ 7.14). All this suggests that a Solutrean couche may once have covered an appreciable area

of Solvieux Centre. Whether the points that appeared in couche A represent intact pockets of a minor lens of this couche or relics collected by the Early Magdalenian occupants of the sector is unknown. The only other Solutrean material ever recovered in the Neuvic area consists of three fragments of laurel leaf points discovered by Gaussen and the writer during commercial backhoe operations near the Coly dam 2 km upstream from Solvieux (Gaussen 1980:252).

4.2 Rocks and rock features

The cobblestones and other blocks that appear in all of Solvieux's major couches are of great interest and warrant comment before we review the individual couches. Regardless of the ambiguities that surround them, there is no doubt that both the rock features and the cobbles that comprise them are purposefully artifactual. This point is important because many of Solvieux's horizons are proximate to gravel beds; therefore it cannot be ruled out on a priori grounds alone that the rocks are either simply natural contamination or that they constitute accidental (if still artifactual) by-products of human occupation of graveled surfaces. Neither possibility stands up to scrutiny, however. Some undeniably natural gravel beds have been systematically excavated at Solvieux by way of experiment, and it has been found that they do sometimes exhibit distinctive horizontal configurations. For example, a gravel tongue can have an extremely abrupt and regular edge (see figure 3.6), and gravels that once covered an uneven, undulating surface can assume quite regular, discrete concentrations once the higher points of that surface are carried away by erosion. But shapes typical of rock features do not occur. Even more important, there are fundamental differences in the nature and appearance of the rocks. Apart from a fairly narrow selection for size, couche rocks overwhelmingly consist of quartzite and have almost invariably been reddened and fractured by heating. On the other hand, gravels, whether sampled in the site's Middle zone or in neighboring stream terraces and Tertiary deposits, always include large amounts (often more than 50%) of flint nodules, and they virtually never show signs of thermal alteration.

Furthermore, couche rocks fail to exhibit any consistent orientation in their reddening. The colored patches on the rocks making up any given feature are oriented at random, and no correspondence exists even in the patching of contiguous rocks. Hence, they must have been heated prior to being placed where we find them, which rules out their being the accidental by-product of combustion upon naturally graveled land surfaces, whether or not intentionally produced. Several alternate hypotheses have been suggested to explain this, such as that they were heated for positioning in frozen ground (presumably to prevent its thawing from the warmth of human occupation); that they represent stone boiling and roasting structures and the dispersed contents of such structures; or that their heating resulted from previous activities, perhaps even prior occupations, in which they served quite different functions than those represented by their current arrangements. Each of these hypotheses might be true in one or more specific cases, even if some rock features cannot be explained satisfactorily in terms of any of them. Also, the state and dispositions of the flint artifacts found on and among the rocks verifies that the apparent lack of systematic orientation in their reddening cannot be attributed to postdepositional movements in the surrounding soil.

This lack of systematic orientation, along with the absence of rock configurations of an appropriate shape and of any concentrations of heat-damaged flint, means that no feature made up of typical couche rocks that can be interpreted as a hearth has been found in the Neuvic sector (see Gaussen 1989a for a detailed discussion). The sole candidates for such structures are the limestone features of couche 2-IV (§ 4.6), which were not destroyed by illuviation because of the considerable depth at which they lie and perhaps because of their proximity to the massive platform detritus that encroaches upon northern locality 2 (see figures 4.17, 4.18). It seems unlikely on several counts that the absence of hearths elsewhere at Solvieux or in the Neuvic area in general can be explained in terms of this ordinarily fugitive stone. Among other things, no ghosts, or bare patches, of an appropriate size and shape have ever been found in flint and couche rock distributions that would suggest the presence of a dissolved limestone hearth.

An unpublished Master's thesis by Clay Singer (1975) examines many of these issues in a discussion grounded in both experiment and statistical analysis. It also deals with the special component of *couche* rocks that involves a rock tool industry and the waste products resulting from its manufacture and use rather than structural elements of composite features. According to Singer, these tools can comprise up to one-tenth of the rock artifacts found in some of Solvieux's *couches*. The bulk are made from cobbles similar to those found in the rock features, but they rarely exhibit signs of thermal alteration except in the case of hammerstones, about half of which also show signs of heating. While their range of typological variation finds parallels among Lower Paleolithic tool industries, this range is even more characteristic of primitive technologies in the ethnographic present (like that of the California Indians). Aside from hammerstones and anvils, Singer recognizes a variety of intentionally chipped forms among which bevel-edged tools like choppers, chisels, and scraper-planes are particularly common. While his argument for the existence of a

rock tool industry is cogent, other experienced observers do not agree on how to decide which specific rocks do and do not qualify for membership in it. It is unfortunate that Singer did not have the opportunity to refine and expand his results. It would be interesting to compare his pioneer work with that of subsequent researchers like Sophie de Beune (1993).

4.3 Middle Magdalenian: *couches* I and II

Middle Magdalenian *couches* I and II, now truncated by the plow zone on every side, probably once extended over a broad area of Solvieux Sud (§ 3.2.2, 3.2.3). The angle of their slope toward the north at the point the plow intercepts them in trench M suggests a land surface that could have provided room for occupation up to the level of the platform. Their southward extension might have been bounded by the Isle River well below the latitude of locality 1 in what is now Solvieux Sud. At least, their current topographic situation suggests they may have been more directly oriented toward the bank of the Isle than any other Solvieux occupation. A considerable expanse of *couches* I and II remains unexcavated, particularly north of locality 1. But their proximity to the plow zone and the ubiquitousness of post-Paleolithic intrusions in that area seemingly guarantee that one would be no more likely to obtain significantly large interrupted horizontal exposures here than we recovered in our exposure to the south. We failed even in locality 1 to obtain useful horizontal plans of the two *couches* because of a large post-Paleolithic hearth intrusion that dominates the center of the exposure (see figure 3.5).

It is impossible then to gain a clear idea of the spatial organization of the two horizons. Flint is spread fairly heavily throughout the locality but without apparent differential distribution of the principal artifact types with respect to one another. The *couche* rocks make up a fairly dense scatter, though not actually a solid pavement nor a feature that seems to have had sharp margins. In these respects, locality 1 is reminiscent of the other Middle Magdalenian sites that dot the valley floor. Nor are there special structures such as a cordon or discrete knapping area like those found at the neighboring Plateau Parrain, whose principal occupation



Figure 4.1. Pit-like concentration of cobblestones underlying *couche* II in locality 1

seems to have been quasicontemporary and perhaps even closely related (§ 1.3.3). Gaussen suspects that these pavages may have incorporated limestone blocks that dissolved, leaving empty spaces occupied only by their insoluble fossil inclusions (1980:95). This may well be, and we, too, have come upon such fossils in Solvieux Sud. But the excavations failed to confirm his additional impression that the pavage was laid down during couche II times and that the subsequent couche I occupation simply re-employed it. Instead, as previously noted, we observed two separate stratigraphic entities distinguished by their own couche rocks and, at some points, by what amounts to a virtual paving of the surface of couche II by large flakes of sidewalk flint (which is virtually absent in couche I). One can only speculate as to the duration of the two major occupations and the amount of time separating them. The interval need not have been long, as the mode and tempo of modern changes in the ground surface at Solvieux indicate that the sediments separating them could have been the product of a single season.

In parts of locality 1 a distinct couche IIb was recognized. The designation may not refer to an integral surface, however, because in some areas it appears to represent an episode of occupation immediately prior to the couche II settlement, while in others a downward intrusion excavated from the couche II surface itself. The latter can take the form of a dense concentration of cobbles whose vertical profile might suggest a stone boiling pit (figure 4.1). The small tool collection from couche IIb (47 specimens) exhibits no noticeable difference from the couche II industry and is combined with it in the assemblage counts.

Couche I is represented by an assemblage of 294 tools, while the couche II assemblage has 258 tools (see table 8.1). These tools are largely all that remains of the artifacts from the project's work in locality 1. The debitage and couche rocks from the exposure were lost in the fire that destroyed the site laboratory in the project's fifth year. A significant number of tools referable to these couches was recovered in subsequent years during the successive excavations of trench M (§ 3.2.2). It never proved possible to segregate them stratigraphically from the underlying couche III, let alone from one another, and their value is therefore modest. Suffice it to state

that none of the material from trench M suggests either that the couches display marked lateral variation in their typological makeup or that increased tool sample sizes would add any significant information to the definition of the industries they represent. The Middle Magdalenian at Solvieux would not be a profitable target for future research.

4.4 Early Magdalenian: couche A

The Magdalenian I couche A, Solvieux's richest archaeological unit (see table 7.1), is densest over a broad belt of Solvieux Centre, passing over the lower two-thirds of locality 3 (§ 3.3.1). It weakens rapidly to the north, as the underlying Raysse Perigordian couche B enriches, entering the plow zone at the latitude of northern locality 5 (§ 3.2.2). Presumably, it once extended deep into lower Solvieux Centre; unfortunately, the couche here lies very near the modern ground surface and, as a result, was carried away by whatever agency created the great central basin of the site. Eight raclettes found scattered at the level of couche III in trench M, plus an additional raclette in locality 2, hint that couche A was once present in Solvieux Ouest. If so, it would have fallen victim to the considerable loss of late Pleistocene deposits in that sector. Its absence in Solvieux Est is more puzzling, as the deposits there seem to represent a continuation of the sedimentological context in which it appears in Solvieux Centre (§ 3.4.1).

4.4.1 The couche

Consistent with its rapid falloff toward the north, couche A's horizontal disposition in locality 4 comprises a weak and random artifactual scatter punctuated by small amorphous concentrations of flint and cobblestones. These concentrations may be referable to the slightly higher and discontinuous lenses designated collectively as couche Aa. Despite its relative lack of interest in comparison with its manifestation in locality 3, couche A in locality 4 has yielded what is by far Solvieux's most spectacular find, one of the pecked stone lamps described below (§ 4.4.2).

In contrast, the horizontal picture of couche A revealed in the locality 3 exposure is quite striking. An assemblage of 2184 stone tools was recovered

from this surface, along with a thousand-odd couche rocks that must represent a considerable expenditure of time and energy by the Early Magdalenian occupants. The rocks provide a diverse picture (figure 4.2), particularly when viewed in conjunction with the distribution plan for the 3-A lithic assemblage as a whole (figure 4.3a). The middle latitudes of the west and central portions of the sector are dominated by a fairly dense but diffuse pavement upon which half of the flint tool sample was found. It is of taphonomic interest that this area exhibits the couche's narrowest vertical concentration, as if the density of rock and flint consolidated it while at the same time warded off burrowing animals and other agencies of disturbance. Here the couche averages between 15 and 20 cm thick, whereas in areas where it is less charged with flint and couche rocks it averages 30 cm or more. Immediately to the south lies a separate pavement partially damaged by plowing. The removal from its plan of all cobbles bearing the iron-stained marks of the plowshare leaves a 4 x 6 m rectangular feature with decidedly more clear-cut margins. This feature is relatively poor in stone tools and debitage.

At the center of the dense concentration to the north is an oval mass of cobbles whose vertical profile suggests the outline of a broad pit somewhat wider at the top than the bottom. Many of its rock fragments fit together with broken cobbles in the neighboring pavement, suggesting that construction of this feature may have been responsible for the relative dearth of cobbles now found in its immediate vicinity. This feature is much larger than the 'stone boiling pits' encountered in couche IIb. Instead, it brings to mind the so-called Tas de Beaufort excavated by the writer in 1984 in the Middle Magdalenian zone of occupation on the neighboring Plateau Parrain (§1.3.3). This latter feature suggests to Gaussen a facility that might have been used to store frozen meat (Gaussen and Sackett 1990).

The northern and eastern sectors of locality 3 are much poorer in flint artifacts and present altogether different structures made up of extremely large blocks that individually may weigh more than 50 kg. The circular structure near the center of the locality is composed of rounded diabase boulders that, judging from the relative elevation of their associated flint, may have originally occupied a

shallow excavation of some kind (figure 4.4). A lively paleoethnological imagination might envisage some sort of hut foundation (*fond de cabane*) here. But the flint in the area seems in no way to be framed or constrained by what would have been the cabin's walls, and it is difficult to imagine why such massive blocks would be called for. Toward the east a more or less straight alignment of tabular blocks of fossiliferous flint appears that apparently belongs to a much larger formation extending beyond the eastern margin of the locality exposure (figure 4.5). These blocks may once have carried engraved depictions of animals, of which more below (§ 4.4.2). Although its eastern end seems to constrain a diffuse pavement of cobblestones lying immediately to the south, it is difficult to assign an architectural function to the alignment. In any event, it and the circular 'hut' are unique; similar large blocks appear occasionally elsewhere at Solvieux and the rest of the Neuvic group but only individually as isolated anvils or 'seats' (*sièges*).

Unhappily, no fully comprehensive horizontal analysis can ever be made of locality 3 because the greater proportion of its debitage also fell victim to the laboratory fire. But the tools themselves do not suggest that striking horizontal patterns existed there. As elsewhere on the site, a fairly strong correlation exists between the density of cobblestones and that of the flint artifacts, and the tool sample in the ensemble correspondingly tends to concentrate in the west central part of the locality. In terms of its typological makeup, a localized assemblage collected from any given sector of the exposure behaves statistically much like a random sample drawn from the global assemblage of the locality as a whole. In other words, there appears to be no differential spatial distribution of the principal artifact types with respect to one another. This observation, apparent upon inspection, is confirmed by a chi-square comparison of type frequencies from one grid square (or group of contiguous squares) to another. It is further confirmed by a computer imaging analysis conducted in collaboration with Tom Sackett, which allows pair-wise visual comparisons to be made of the relative distributions of each major typological group in the couche 3-A industry. This seeming randomness in which the types associate with one another over space is illustrated by

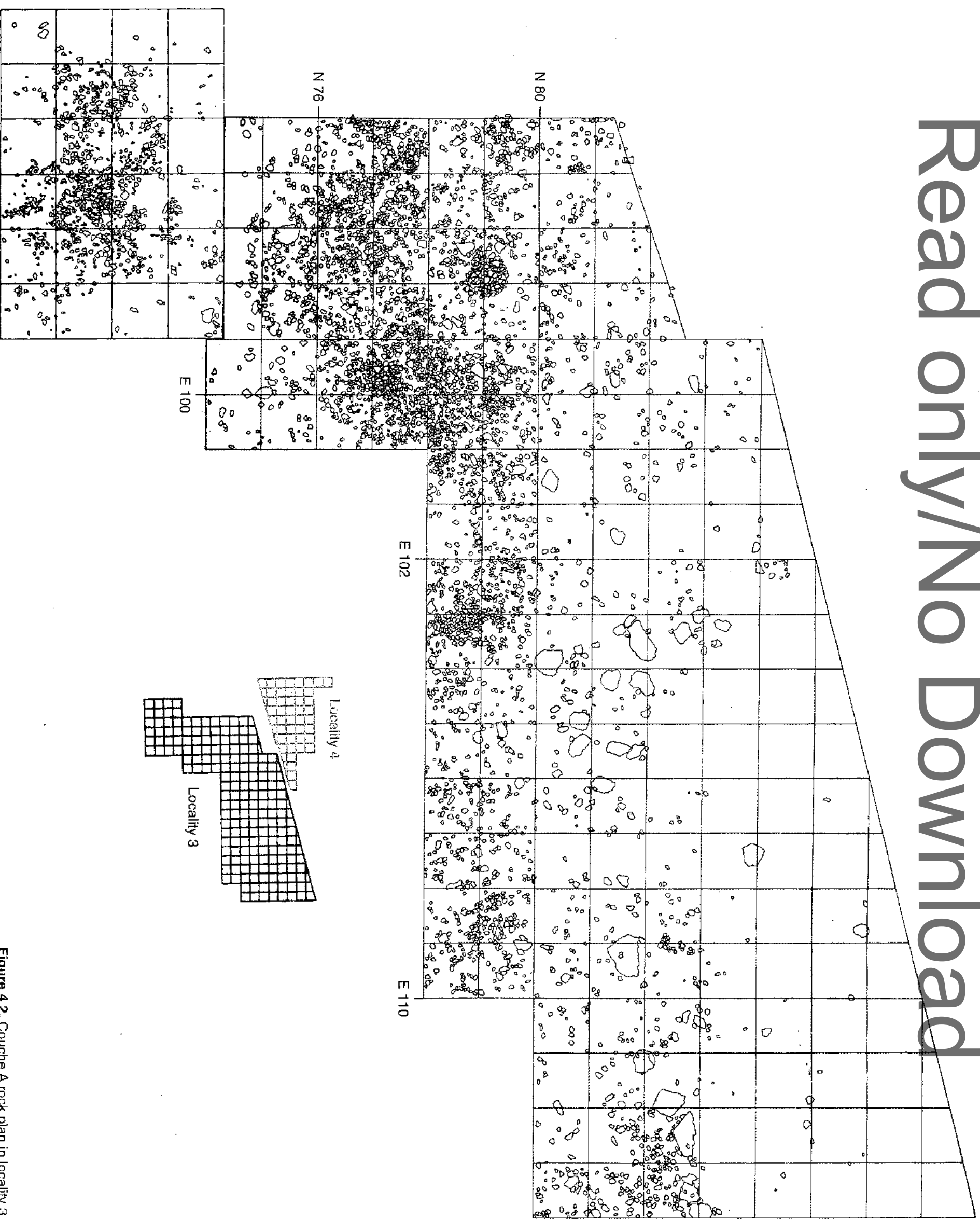


Figure 4.2. Couche A rock plan in locality 3.

Read only/No Download

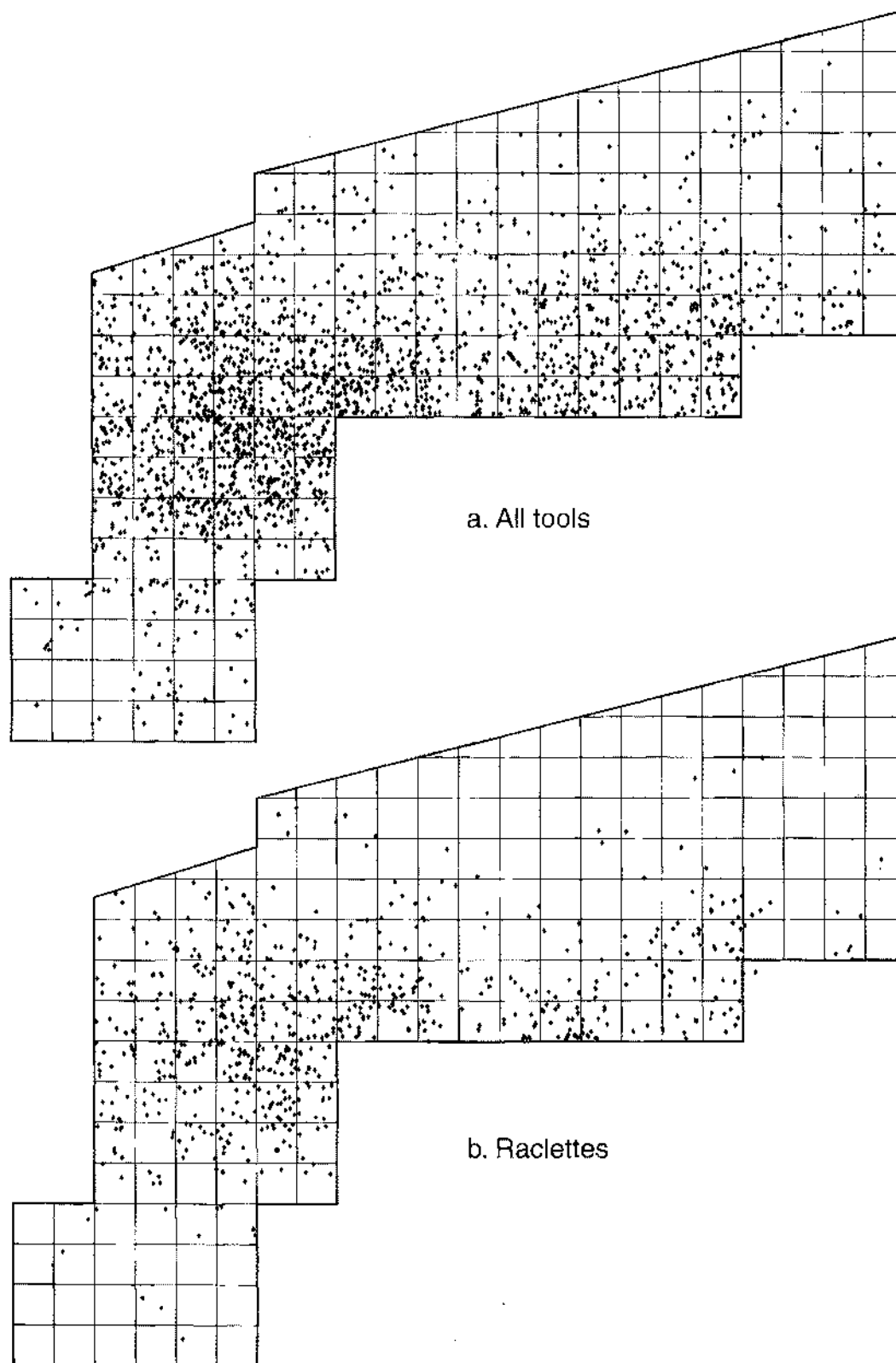


Figure 4.3. Horizontal distribution of tool types in couche 3-A

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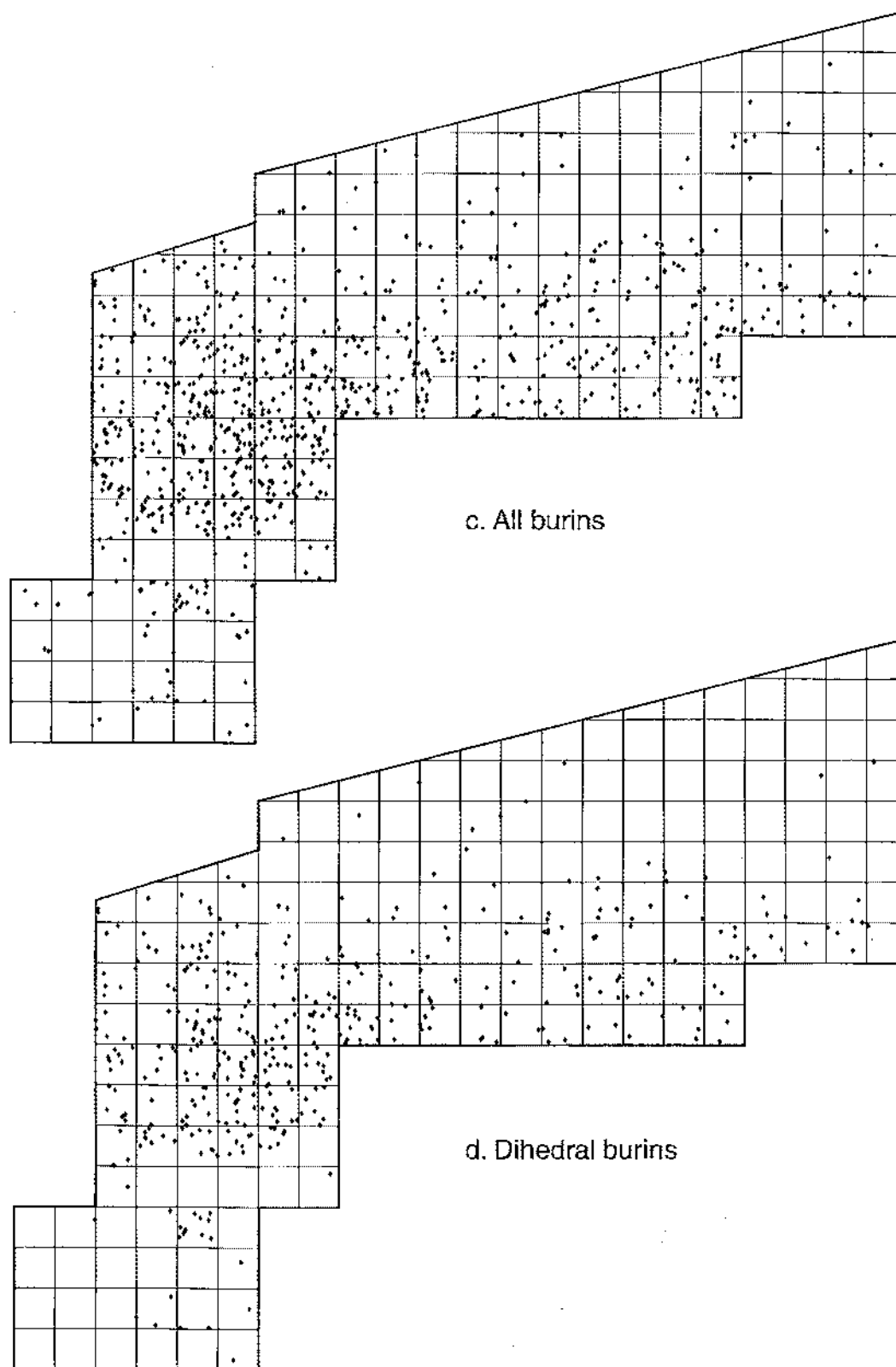


Figure 4.3. Horizontal distribution of tool types in couche 3-A (continued)

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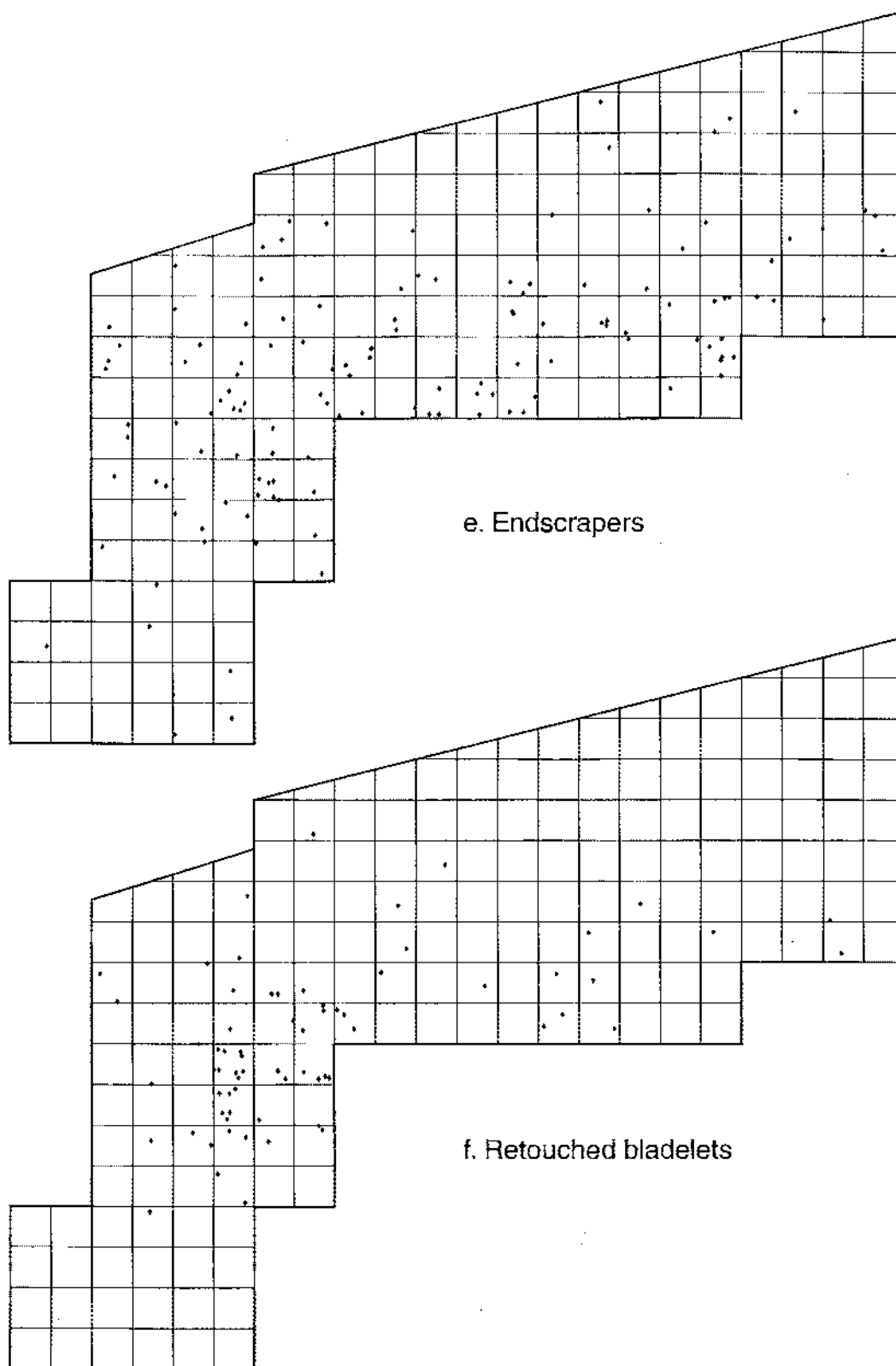


Figure 4.3. Horizontal distribution of tool types in couche 3-A (continued)

Figure 4.4. Early Magdalenian *cabane* of large blocks in central locality 3



the distribution plans of raclettes, all burins, dihedral burins, endscrapers, and bladelets (see figure 4.3). The absence of bladelets on the small pavement in the southwestern extremity of locality 3 might seem an exception, but it is probably more justly explained by the fact that this sector was dug when recovery standards fell somewhat short of what they were to become in later seasons.

In sum, although the rock features of locality 3 make up an organized and well-differentiated background, the tools are not distributed in a manner that suggests spatially organized activity areas. They may be more or less densely distributed overall, but they do not segregate horizontally along typological lines. This distribution, along with the couche's typological diversity, strongly suggests that the 3-A

horizon is a palimpsest in which several activities and, very likely, distinct episodes of occupation are superimposed. The homogeneous sedimentological context of the couche and its lack of internal gravel lenses might argue that these episodes were not separated by significant periods of time. But the successive groups would appear to have been installed in sufficiently different fashion as to have had the cumulative effect of randomizing the remains of one another's patterns of spatially segregated activities. It is also possible that the large stone features and the cobblestone pavement date to two or more distinct phases of occupation, which would again mean that the area exposed in locality 3 was organized quite differently from one occupational episode to the next.

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Figure 4.5. Part of an alignment of large tabular blocks in east-central locality 3. The elongated triangular block carries the engraving shown in figure 4.6.



Figure 4.6. Rock engraving from couche 3-A. (After Gaussen and Sackett 1984)

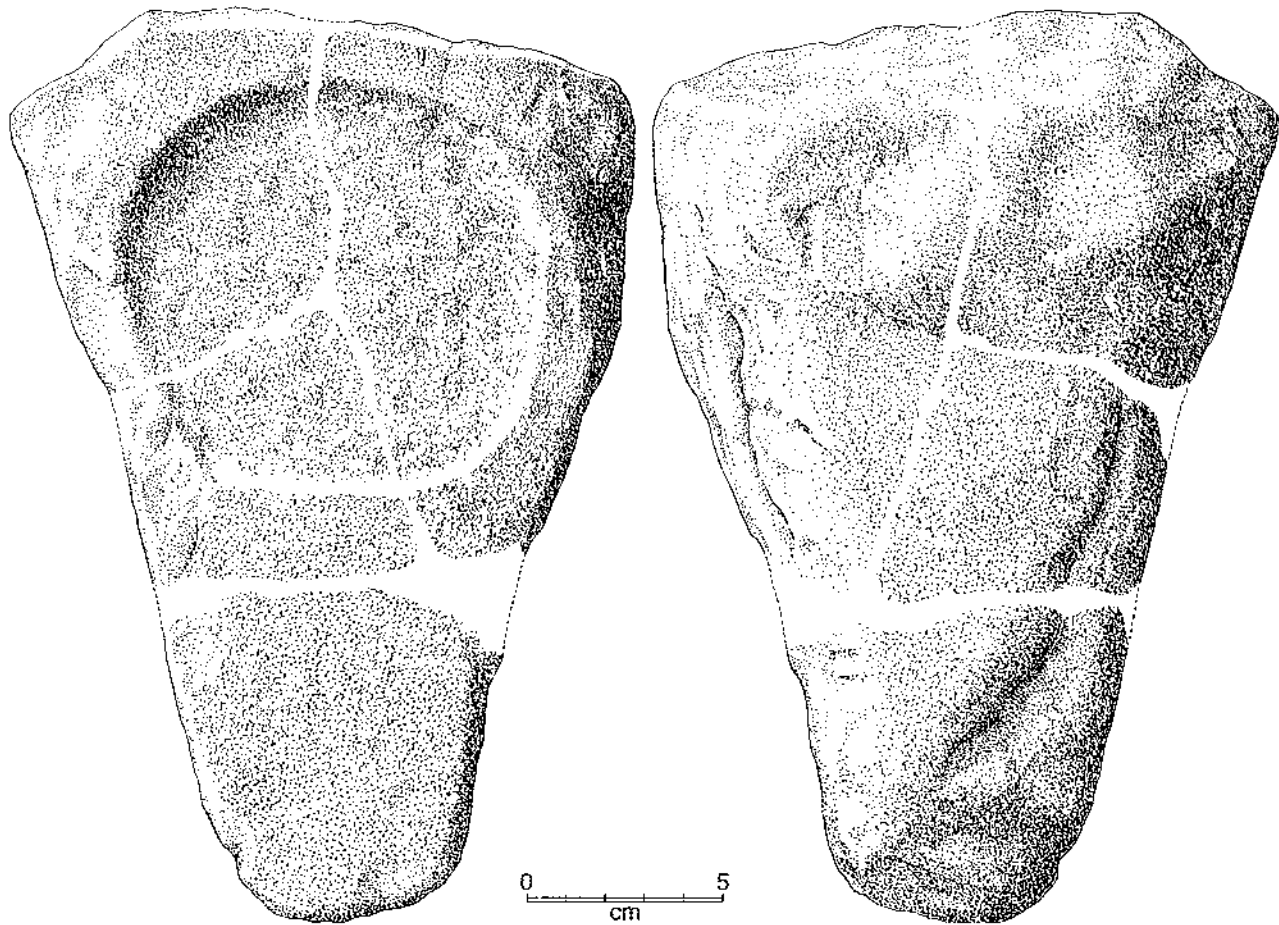


Figure 4.7. Early Magdalenian lamp from couche A in locality 3. (Drawing by Pierre Laurent)

4.4.2 Special finds

Couche A has yielded three objects of exceptional interest: an enormous engraved stone slab and two handled lamps. Detailed descriptions of these objects have already appeared in print; what follows briefly summarizes the main points.

Engraved slab

The remnants of an engraving were discovered by Gaussen on one of the large tabular blocks of silicified limestone that extend toward the eastern margin of locality 3 (figure 4.5). It appears to have depicted an ensemble of animals, most of which has been effaced by erosion (Gaussen and Sackett 1984). What remains consists of the hindquarters of an equid and a second animal that is most likely a cervid (figure 4.6). They are executed in style III

of André Leroi-Gourhan's (1968) developmental scheme of Paleolithic art, whose chronological position has been more firmly established because of the slab's well-defined archaeological context. This is the style found at Lascaux and at the engraved cave of Gabillou some 2 km downstream from Solvieux (Gaussen 1964). The slab stimulates speculation about a novel venue of Upper Paleolithic art that warrants classification as neither wall art nor portable art, unless the latter class is expanded to encompass objects weighing 45 kg.

Stone lamps

Simple *godets*, hollowed-out stone objects whose form suggests they could have served as oil lamps, are fairly common in late Stone Age times. But only some thirty-odd examples are known of the classic

form of Upper Paleolithic lamp in which the sculpted body carrying the depression is equipped with a distinct handle. Couche A has provided two of the most remarkable members of this group known in France. They are summarized in de Beune 1987 *passim*, and de Beune, Roussot, and Sackett 1986, both of which sources draw upon an unpublished 1973 laboratory memorandum by Clay Singer.

The first lamp appeared amid a dense concentration of flint and couche rocks near the western margin of locality 3, upside down and broken but still fully articulated. Documented in field notes and photographs as a couche rock, its real nature was only discovered in the rock laboratory once Singer had washed and examined it. The lamp is a fairly large specimen of friable sandstone made in the form of an elongated triangle with rounded corners, of which the handle constitutes the narrowest angle (figures 4.7, 4.8). De Beune assigns lamps of this shape are assigned to the La Mouthe type, of which 14 other specimens are known. Lying within a meter of it were four beveled pieces of diorite that Singer identifies as 'bar chisels', the kinds of tools that could have been used to peck and scrape soft rocks

like sandstone. The lamp does not seem, however, to have been broken during manufacture.

The second lamp appeared in the western portion of locality 4, some 13 m to the north and east of the first. It, too, was face down but William Breece, the excavation foreman, immediately recognized its special nature. It lay within the diffuse vertical scatter of a higher horizon of couche A, very possibly the one identified as couche Aa along the northern boundary of locality 3 (see figure 3.9). Also made of sandstone, it is somewhat smaller than the first but is more thoroughly and carefully sculpted into an oval body equipped with a quadrangular, nearly square, handle (figures 4.9, 4.10). De Beune assigns lamps of this form to the Lascaux type, of which scarcely a dozen exist. Like the first lamp, its depression is impregnated by blackish specks that might represent traces of combustion or simply iron manganese. These traces apparently cannot be removed for analysis without damaging the lamp.

It seems that much remains to be learned about the evolution of handled lamps. All well-documented ones have appeared in Magdalenian contexts, and the two from Solvieux seem to be the oldest of these whose dating is indisputable. Most,



Figure 4.8.
Couche 3-A lamp

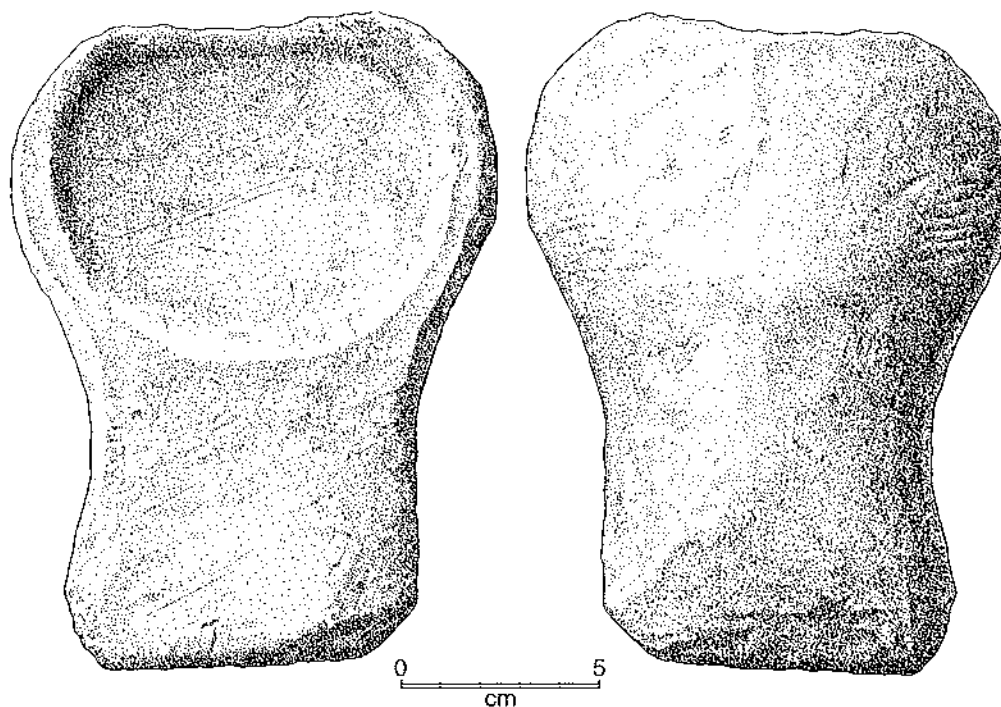


Figure 4.9. Early Magdalenian lamp from couche A in locality 4. (*Drawing by Pierre Laurent*)

like the Solvieux lamps, are made of sandstone, which, it is interesting to note, is otherwise absent at the site. Their handles in fact may have evolved as a means of prehension because sandstone conducts heat readily. It also has aesthetic properties. As Singer points out, the two Solvieux lamps tend to sparkle or glitter when light reflects off the surfaces of their small muscovite inclusions. The effect could have been pleasant indeed when joined by the flickering light produced by an oil-burning wick.

4.5 Raysse Perigordian: couches III, B, and M

A vast zone of Upper Perigordian occupation stretches across the entire middle and upper reaches of Solvieux, uniting as stratigraphic and typological analogs the main horizons of couches III, B, and M (see table 9.1). On sedimentological grounds, these horizons may be considered quasi-contemporary. As we have seen, however, the task of establishing true historical contemporaneity between occupa-

tions of different sectors, in fact between various locales within any given sector, is formidable (§ 2.6). Given the current evidence, it is virtually impossible.

4.5.1 Couche III

Doubt must surround the integrity of couche III, whose complex stratigraphic situation in locality 2 was reviewed in § 3.2.4. In this exposure its flint is distributed in a zone 30 cm thick, suggesting at least some vertical dispersion of its elements. This dispersion is not surprising in view of the couche's proximity to ground surface, its only moderate wealth in flint artifacts, and the absence of a heavy pavage to help consolidate it as a distinct sedimentological unit. More importantly, we have seen that at least some loss of deposits and stratigraphic merging seems to have taken place, with the principal horizon incorporating tributary lenses in passing from the northern to the southern half of the locality. That the upper couche IIIa lens merges here with the principal horizon is obvious, and very probably



Figure 4.10. Couche 4-A lamp

the single couche III horizon found in the southern two-thirds of the locality is something of a composite of the two. This merging does not seriously reduce the value of the couche's industry in the perspective of industrial systematics, because the upper lens is weaker in flint and in any case is essentially identical in form and typology to the principal one. It does, however, indicate that the analysis of couche III's horizontal organization must be approached with very limited expectations.

It is also tempting to speculate that the main horizon may be joined at the same point by a minor lens coming from below. No distinct line of flint actually appears on scatterplots nor was one ever seen during excavation. But it is noteworthy that flint is scattered below the main couche III horizon in the brown silt and among the salamander gravels, of which the few tools to appear include four Noailles burins. This number may not be insignificant in light of the fact that the main horizon incor-

porates only one quite atypical Noailles in the northern half of the locality but six reasonably typical ones in the southern half. (None appear in the couche IIIa lens, but its tool sample may be too small for their absence to be considered significant.) These burins might then be taken as circumstantial evidence for some sort of lower lens (that is, couche IIIb) that becomes incorporated within the main horizon as part of the general stratigraphic merging that takes place in locality 2 somewhat north of the latitude of trench A. A much more clear-cut stratigraphic counterpart for this hypothetical lens underlies the principal Raysse Perigordian horizon (couche B) in Solvieux Centre (§ 4.5.2).

The locality 2 rock plan reveals a light scatter of cobblestones and a few large blocks along with two denser rock concentrations: a small but dense oval feature near the northern edge of the exposure and the curved 'wall' in its southeast quadrant (figure 4.11). The oval does not suggest a hearth, because, among other things, all of its cobbles bear heat-reddened patches that, as usual, are oriented at random with respect to one another. The cobbles must have been heated then prior to the construction of the feature. Heat-damaged flint, by the way, is virtually absent throughout the couche. It is difficult to make sense of the 'wall,' assuming it is an artificial feature, given its shape and the fact that the distribution of flint in the vicinity bears no apparent relation to it. Possibly it belongs to a larger feature extending southward beyond the confines of the exposure.

Figure 4.12 depicts the horizontal distribution plan of the assemblage of 784 stone tools obtained from the main couche III horizon in locality 2. As noted, throughout the southern half of the locality the couche should be regarded as the mixed product of two distinct lenses, 2-IIIa and the main horizon. The northern half presents its own obstacles to horizontal analysis in the form of major post-Paleolithic intrusions that seriously interrupt whatever spatial patterns may exist. Furthermore, it was not possible to segregate couche 2-IIIa consistently from the main horizon in the western sector of the northern half, which presumably accounts for the apparent greater density of tools there. Not surprisingly, computer plotting suggests little in the way of differential distribution patterns among the typological

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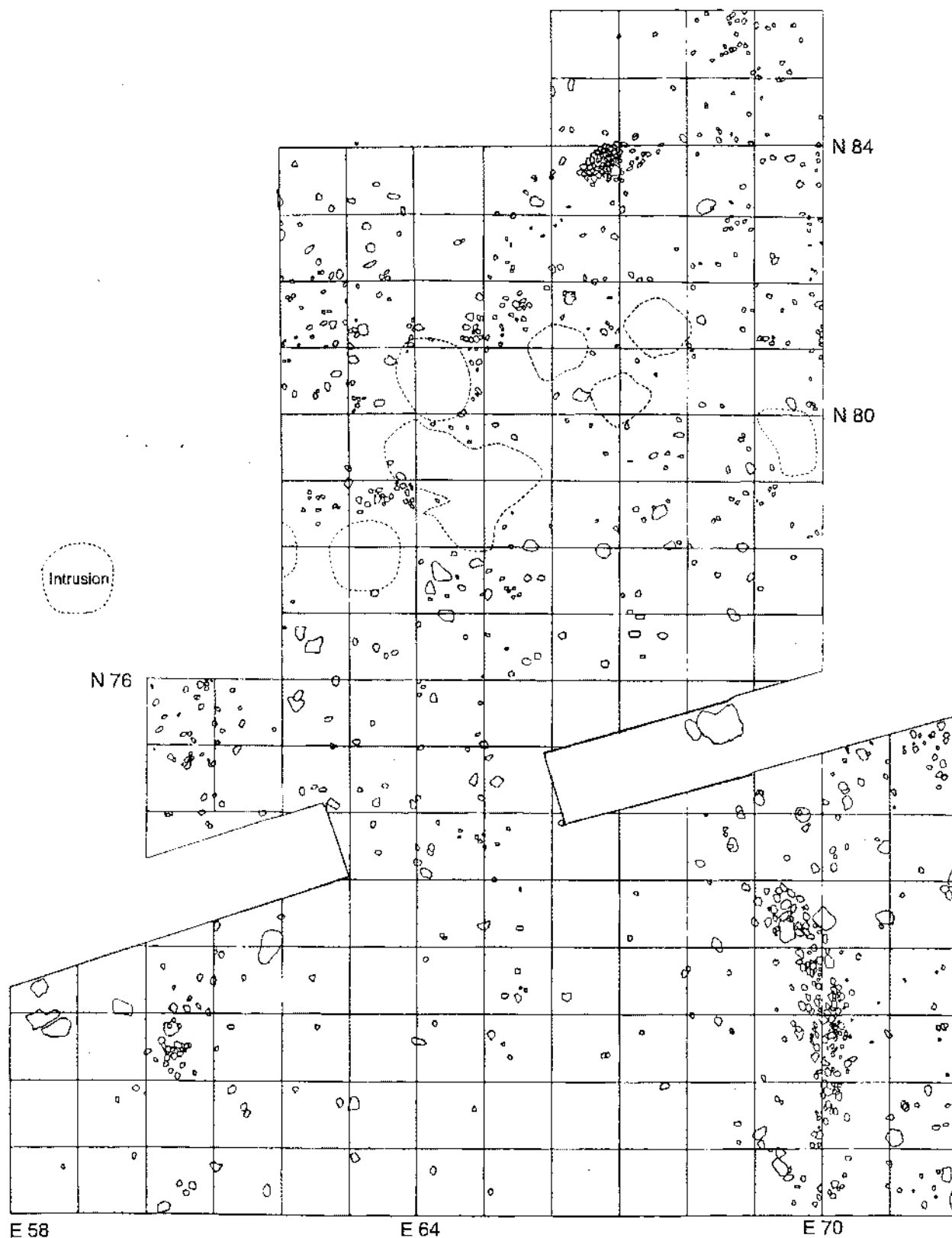


Figure 4.11. Couche III rock plan in locality 2

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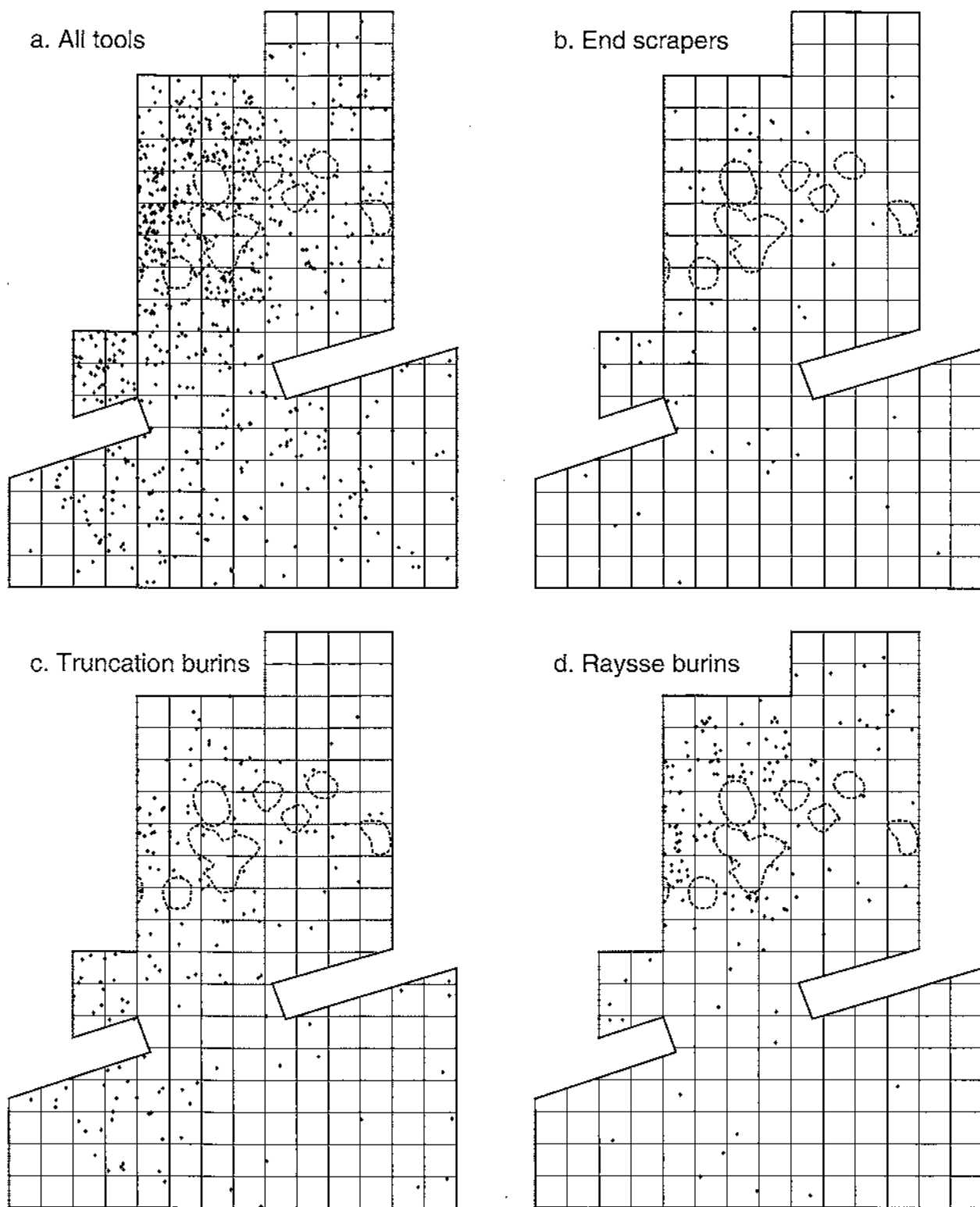


Figure 4.12. Horizontal distribution of tool types in couche 2-III

groups, as illustrated by endscrapers, truncation burins, and Raysse burins (figure 4.12a-d), with the possible exception that the last may be somewhat underrepresented in the southwestern quadrant of the exposure in comparison to their numbers in the northwestern quadrant. It will be seen that Raysse burins are in any event horizontally distributed at random in the other two Rayssian exposures.

In progressing toward the middle (trench M) and lower (locality 1) reaches of Solvieux Ouest, couche III weakens in more or less direct proportion to the increasing wealth of couches I and II that overlie it (§ 3.2.2). No clear-cut divisions can be drawn between these couches when they are viewed in stratigraphic section; thus, assemblages useful for typological description cannot be segregated. The question of the couche's stratigraphic integrity arises with even greater force here. In passing southward in the trench, its flints take on a soapy feeling to the touch, and the smallest and lightest categories of chipping debris disappear nearly entirely. Both factors suggest that the couche here has been washed and to at least some extent sorted by running water. While this was not sufficient to orient the flint or to produce signs of rolling or bruising, it involved some loss of deposit and some amount of stratigraphic subsidence. As a result, the lower half of the couche in trench M actually mixes with the surface of the underlying gravel complex. At the latitude of locality 1 it seems to have lost most of its stratigraphic integrity, and simply takes the form of a weak and broad vertical scatter. No artifactual novelties appear in trench M which suggest that augmenting the couche III sample from here would in any meaningful way change the typological definition of its industry.

At least a couple of thousand square meters of couche III must remain intact below the surface of Solvieux Ouest. Were more of it to be excavated, the most favorable area to attack appears to be a strip 10 m wide extending eastward from locality 2 north of trench A. This strip would probably reveal the main horizon in its richest and most intact state, free of the major intrusions that plague it in western locality 2. It would also literally lay the groundwork for attacking the even more interesting couches D and IV that lie below it at this spot.

4.5.2 Couche B

The main horizon of couche B seems to distribute widely in Solvieux Centre, extending upward from the latitude of trench A to a point just beyond the northern margin of locality 5 (§§ 3.3.1, 3.3.2). The land surface it occupied sloped more obliquely than the current ground surface, apparently aiming more or less for the level of the existing platform. In its southerly reach couche B seems to have undergone the same stratigraphic merging that affected couche III in locality 2, but here this merging was accompanied by so much loss of deposit that it is represented in locality 3 only by isolated Raysse burins found mixed with couche A (§ 7.14). Even where intact, however, couche B has only moderate interest due to its relative artifactual weakness and its lack of any organized rock features apart from a scatter of cobblestones (figure 4.13). This prosaicism is certainly true of the occupation represented by the sample of 190 tools from locality 4. Figure 4.14 shows the horizontal tool distribution of the couche in locality 4. Again, as in the case of couche 2-III, there seems to be little in the way of differential spatial segregation among typological groups. Endscrapers, which seemingly concentrate in a roughly circular area in the northwestern quadrant of the locality, could be an exception, but they are few enough that the role of sampling error cannot be dismissed.

Nonetheless, the couche B ensemble has considerable interest because of the relationship of its main horizon to the underlying couche Bb lens with which it joins at the N86 line in locality 4 (see figure 3.11a). While couche Bb is neither particularly rich in artifacts nor equipped with rock features, it is intriguing in that north of N86 it possesses Noailles burins but no Raysse burins, whereas Noailles burins appear in the overlying couche B only south of N86. We have seen that something of this sort may also exist within the couche III ensemble in locality 2. This finding is relevant to the major controversy reviewed later in § 11.3 concerning the nature of industrial variation in Upper Perigordian times, specifically whether the two special burin types are temporally phased or can enter and exit the archaeological record more or less at random. Solvieux's stratigraphy seems to strengthen the case

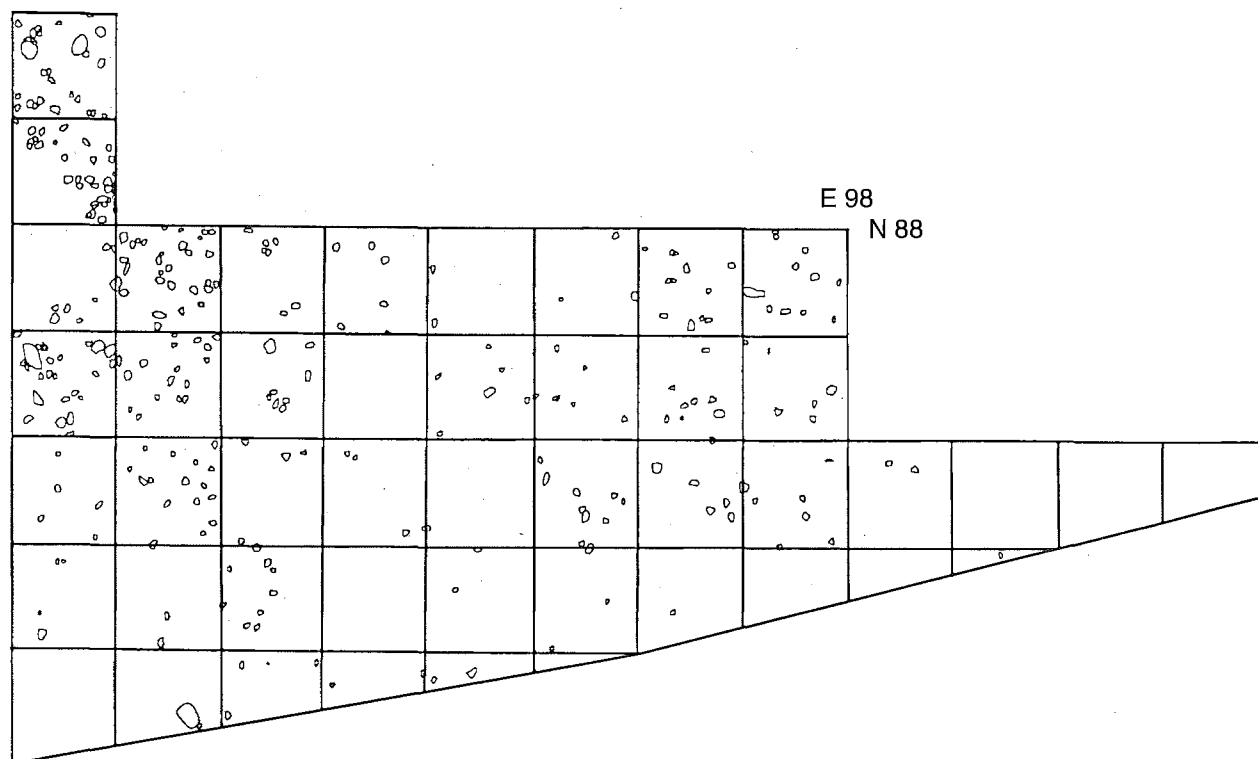


Figure 4.13. Couche B rock plan in locality 4

for chronological staging. It is noteworthy that the stratigraphic disposition of the B and Bb horizons shows that a major phase of erosion intervened between their depositions.

4.5.3 Couche M

The depositional situation of couche M is straightforward (§ 3.4). It is richly concentrated in a strip some 12 m wide running the length of Solvieux Est immediately above trench A. Beyond this to the north it weakens appreciably, disappearing well short of the current road embankment. South of trench A it simultaneously weakens and mixes with couche H. The areal extent of the couche in this direction appears to be somewhat less than its sedimentological context seems to provide for. It also appears to diminish rather abruptly a few meters east of locality 6 and may be only weakly represented on the eastern margin of the site even though continuing into the vineyard beyond it.

Couche M is best known from locality 6, whose assemblage of 473 tools, thanks presumably to the

depth at which they lie beneath the surface, presents an extremely fresh and unpatinated aspect. Their seemingly pristine condition is matched by the couche's depositional aspect, by far the cleanest and clearest found at Solvieux. Like other couches at the site, it lacks a distinct sedimentological context of its own, simply taking the form of a vertical concentration of flint and couche rocks within a much broader and seemingly homogeneous sedimentary zone. But in this case, the concentration is sharply delineated and particularly dense, barely exceeding 10 cm in thickness, and presents no stratigraphic divisions or even internal differentiation into lenses. Intrusions are altogether absent, and the contents of the couche do not appear to have moved or been disturbed. Couche 6-M, in short, should be the ideal candidate for displaying the kinds of spatial organization of activities the Solvieux project was undertaken to recover. But results have been disappointing and, indeed, disillusioning.

The horizontal distribution of flint tools, debitage, and couche rocks in locality 6 was analyzed in

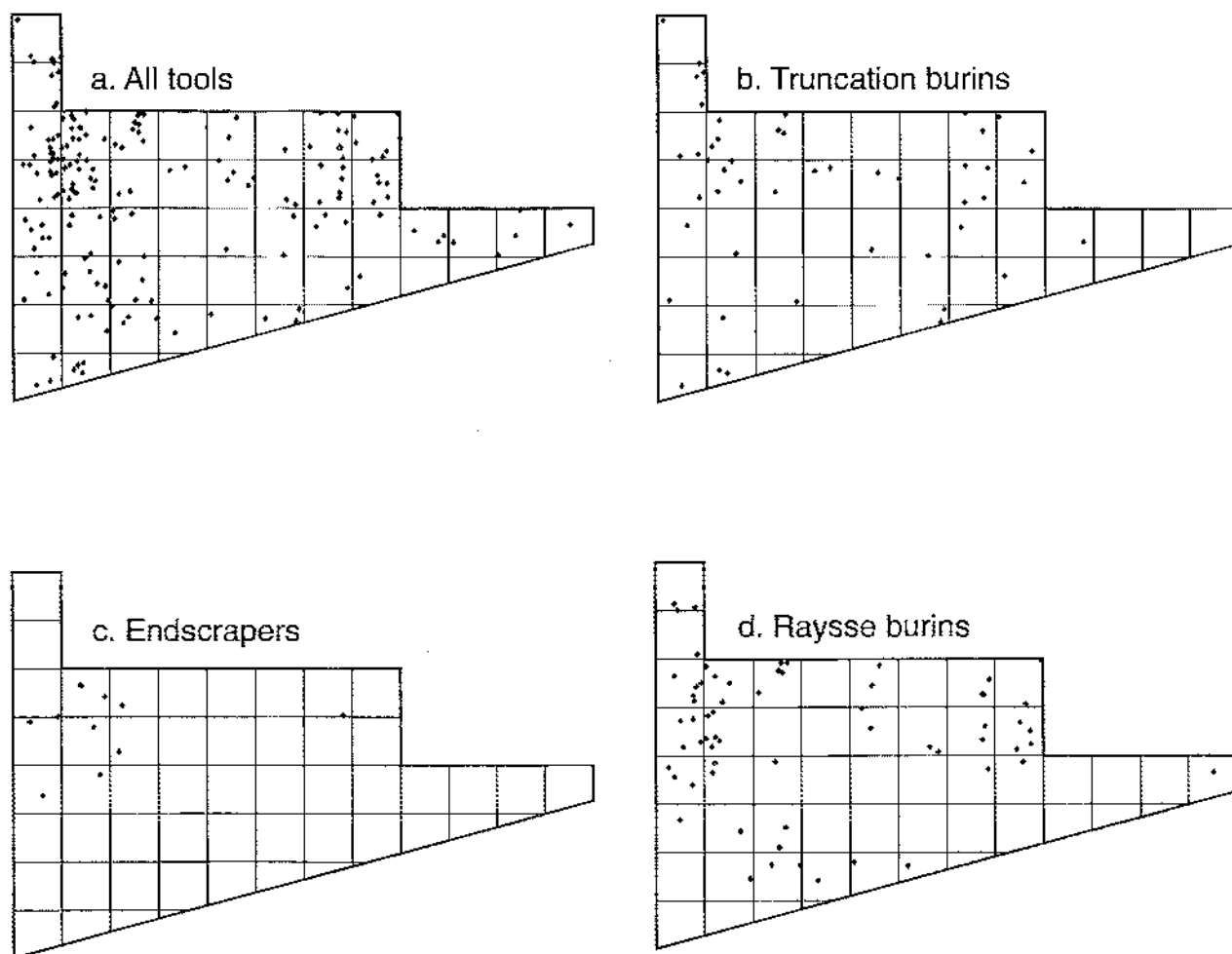


Figure 4.14. Horizontal distribution of tool types in couche 4-B

a PhD dissertation by Ruth Winterman (1975), who produced the general couche plan illustrated in figure 4.15. Like the other Raysse Perigordian couches, couche M shows a relatively heavy but amorphous distribution of flint over a surface characterized by dispersed cobblestones that, with the exception of one dense cluster, give little hint of any larger organization. As in the case of the similar feature in couche 2-III, the cobbles making up the cluster seem to be oriented at random with regard to their heat-altered edges and the flint associated with them is unburnt. The horizontal array of flint tools and debitage shows little more in the way of patterning. Local flint concentrations appear, but again there are at best only weak statistical correlations in the spatial associations among specific typological

groups or between the flint and rock concentrations. Winterman concludes that the task of isolating meaningful activity patterns at Solvieux may call for using functionally significant tool groupings that equate more specifically with different techno-economic tasks than do the classes provided by conventional typology.

Subsequently, locality 6 was subjected to a particularly sophisticated investigation by Linda Grimm in the form of a refitting analysis. She successfully brought a thousand or more pieces of tools and debitage into refits, ranging from relatively simple matches between spalls and burin facets to large-scale reconstitutions of tools and debitage with cores. The results of this analysis will be of key importance to understanding the technological system

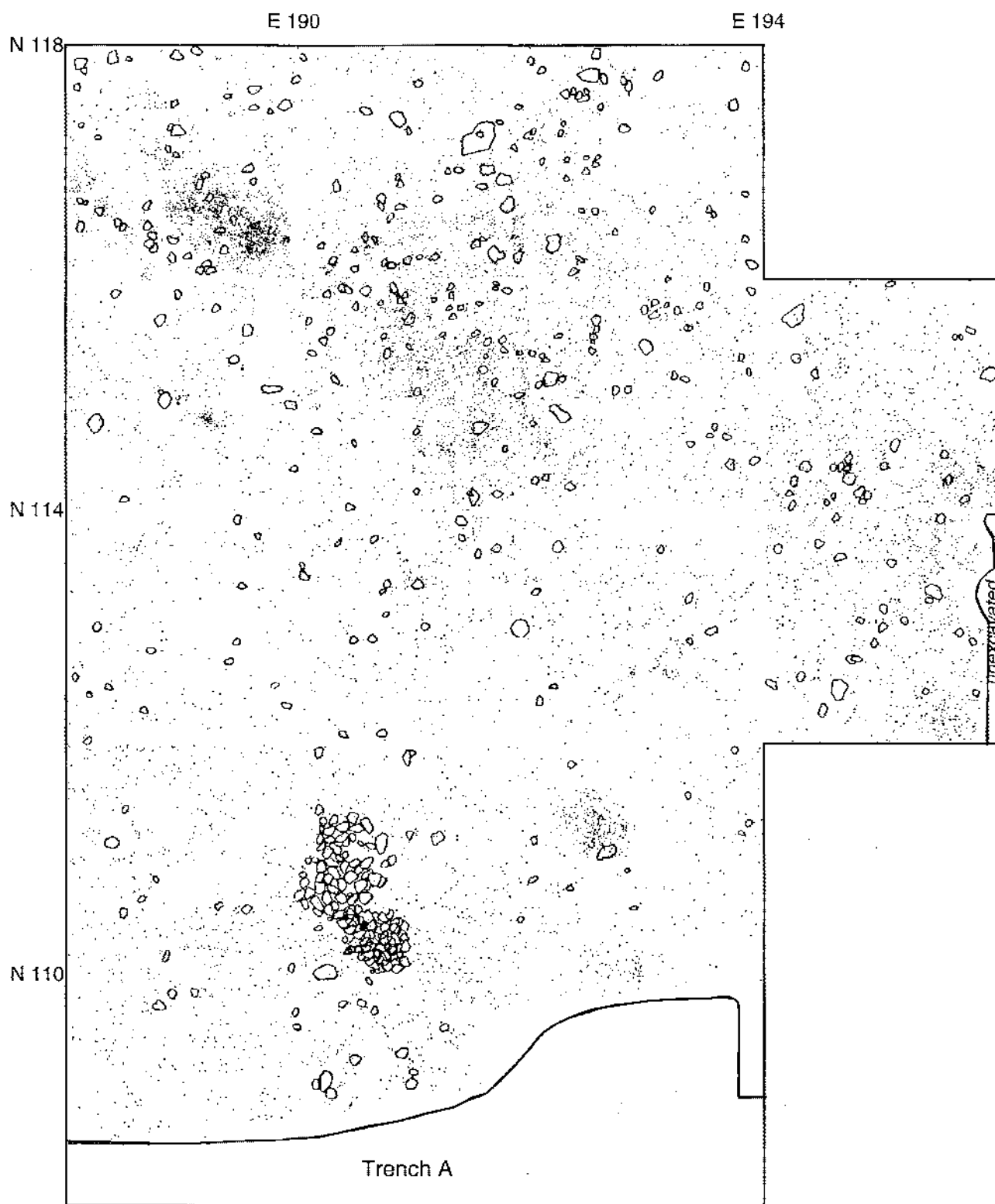


Figure 4.15. Plan of flint and rocks in couche M, locality 6. (After Winterman 1975)

that lies behind the 6-M industry, an issue dealt with only in passing in these pages. It will also provide basic information that allows a much more sophisticated, dynamic view of spatial organization than the essentially static one provided by tools and debitage simply plotted at the spots where they were discarded.

So far, however, results in this second area have turned out to be more provocative than gratifying (Grimm and Koetje 1992). Grimm's data have been subjected to the K-means clustering technique, which seems to be the mathematical search procedure of choice for those who pursue spatial analysis of the region's Paleolithic sites (for example, Simek 1987; Koetje 1987). Readers are referred to the original article for the details of Grimm and Koetje's findings. Suffice it here to state that they fail to reveal a picture of spatially organized activities that could excite a paleoethnologist. Their results simply show a fairly undifferentiated horizontal dispersion indicating either that the couche represents a heavily mixed layer or that it is a palimpsest of overlapping small-scale activity areas left by successive occupations. The core reduction strategies discovered by Grimm are apparently consistent with the latter interpretation as is, in the writer's view, the depositional evidence. In any event, that couche 6-M has so far proved to be a recalcitrant player in the domain of spatial archaeology makes it less surprising that Solvieux's other less pristine couches are equally uncompliant. We seem to be wrestling with an aspect of depositional reality that was not fully appreciated at the time we put the Solvieux project into action. This issue is examined more thoroughly in § 4.7.

Another archaeological horizon deserves mention, the enigmatic couche H. Its areal distribution is virtually coincidental with that of couche M north of trench A, while to the south it either dies out in merging with the latter or continues alongside it, making a slight artifact contribution to the resulting composite. Yet even in upper Solvieux Est it remains poorly defined, largely because it is represented everywhere only by a diffuse scatter of flint that was not considered worth the time and effort its intensive excavation would have required. In locality 6 it is known only from a handful of tools recovered by the backhoe operation that removed the

extremely large volume of nearly sterile deposit that overlay the couche M occupation. Here it is represented by one Raysse burin and a handful of chunky truncation burins whose form is more reminiscent of couche III than of couche M; the same impression is given by its considerably flakier aspect and fairly heavy patination. No diagnostic tools at all appear in the even poorer artifact samples obtained from trenches F and D. Nonetheless, these samples can fairly safely be correlated with the couche H horizon of the E194 line of excavations because of their identical stratigraphic contexts and because the connecting segments of trench A strongly suggest the presence of two archaeological horizons bearing Raysse burins. These horizons exhibit the same stratigraphic expression as the closely lying couches H and M seen in the wall of trench A immediately south of locality 6 (§ 3.3).

4.6 The Beauronnian: couche IV

Couche IV represents an important occupation of a land surface whose topography differed markedly from that of Solvieux's later settlements. As this surface is defined in the locality 2 exposure (see figures 3.6, 3.9), its northern margin is bordered by the limestone slope detritus descending from the platform and its southern margin by a stream channel (the lower chute) that bisects the locality (§ 3.12.4). In between, it describes two relatively horizontal steps separated by the abrupt slope of the upper chute. The disposition of couche materials on the lower chute, that is, the face of the channel attributed to a former course of the Beauronne stream, suggests they may have been carried there by a combination of cryoturbation and slump. But on the lower step, on the slope of the upper chute, and continuing some 3 m farther on the upper step, the couche comprises a rich and intact concentration of flint tightly bedded within a vertical zone 10 cm thick. To the north of this principal reach it maintains its stratigraphic integrity but weakens rapidly, ultimately penetrating and finally becoming lost in the calc zone of progressively breccified soil and limestone blocks that emerges from the slope detritus.

Although couche IV is often seen in the vertical perspective of stratigraphic trenches and sondages,

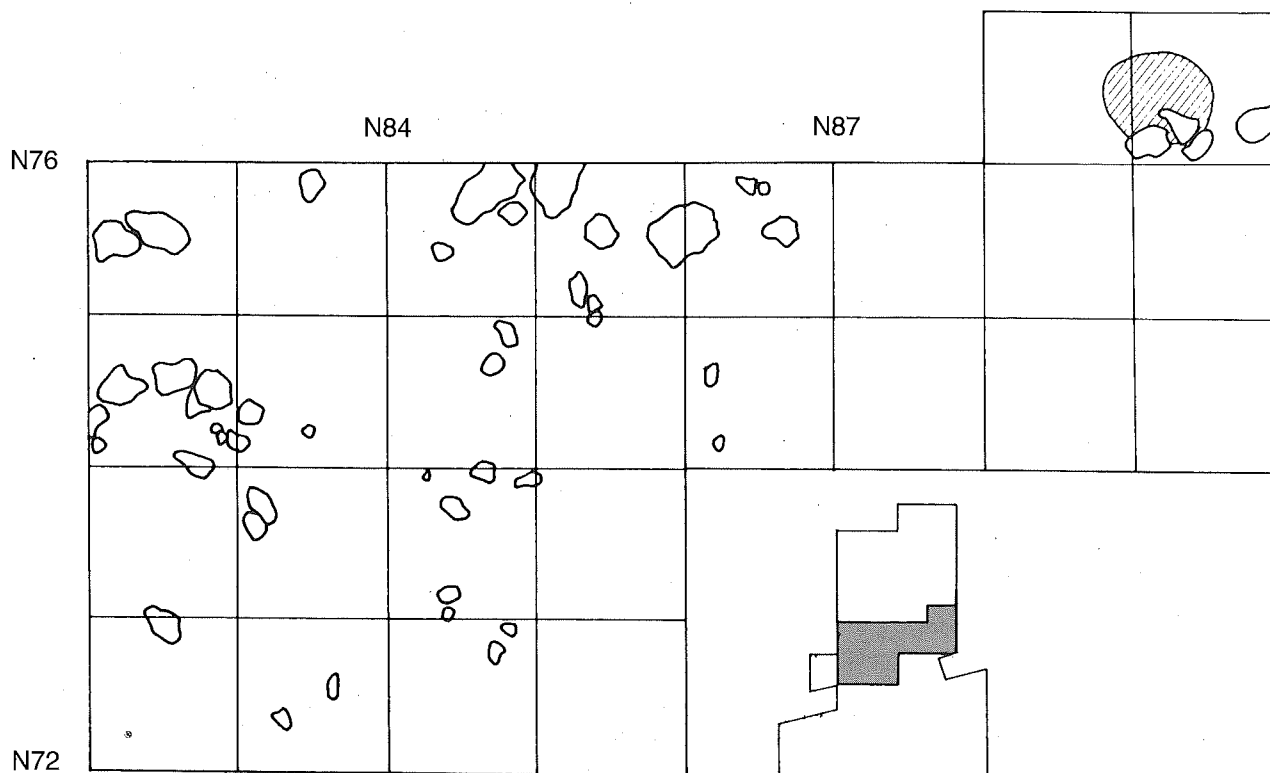


Figure 4.16. Couche IV rock plan in locality 2

its horizontal disposition is known only from a 26 m² exposure of the somewhat undulating surface of its lower step in the central part of the locality (figures 4.16 through 4.18). The base of the upper chute immediately borders this surface on the north, following a slight northeast-southwest slope; it is framed on the south by the edge of the lower chute, which slopes somewhat more sharply along a line connecting the southeast and southwest borders of the exposure. The depth at which the couche lies accounts for the quite fresh aspect of the flint, which contrasts with the heavy patinas seen on flint from the archaeological horizons overlying it. Much more important, because of this depth and the proximity of the platform detritus, limestone and even small amounts of organic material have escaped dissolution by the strong leaching at work elsewhere at the site. Their presence, along with the near absence of quartzite couche rocks, lend the couche IV exposure an aspect that is unique not only to Solvieux but to the entire Neuvic group.

The limestone, accompanied by a few elements of diabase, takes the form of blocks and flagstones

disposed in a manner that at least suggests hearth places. One example, appearing in the southwestern quadrant of the exposure, consists of a semicircular arrangement of large rocks under which charcoal-stained soil and unidentifiably small bone fragments appear. Part of what could be a similar structure occupies the center of the exposure along its northern edge; it presumably continues into unexcavated deposits. The most intriguing structure, lying at the northeastern margin of the exposure, consists of a well-defined circular concentration of what seems to be hearth debris, including burnt flint, occupying a shallow basin. A few blocks seem to be directly associated with it, and the edge of what may be a related large block feature is visible in the neighboring eastern wall of the exposure. Unfortunately, this last complex was encountered just when the excavation was being closed down, which precluded its satisfactory exploration.

An assemblage of 556 tools was recovered from the principal couche IV horizon, some two-thirds of which derive from the exposure on the lower step (see table 10.1). Here, as in the case of couche 6-M,



Figure 4.17. View from southeast corner of locality 2 of couche IV surface after the flint was removed. The stone features appear on the rock plan (see figure 4.16). In the right foreground appears the lower half of the T-A4a section (see figure 3.7). To the center and left are seen in vertical section the terrace gravels cut by the stream channel, into which the couche plunges in its lower chute. Its upper chute begins immediately north of the wall on which the dark shadows of post-Paleolithic intrusions are visible.

Grimm has pursued a comprehensive refitting analysis of tools and debitage, and with even greater success, involving nearly 30% of all pieces in refits. The light this analysis throws on the technology of Beauronnian tool manufacture should be of paramount importance, especially as it seems to be as distinct from that of later industries as the typology that resulted from it. Yet as in the case of locality 6, the results of the spatial analysis that accompanies Grimm's investigation seem ambiguous and refractory. Preliminary findings are reported in an honors thesis written by Paul Welch (1977) under her direction. The density of artifact distribution is not entirely uniform, and there may be some amount of localized clustering. Still, the overall picture is one of homogeneity and redundancy: tool manufacture, use, and discard seem to have taken place throughout, and the various tool types (whose numbers are dominated by Beauronnian truncations and various kinds of burins) show little spatial segregation suggesting definable activity areas. Further explication

of all this may come from Grimm's refitting analysis, which should also throw light on the depositional factors at work. If we are dealing, as it seems, with a palimpsest, one would like to know whether it possibly results from the manner in which members of a single occupation went about their business or from some sort of mixture in which two or more successive occupations are represented.

Many additional questions remain concerning the depositional history of couche IV. For one thing, it is difficult to picture in the mind's eye that part of the occupation which extends along the 5 to 6 m wide strip stretching between the stream channel and the abrupt rise described by the upper chute, along whose base one or more hearths were positioned. Presumably, it was originally more expansive and perhaps involved more specialized activity areas at some distance from the centralized hearths. Sufficient room would have been available if the edge of the stream channel lay farther to the south at the time the lower step was occupied. Relatively



Figure 4.18. View of couche IV surface from the west side of southern locality 2. Flint markers trace the ascending line of its upper chute on the section to the left. The top of the section to the right lies just below couche III; the gravels below it incorporate couche D and an upper horizon (a) of couche IV.

intense occupation does seem to have continued for an additional 2 to 3 m to the north of the upper step. This unexcavated zone is very likely heavily damaged by the major intrusions that interrupt the central portion of locality 2. Laborious as the work at locality 2 may have been, couche IV above the upper step is known only from test excavations. Those on the western side of the locality met with additional major intrusions, while those on the eastern side succeeded in gaining an interrupted profile but exposed only a meter-wide swath of the couche itself.

Depositional questions are also raised by a half dozen Solvieux truncations that appear in the northernmost 4 m stretch of the locality scattered between the salamander gravels and the principal couche IV horizon. While the latter appears to have no connection with the overlying platform, this scatter hints at the former presence of one or more higher lenses that might have. Less ambiguous is couche IVa, an areally restricted Beauronnian lens that appears in the middle reaches of the eastern por-

tion of the locality just under the Aurignacian couche D. Although the main horizon lies well below it in an altogether distinct sedimentary context, couche IVa appears at approximately the same level which the main horizon occupies toward the north before it descends the upper chute. Couche IVa has no rock features and yields only a handful of tools. The tools include characteristic Solvieux truncations, however, and the lens therefore confirms that the highly distinctive industry typifying the principal horizon is associated with other depositional episodes.

Apart from what remains of it in locality 2, the test trenches indicate that the principal horizon of couche IV must extend over upper Solvieux Ouest nearly as far west as the longitude of trench M (§ 3.2.1) and to the east about half the distance between localities 2 and 4 at the latitude of trench A (§ 3.2.4). That it extends even farther in this direction in unexcavated deposits north of the trench is hinted by couche L. This horizon consists simply of a small scatter of flint lying deep in the Middle zone below

couche B in west central locality 4. It has produced no tools, and its industry is unidentified. Its stratigraphic position is nonetheless intriguing, and one cannot help but wonder whether it represents an eastern extension of the couche IV horizon that occupies a roughly analogous stratigraphic position in the T-A4b section midway between localities 2 and 4. At least a few hundred square meters of the occupation may still remain intact, in any event. Given the striking character of the industry and the content and organization of its occupation surface, the recovery of this couche should be the highest priority of any future excavations at Solvieux.

4.7 Discussion: Solvieux in horizontal perspective

In digging Solvieux we had hoped to find archaeological surfaces that had been occupied only briefly, and only once, by groups that, being areally unconstricted, would have deployed themselves rather broadly over space. This deployment would have served to partition their living area into fairly distinct zones that horizontally segregated the lithic remains of disparate activities like core reduction and tool manufacture, specific tasks calling for typologically specialized toolkits, discard heaps, and various domestic pursuits—all projected against, and given enhanced organization by, stone architectural features. But this is not the way things turned out. It is fair to say that the limited and ambiguous results summarized in the preceding sections regarding the horizontal disposition of Solvieux's couches constitute the project's greatest disappointment.

In part, our lack of success stems from the vastness and sheer depositional complexity of Solvieux, the effort to gain control over which consumed much of the time and energy we had hoped to expend excavating truly great areal expanses of archaeological surface. And the 2000 m² of exposure we did obtain still fell short of our expectations. Often the archaeological couches involved were compromised by massive intrusions and depositional histories that entailed their partial destruction by natural agencies and/or collapse and the merging of what were once stratigraphically distinct horizons. Even when seemingly undisturbed and pos-

sessing a high degree of stratigraphic integrity, the couches present a decidedly blurred appearance when viewed horizontally. Stone features may lend them an apparent air of organization, yet the industrial remains in flint tend to be distributed at random.

It would appear that, in a typical Solvieux occupation, essentially all flint was obtained from nearby sources, largely reduced on the site itself, and employed in an expedient technology—tools were made, used, and disposed of on the immediate living surface.² The remains of these disparate industrial activities are spatially undifferentiated: the overall density of tools, chipping debris, cores, and unused supports may vary from one sector of the occupation surface to the next, but their relative proportions are essentially the same throughout. Specifically, toolkits are not apparent: the individual tool types exhibit little, if any, significant nonrandom spatial patterning with respect to the lithic distribution as a whole or to one another. It bears stressing that the tool assemblage involved is usually large in number and generic in content; it constitutes what an American archaeologist would regard as a 'normative' sample that reproduces a stereotyped industry like those codified in regional systematics and that presumably represents a compound of several individual toolkits (Sackett 1991:125). In short, although the size and content of one of Solvieux's couches indicate a considerable variety of activities, their nature is obscured by the undifferentiated manner in which the industrial remains are disposed.³

Our experience at Solvieux has not been unique. It appears that similar attempts at horizontal archaeology in the Paleolithic of Western Europe have more often than not met with frustration rather than with success. Others, too, have found themselves wrestling with palimpsests (Bricker 1992) or attempting to untangle the roles played by cultural and natural agencies in determining the form assumed by couche deposits (Petraglia, Akoshima, and Strauss 1994). One suspects that still other researchers involved in the enterprise probably should have done so before drawing their paleoethnological conclusions. In any event, the literature indicates that most Upper Paleolithic couches exposed in France during the past quarter century seem to constitute noisy systems when viewed

horizontally and that, indeed, significant intrasite industrial variation is essentially restricted to rather obvious hearth-centered occupations (Koetje 1994). Particularly well-documented examples include the rock shelter of Le Flageolet I (Simek 1987) and certain particularly well-conserved open air sites in the Paris Basin like Pincevent (Audouze 1987).

Now, except for Solvieux's couche IV, the Neuvic group has no hearths to offer whatever. What distinguishes it in contrast to the hearth sites is its remarkable diversity of types and sizes of archaeological horizons and the diversity of industries and rock features they contain. The architecture of some of the features is without parallel, and it seems reasonable to expect that they should provide a framework for intrasite spatial variation of lithic remains at least equal in degree, if not in kind, to that of hearths elsewhere. But the issue is a bit more complicated. Some members of the Neuvic group are elemental sites, restricted enough in size and specialized enough in content to warrant being regarded as single activity areas in their own right. As a result, their intrasite industrial variation is patently self-evident, as well as somewhat different from what is usually implied by the term. This is true of the alignment of miniature pavements at Le Breuil (§ 1.4.3), each with its handful of tools, and of the remarkable rectangular pavage and highly specialized industry found on it at Le Cerisier (§ 1.3.4). Also self-evident are the circumscribed elemental sites of Le Chatenet and Lacaud (§ 1.3.5), even though rocks at the first lack organization and at the second are absent altogether.

Apart from Solvieux, the question of intrasite variation in lithics as it is asked elsewhere in the Neuvic group really concerns only a few pavement sites that are large and that possess normative, generic stone tool industries. Relevant here are Guillassou (§ 1.3.1), Le Mas de Sourzac (§ 1.4.1), and Plateau Parrain I (§ 1.3.3), to whose horizontal tool distribution Todd Koetje has applied k-means analysis in a sophisticated and thoughtful study (1987). (This study also includes Le Cerisier, but without much success; in this instance, the question asked by his analytic technique probably misses the point, for there is no intrasite variation to be discovered where the site itself happens to constitute a single activity area.) Overall, Koetje's results are

ambiguous, much along the same lines as ours at Solvieux. At Guillassou and Le Mas de Sourzac, which involve substantial paved areas, some amount of spatial clustering of lithics is apparent, but the clusters are not typologically distinguished from one another or the rest of the distribution in a manner suggesting distinct activity areas. Koetje suggests, therefore, that they represent disposal zones, although noting (perhaps with insufficient emphasis) that the clusters might originally have been integral parts of the larger and more or less continuous lithic distribution that only long after became partially isolated by postdepositional disturbance. Plateau Parrain I shows spatially more discrete lithic concentrations, in this case associated with more distinctively organized cobblestone features. Yet here again the tool types themselves seem to distribute essentially at random horizontally.

We have noted that subsequent work at Guillassou and Plateau Parrain suggests that more discrete activity areas may be found somewhat apart from the horizontal exposures dealt with in Koetje's study (§§ 1.3.1, 1.3.4). Yet current evidence suggests that those Neuvic sites excavated by Gausson which do not constitute elemental sites seem to show, like the exposed horizons at Solvieux, a disappointing lack of horizontal structure in their lithic distributions, even when their rock features do exhibit considerable organization. It seems their industrial remains have collected in the form of palimpsests that blur the distinctions between types and type frequencies which once distinguished what were presumably spatially differentiated activities.

Perhaps these horizons are the product of single, relatively long-term settlements of groups that, to say the least, allowed themselves flexible horizontal arrangements. More likely, however, they were produced by several distinct occupational episodes of either the same group or related ones that practiced the same industrial traditions. The lack of sedimentological divisions within the archaeological horizons does not, by the way, abrogate this second possibility. The occupational episodes may have followed upon one another too quickly for natural sediments to have built up or, equally likely, sediments were laid down only to be subsequently destroyed by washing or masked by illuviation. It bears repeating in this connection that, although we envisage

Solvieux's occupations in terms of 'surfaces,' true living floors (*sols d'habitat*) are not involved. The artifact concentrations that make up the archaeological horizons never occupy distinct sedimentological units that stand apart from the natural soil and gravel zones through which they pass.⁴ In fact, there is no distinct sedimentological component to the couches at all, as the same leaching process that destroyed their organic contents also masked all signs that may once have existed of soil features like postholes, pits, and the outlines of hearth basins (if any), save in the deepest (couche IV) horizon. Thus, Solvieux's couches lack the distinctive fine-scale sedimentary layering like that found at, say, Pincevent (Leroi-Gourhan and Brézillon 1976), without which the latter would take the form of fairly nondescript, redundant scatters of industrial debris.

An additional factor may somehow be involved in our failure so far in the Neuvic sector to obtain differentiated intrasite lithic distributions in what presumably constitute multi-activity archaeological couches. This is the question of the scale of the excavations, which, of course, has much to do with whether one sees patterning at all and, if so, the form it assumes. It may be, for example, that the patterned organization of Solvieux's occupation surfaces is on a scale truly commensurate with their often great areal extent and that the currently available exposures provide windows much too small to perceive it. In other words, despite its size and fascinating diversity, even the exposure of couche A in locality 3 (see figure 4.2) is too inadequate to support

generalizations about the vast occupation it samples. Coarse patterns cannot be retrieved through fine screens.

Yet many Paleolithic occupations for which a high degree of spatial patterning is claimed are known from exposures considerably smaller than those at Solvieux. In the case of a few elemental sites like Le Cerisier and Le Breuil, the organization is so explicit as to be undeniable. But often the question might reasonably be asked: Is not the apparent pattern one observes on a given occupation surface the artificial product of viewing that surface at too fine a scale? For example, the extremely diverse rock features in couche A's exposure in locality 3 would give a much greater appearance of organization were they viewed in more piecemeal fashion. Superimposing on the 3-A rock plan cutout rectangles and squares of various sizes akin to picture framing matts could frame specific rock configurations (such as the central 'hut' foundation), lending them a distinctiveness they altogether lack when viewed in the broad focus of the exposure as a whole. Had the excavation been more restricted areally and framed them individually, the impression of pattern and organization would have been greatly enhanced. One wonders whether the claims for clear-cut horizontal patterning made by spatial archaeologists working in open air sites elsewhere are not also affected by issues of scale in this fashion. In other words, what they sometimes perceive as pattern may in reality be no more than simplicity born of seeing too little.

Notes

1. The shouldered point was stolen in summer 1974, the only incident of its kind in the project's history. Unhappily, no illustration of it exists.
2. For a discussion of expedient lithic technology, see Sackett 1982:89-91.
3. While they are believed to hold true for the site as a whole, the degree to which these generalizations can actually be documented varies from one couche to the next. For some of them, especially in the case of those whose debitage was mostly lost in the laboratory fire, one must rely on the broad categories of excavators' catalogs for horizontal information on cores and other classes of debitage. For most of them, determination of horizontal patterning or its lack among tools has depended upon visual comparison of computer-generated plots complemented by chi-square comparison of typological counts among grid squares or groupings of contiguous squares. Point-provenience data are, however, available at least for all retouched tools, and a sophisticated mathematical search technique such as k-means analysis might provide more rigorous definition of the horizontal picture. Yet it remains telling that the cleanest and depositionally best-defined archaeological horizon, couche 6-M, exemplifies all our generalizations, even though its k-means analysis entailed refits that allowed it to be viewed in dynamic, rather than static, terms (Grimm and Koetje 1992).
4. Gaussen, however, reports that the stones forming the pavage of cahane 1 at Le Breuil sit on a thin bed of sand that could only have been transported to the site by purposeful human action (1980:186).

5

Analytic Regime

The remainder of this monograph is devoted to Solvieux's stone tool assemblages. It examines the formal variation that defines their typological makeup and brings them into relationship with, and in turn augments our knowledge of, the regional succession of Upper Paleolithic stone tool industries. As a necessary background to this discussion, this chapter and the next review the methodological basis of our approach to lithic assemblages. This chapter outlines the body of notions and techniques that constitute the analytic machinery of our approach, while chapter 6 details the typological system upon which this machinery operates. Because much of our methodology goes beyond conventional practices, this chapter sometimes assumes the form of a manual for pursuing lithic typology and industrial systematics that could stand alone. But the discussion is, in fact, tightly integrated with the analyses of the individual Solvieux industries that make up the remainder of the volume; it and they are fully complementary and are expressly designed to be read as much in conjunction with one another as in tandem.

5.1 An apologia for systematics

Many would argue that, despite the great wealth and variety of Solvieux's lithic assemblages, it is excessive to devote so much space to their systematics. Admittedly, the enterprise can be tedious, systematics being the sort of thing that appeals only to those

who like that sort of thing. Perhaps we need to justify attacking the subject at such length.

Systematics lies at the heart of quotidian, or 'straight,' archaeology (Sackett 1991). Yet in recent decades we have frequently heard that the pursuit is old-fashioned, an exercise in pigeonholing that has become an end in itself without any higher purpose or value. What is needed now, the argument goes, is to shift our interest from the sterile task of classifying stone tool assemblages to the study of new kinds of data having 'functional' significance that will inform on the activities and customs lying behind the assemblages. A tempered version of this argument was in fact inherent in the paleoethnological approach that provided the rationale for embarking upon the Solvieux project in the first place (Sackett 1968). Nonetheless, stone tools have not been laid to rest; on the contrary, they seem to be showing signs of increasingly lively behavior in recent years.

To be sure, prehistorians have warmly welcomed investigations of palaeoecology, the spatial organization of occupation surfaces, the stigmata of use on artifact edges, and other similarly functional studies. Some of these investigations have achieved solid results, while others have at least stimulated thought and enlarged our experience of the archaeological record. Yet none has achieved an overnight revolution, and none has brought to light new kinds of patterning that are as explicit and consistently expressed as those already documented for stone

tools. In this sense lithic typological and technological patterns have been lent by reflection in recent years an aura of intellectual challenge that they have not enjoyed for a long while. At the same time, anyone who objectively pursues these studies cannot help but be reminded of the impossibility of ignoring stone tools for the fundamental reason that they constitute the sole element that is ubiquitous to Paleolithic archaeology, the one common denominator shared by all of its lines of research. It would be absurd to pursue functional investigations of Stone Age economics, settlement, and technology without reference to the patterns of lithic variation that frame and link them together.

Coincidentally with the reviving interest in systematics has come the realization that the current state of the art is not adequate to the challenges confronting it. Because its role is so fundamental, it always poses the danger of becoming an end in itself. One problem lies in the realm of methodology. No one would deny that lithic classification was vastly strengthened a half-century ago with François Bordes' introduction of standardized typelists and simple quantitative techniques (see Sackett 1982, 1991). Nonetheless, the Bordesian approach that underlies conventional systematics represents in a sense the ultimate codification of more traditional notions of type-based systematics. Most researchers would agree that what is needed now is a more flexible analytic method whereby lithic typological variation can be manipulated in terms of its individual attributes rather than the more comprehensive type categories. By this means, not only can the conventionally recognized types be subjected to testing and refinement, but additional and even crosscutting patterns of variation among stone tools can be explored and codified in formal terms. The basic method has long been available, but its useful application has had to wait upon the appearance of a clearly defined theoretical need and large, stratigraphically well-segregated artifact assemblages. The work at Solvieux has been one of the handful of modern projects that provides both.

Simultaneously, the progress of substantive research in recent years has revealed that the accepted schemes used to define and order lithic industries have lost much of their authority. Partly, this reflects the discovery of hitherto unknown pat-

terns of industrial variation, not the least of which are those revealed by excavations in the open air. And partly, it involves more refined methods of attacking the archaeological record (see Laville, Rigaud, and Sackett 1980 in passim). The degree of chronostratigraphic resolution with which we now regard the Upper Paleolithic sequence has become greatly enhanced, thanks to refined techniques of microstratigraphic excavation coupled with radiocarbon dating and the complementary findings of sedimentological, palynological, and faunal analysis. Unlike most domains of Stone Age research, this sequence is beginning to come under a measure of control that is comparable at least in kind (though not in extent) to that with which we view many Neolithic sequences. But the degree of resolution afforded by our current systematics schemes tends to be considerably coarser. Thus, the ambiguities that surround our attempts to grapple with industrial variation in the Perigord arise as much from lack of refinement in our ability to define and codify the variation itself as from lack of precision in chronostratigraphically ordering the assemblages that exhibit it.

Not surprisingly, the more novelty we see in the archaeological record and the more our archaeological deposits are brought into narrow chronostratigraphic alignment, the less the traditional models of Upper Paleolithic systematics seem to hold. Instead, there appear to be rather striking cases of temporal overlap and even interstratification of quite unlike industries, instances where the conventionally recognized *fossile* types fail to possess the time-diagnostic values attributed to them, and significant departures from the more or less straightforward schemes of industrial succession. Almost every industrial tradition is now regarded as being 'polymorphic,' which often means no more than that our taxa have not kept up with our data—in other words, that systematics has failed to keep pace with our growing appreciation of lithic variability in the Upper Paleolithic record. At the same time, as we will see, even the fundamental integrity of the traditions themselves has come into question. In short, systematics has very much become a central and, indeed, lively issue. (This is particularly well illustrated in the discussion of the tangled taxonomies of Magdalenian and Perigordian times in chapter 11.)

All this should make it clear why the second half of this volume can profitably be devoted to classifying stone tools and industries. While paleoethnological issues are touched upon occasionally, our concerns remain largely substantive and deal with theory only where systematics is directly concerned. Whether or not they particularly like this sort of thing, readers should be interested to find here a somewhat novel methodology that claims both to increase the power and flexibility of formal typological analysis and to enhance its degree of refinement. They will also find that Solvieux's assemblages constitute a solid contribution to our knowledge of Upper Paleolithic industrial variation in terms of their quality, number and size, and typological novelty. Their analysis should help clarify many of the current issues in Upper Paleolithic systematics, pose new ones, and, it is hoped, give new impetus to the enterprise.

5.2 Overview of the analytic regime

While methodologically innovative, our approach is grounded in the *typologie morphologique* of conventional Upper Paleolithic research in France. A morphological typology is made up of classes of tools whose distinctive standardized shapes justify their utility for describing and comparing lithic industries. Such types are 'morphological' because their definition is, at least in theory, based upon their formal properties alone, exclusive of any stylistic or functional significance that may or may not also be attributed to them. The notion of morphological typology is inherent in the mind-set of most prehistorians who specialize in the inherently ambiguous and recalcitrant world of lithic variation, an enterprise that retains much of the aura of traditional natural history (Sackett 1982). It depends upon the ability of seasoned observers to recognize significant form even though they may only be able to guess why and how it happens to be significant.

Our analytic regime blends three distinct approaches: the type-list, attributal description, and full attributal analysis. The first, primarily inspired by the work of François Bordes, has been the conventional vehicle for pursuing Paleolithic research in the Perigord for the past four decades. The Bordesian approach to systematics is based upon com-

binning a type-list, that is, a standardized list of all the morphological types recognized in a given block of Paleolithic industries, with a set of simple descriptive statistical procedures for inventorying lithic assemblages in terms of this list and in turn comparing their respective typological compositions. We retain the basic thrust of this approach even though substantially modifying its mechanics. The latter includes some accommodation of the Upper Paleolithic type-list to the specific character of the Solvieux assemblages, the addition of a considerably more elaborate battery of count sheets for inventorying and comparing assemblages, and the occasional use of statistical inference in making these comparisons.

Our second approach, attributal description, may also be said to be conventionally employed, at least by modern Bordesian researchers, albeit in piecemeal fashion. It is based upon an attribute system or, better, scheme of systems, that allows formal variation among stone implements to be codified in terms of their discrete component features, or attributes, whose behavior can, in turn, be examined independently of the morphological types themselves. When used in parallel with count sheet inventories derived from the type-list, attribute systems add precision and flexibility to typological investigation and provide a format in which considerably more information can be brought to bear than the inventories alone can provide. Like the count sheets themselves, however, attribute systems used in this manner remain in the realm of statistical description.

Our third approach carries us from attributal description to full attributal analysis. It attempts to illuminate the dynamics underlying patterning among stone tools as it is revealed when two or more groups of related attributes are juxtaposed so that their joint interactions can be observed. This approach is designed both to reveal typological patterns that otherwise might be missed, or at least only impressionistically perceived, and to help us explain in dynamic terms what the Bordesian type-list approach and attribute description codify only in essentially static terms. It constitutes, therefore, what has been rather grandly termed "dynamic typology" (Sackett 1989). Apart from calling for an analytic format in which different kinds of attributes

can be handled simultaneously, it entails more complex forms of statistical manipulation, including techniques of statistical inference, that are not ordinarily encountered in the literature of Paleolithic systematics. Let us examine each of the three approaches in turn.

5.3 Inventory: type-list and count sheets

The apparatus used here to inventory and compare the typological makeup of Solvieux's assemblages is simply an elaboration of conventional Bordesian practice. The type-list and count sheets derived from it are designed with reference to Solvieux's Magdalenian and Rayssian industries. Because the Beauronnian industry is so distinct that its typological makeup would only be distorted were it inventoried in the same terms, quite different count sheets specifically designed for it are presented in chapter 10.

5.3.1 Type-list

The Solvieux type-list is based upon the updated, or new, revision of the classic, or old, Upper Paleolithic type-list of de Sonneville-Bordes and Perrot (1953) with which Perigord researchers began experimenting some two decades ago. Useful examples of its employment are provided by Bordes (1978) and Bietta (1976/77). The Solvieux list employs the category numbers of the new list but adds a few types (for example, type 34b, burin-point and type 101b, Solvieux point), merges others, and omits still more that play no role in the Solvieux assemblages. Merging particularly involves the burin types, as the classification of burins we use here is based upon attribute-based distinctions that depart from, and are to a considerable extent obscured by, the conventional lists. The Solvieux type-list categories are shown in figure 5.1, ordered into larger typological classes that make its organization more apparent and facilitate comparison between it and the count sheets.

5.3.2 Piece Count and Tool Count

We must at this point distinguish between the general use of the term tool as used in earlier chapters and the more specific sense we give it in lithic analysis here and in the remainder of this volume.

What is involved is the difference between an artifact that belongs to a category of the type-list and the actual fashioned working edge or end it carries. We refer to the former as a "piece" and to the latter as a "tool" (*sensu stricto*). The distinction is needed because many pieces on the list carry more than one tool; as a result, piece counts and tool counts yield significantly different inventories of assemblages. Two additional terms may be introduced here. The business end or edge of a flint artifact is the "active part" (*partie active*); the active part, of course, determines what kind of tool we are dealing with. The blank that carries it is often referred to as the "support" (*pièce support*). In these terms then, we can say that the distinction between pieces and tools is needed because many supports carry two distinct active parts, one at each end.

Four separate count sheets derived from the Solvieux type-list serve as inventories, only the first of which has a direct counterpart in Bordesian systematics. Two of them inventory assemblages globally, that is, where the percentage of each category is calculated as a proportion of the total assemblage. One is the Piece Count, which is simply the type-list reformatted as a count sheet in conventional Bordesian fashion (see table 7.1). It deals with whole artifacts, that is, pieces. Because many pieces bear a distinct tool at either end, this count sheet includes several categories for "combination" pieces, such as a burin joined with an endscraper (type 17) or twinned dihedral burins (type 36). Where necessary, a piece that, contrary to such combination forms, bears only a single tool can be referred to as a "single" piece. The numbers on the Piece Count, as on the other count sheets, refer to the numbered categories of the type-list. For purposes of illustration, the reader is referred to examples of these count sheets as they are used to inventory the Early Magdalenian couche 3-A industry reviewed in chapter 7; numerous additional examples can be found in chapters 8 (Middle Magdalenian) and 9 (Raysse Perigordian).

The other global count sheet is the Tool Count, which inventories the tool types as they are individually represented within an assemblage regardless of whether they appear on single pieces or as members of combination (composite or multiple) pieces (see table 7.3). It retains the same morphological

Scrapers		Gravettes	
1a	Endscraper on blade	48b	Gravette technopiece
1b	Endscraper on flake	51	Gravette point
2	Double endscraper	52	Microgravette point
3	Flake scraper	Truncations	
9	Endscraper on retouched blade	57	Traverse truncation
11	Block/Aurignacian scraper	58	Oblique truncation
Composites		59	Medial oblique truncation
17	Scraper + burin	60	Bitruncated piece
18	Scraper + truncation	Marginally retouched pieces	
19	Burin + truncation	61	Whole
20	Perforator + truncation	62	Fragment
21	Perforator + scraper	Ad hoc tools	
22a	Perforator + burin	72	Notched piece
22b	Point + burin	73	Denticulate piece
22c	Point + scraper	74	Splintered piece
Perforators		75	Sidescraper
23	Perçoir	Raclettes	
24	Microperçoir	76a	Raclette (whole or quasi-whole)
25	Star perforator	76b	Raclette fragment
27	Bec	Bladelets	
28	Thorn	85a	Backed bladelet
29	Bec burinante alterne	85b	Special backed bladelet
Burins		86	Fragment of backed bladelet
30	Axial dihedral burin	94	Bladelet with direct retouch
31	Lateral dihedral burin	95	Bladelet with inverse retouch
32	Lateral break burin	Points	
34a	Corbiac burin	101a	Pointed blade
34b	Burin-point	101b	Solvieux point
36	Double dihedral burin (30–32)	Diverse pieces	
37	Axial truncation burin	105	Diverse
38	Lateral truncation burin		
41	Transverse burin		
42	Double truncation burin (37–41)		
43	Noailles burin		
44a	Raysse (Bassaler) burin		
44b	Double Raysse burin		
46a	Multiple mixed burin (std/std)		
46b	Multiple mixed burin (std/special)		

Figure 5.1. Solvieux Type-List. Magdalenian and Raysse Perigordian industries.

types as the Piece Count except for the combination types, which are omitted because their constituent tools are, of course, counted separately. Adding the individual tools from combination pieces to those on single pieces to form a separate tool sample (as opposed to a piece sample) is totally justifiable. The active parts involved are no different in their mor-

phological expression; they conform to precisely the same typological dynamics; and they are carried by essentially the same kinds of blanks. At the same time, tool samples offer two major advantages over piece samples. First, because they fully bring to light tools that are individually submerged, or buried, in the composite and multiple piece types, they

provide a more ample and consequently more informative picture of an assemblage's typological makeup. Second, because they are numerically larger than piece samples, tool samples are more trustworthy for statistical comparison and analysis. (The gain in sample size ranges from 15% to more than 30% in Solvieux's assemblages.)

The Tool Count is organized somewhat differently than the Piece in that its typological groups have been reordered specifically to accommodate the structure of the Solvieux assemblages. Among other things, the count begins with burins, which constitute by far the numerically dominant typological group in all of Solvieux's Magdalenian and Raysse Perigordian assemblages and is therefore the logical point of departure for attacking their analysis and comparison. In every assemblage burins comprise at least 30% of the global piece sample and at least 40% of the global tool sample; scrapers run a very poor second, outnumbered at least three to one by burins.

5.3.3 Piece Group Count

The third inventory is the Piece Group Count, whose uncluttered format abbreviates the Piece Count by collapsing its individual types into broader categories that are, in turn, arranged into still more comprehensive typological groups (see table 7.2). Apart from providing a summary picture of the overall quantitative makeup of an assemblage, this format displays the relative frequencies of the type classes as a function of the specific typological group to which they belong rather than of the global piece sample of the assemblage as a whole. 'Restricted sample' counts of this nature highlight the kinds of quantitative patterns that are obscured by global sample counts. (For example, the pattern of relative frequencies of dihedral, truncation, and break burins with respect to one another—a highly diagnostic aspect of Magdalenian and Raysse Perigordian systematics—is made immediately apparent in the Piece Group Count, whereas it takes considerable searching and calculation to retrieve it from the Piece Count.) The need to denote restricted sample proportions of this kind is not, of course, overlooked in conventional Bordesian practice, but it is met only in a more limited and piecemeal fashion by typological indices (§ 5.3.5).

5.3.4 Common Toolkit

Both logic and need dictate that a group inventory analogous to the Piece Group Count be generated from the Tool Count. This inventory is the Common Toolkit, whose format sets it apart from the other count sheets (see table 7.4). Basic to its design is the distinction between "standard" and "special" typological categories. The former comprise the common and essentially banal forms that are ubiquitous to all regional Upper Paleolithic industries; the latter are either distinctive *fossiles directeurs* restricted to specific industries or simply rare forms whose specific industrial significance remains unclear. The Common Toolkit inventories only standard forms (which, it should be noted, comprise many more type categories than are specifically identified as such on the Tool Count and Piece Group Count).

This count sheet serves two somewhat different functions. The first is simply to provide restricted sample counts for the standard types of tools. (Restricted counts of the special tool types are of course meaningless, because most of these constitute typological groups in and of themselves, and those that do not appear in only small numbers when they appear at all; in either case, their frequencies are satisfactorily inventoried in the Tool Count.) The second function of the Common Toolkit is to provide a framework for viewing all assemblages on common typological grounds, free of the distracting presence of special forms and of the statistical skewness such forms introduce into the quantitative structure of assemblages. (Relevant to the latter point is the fact that *fossile* types alone account for more than one-third of both the Early Magdalenian and Raysse Perigordian assemblages at Solvieux.) Equally important, because it restricts itself to what can be regarded as the typological substrate, the Common Toolkit can potentially illuminate much about the constants and basic variations among industries that is obscured by the other three count sheets. While Upper Paleolithic systematics at least implicitly recognizes the basic idea underlying the Common Toolkit's design, formal count sheets providing for its explicit use in systematics seem to be nonexistent.

It might be thought preferable to inventory the banal assemblage of standard typological groups in terms of a piece count rather than a tool count,

thereby giving appropriate consideration to the part played by combination pieces. But this raises a practical difficulty: How are we to count combination pieces that join a standard tool with a special one—for example, a composite associating an endscraper with a Raysse burin? The problem cannot be happily resolved within the format of a count sheet.

5.3.5 Typological indices

Although an excellent overall inventory, the conventional piece count directly reproduces the type-list and is therefore too detailed to lend itself easily to characterizing the typological highlights of an assemblage or to making interassemblage comparisons. These tasks are met in the Bordesian approach by a battery of individual indices that provide proportional measures of broader typological groupings. But being themselves derived from the type-list count, these typological indices also have drawbacks. Some of these involve weaknesses of design (see below). Other drawbacks are that the indices usually provide global rather than restricted frequencies, concern pieces rather than tools, and necessarily exclude active parts that happen to be buried among type categories for composites and certain multiple combinations. It is of course to avoid such drawbacks that we have introduced the different kinds of count sheets that allow one to inventory and compare assemblages more flexibly in terms of both pieces and tools and both global and restricted frequencies.

Nonetheless, the typological indices must be used in the interpretive discussions of this study (see chapter 11) because the type-list categories remain the conventional idiom of description and comparison for assemblages from other sites. The literature does not systematically provide the information needed to compare our industries on any other terms than these.

Figure 5.2 summarizes the indices that we employ. Although they are defined in terms of the category numbers of the Solvieux type-list, the manner in which they equate with the indices produced by either the old or new Bordesian type-lists should be obvious. Some supplementary indices have been added to correct what are regarded as distortions in the conventional ones. These additions mostly cor-

rect for how the conventional indices confound the important distinction we make between standard and special burin types and how they unrealistically divorce truncation burins bearing transverse profiles from their standard axial and lateral siblings. The significance of these distinctions will become clear in the next chapter (§ 6.3).

5.3.6 Inventory statistics

Because the count sheets are percentage-based devices of statistical description, using them calls for heeding the possible distorting effects of sampling error. Many statements about the significance of percentages, or the decision to forego them altogether in favor of simple raw counts, are grounded upon simple statistical procedures, such as the standard error of proportions, that are brought into play as the analysis proceeds. One additional technique from the realm of statistical inference is used extensively, the nonparametric chi-square (χ^2) test of significance, which is the statistic of choice for comparing distributions of nominal (qualitative) categories like those that make up our types and typological groupings. Wherever the text indicates that a chi-square test would show such and such a result, readers can assume that the test was done even though it does not appear in a table. Those unsure of the specific properties, calculations, and limitations of these techniques can find easy-to-follow discussions in most basic statistical textbooks (Blalock 1960 is a particularly useful guide).

5.4 Attribute systems and attribute description

5.4.1 General

An attribute system comprises one or more “sets” of mutually exclusive categories, or “attributes.” Each set refers to a given dimension or aspect of formal variation in a given class of artifacts, while a set’s attributes codify the specific alternative states that dimension can assume. (Thus red, blue, and green can be regarded as attributes belonging to a set we call ‘color.’) Some typological groups recognized on the type-list happen to constitute attribute sets in their own right. The Truncation group is one such example; its constituent transverse, oblique, and

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A. CONVENTIONAL INDICES

These indices are not defined or named with perfect consistency in Bordesian systematics, but the variations in usage have little practical significance to the quantitative description and comparison of assemblages. The tool type numbers are those of the Solvieux type-list (see figure 5.1).

IG	Indice de grattoir (1a-11) All scrapers except those involved in composite piece
IC	Indice d'outils composites (17-22c) All composite pieces
B	Indice de burin (30-46b) All burins except those involved in composite pieces
IBd	Indice de burin dièdre (30-32, 36) All single and double dihedral burins plus break burins
Bt	Indice de burin sur troncature (37, 38, 42-44c) All single and double truncation burins except those with transverse profiles; this index includes Noailles and Raysse burins.
PB	Indice de perçoirs et becs (23-29) All perforators except those involved in composite pieces, including thorns and special types such as micropersoirs
IT	Indice de pièces tronquées (57-60) All truncations except those involved in composite pieces
LR	Indice de lames retouches latérales (61-62) Marginally retouched pieces
IMo	Indice de microlithes ordinaires (nongeometric) (85a-95) Both retouched and backed bladelets
IMd	Indice de microlithes à dos (85a-86) Backed bladelets
IPg	Indice de pièces gravettiens (48b-52) Gravettian pieces
IPd	Indice de pièces à dos (48b-52, 85a-86) Gravettian pieces and backed bladelets
IR	Indice de raclettes (76a-76b) Whole and fragmentary raclettes
IAH	Indice de pièces ad hoc (72-75) Notches, denticulations, splintered pieces, and side scrapers

B. SUPPLEMENTARY INDICES

These indices are designed to correct what we regard as distorting factors in the conventional burin indices, which confound the standard and special burin types and which unrealistically divorce truncation burins bearing transverse profiles from their standard axial and lateral siblings.

IBs	Index of standard burins (30-32, 36-42, 46) All standard dihedral, break, and truncation burins except those involved in composite pieces
IBds	Index of standard dihedral burins (30-31, 36)
IBdbs	Index of standard dihedral and break burins (37-42) This is the same as IBd above
IBts	Index of standard truncation burins (37-42) This differs from the IBt in that it includes truncation burins bearing transverse profiles and excludes the special burin types, in particular Noailles and Raysse burins
IBn	Index of Noailles burins (43)
IBr	Index of Raysse burins (44a and 44b)

Figure 5.2. Typological indices

medial oblique types simply codify the three alternative states the outline profile of the truncation may describe. Most attribute sets we use here, however, codify aspects of variation that the list ignores or at least obscures.

Some sets crosscut the morphological types, like those making up the system of blank attributes—which is relevant to essentially all typological groups (§ 6.2). Others subdivide specific groups of morphological types at a higher level of detail than they are defined on the type-list. One example of this is the Perforator Profile set, which orders percoirs, becs, and thorns into four categories of outline shape according to the orientation and placement of their projection (§ 6.7.1). In the case of some typological groups, such as standard burins, raclettes, and Gravettes, an altogether separate attribute system consisting of several individual sets is brought into play.

Attribute sets can be used in a straightforward manner to supplement the count sheets, providing additional information that enhances the level of refinement with which the typological makeup of assemblages is described. Their use in this way, the realm of attributal description, constitutes the second approach in our methodology.

Attribute sets relate to different artifact types in different ways. Some simply constitute an alternative means of classifying the artifacts in a given typological group. For example, for certain purposes the attributes making up the Perforator Profile set constitute more meaningful type categories in their own right than do the percoir, bec, and thorn classes that appear on the type-list and count sheets. Other sets provide a more detailed breakdown of the morphological types, allowing for a more refined description than the types themselves provide. This is true, for example, of the Burin Profile set discussed in § 5.4.3 and of the sets used to describe the details of formal variation among Gravette points in § 6.12. Refinement in describing typological variation can involve the synthesis resulting from merging individual artifact types into broader attribute classes rather than the detail resulting from breaking them down into finer ones. For example, one aspect of understanding the dynamics of burin morphology may call for simultaneously grouping the members of all burin types into one or more of the sets

codifying features of blank morphology and then comparing the ensemble to, say, all endscrapers similarly grouped. This grouping can reveal distinct modalities in the production and choice of blanks in the two families that are likely to be overlooked if their members are observed only piecemeal at the level of the individual morphological types. For these manifold reasons an attributal approach can bring the kinds of precision and flexibility to typological description that cannot be achieved by type-list inventorying alone.

5.4.2 Designing attribute sets

Apart from serving the purposes of what is essentially static description, the attribute systems provide the basis for our third approach: full attributal analysis. This involves analyzing, in a statistical device known as a contingency table, how various sets of attributes interact with one another to reveal the dynamics underlying typological variation. This, our third approach, requires mention at this point because the needs and limitations of its statistical format strongly influence how attribute sets are designed. At the level of attributal description, statistics makes only two demands. One is that the attributes making up any given set be mutually exclusive: obviously, typological features cannot be meaningfully quantified unless they are grouped into discrete, nonoverlapping categories. The other is that these features have some numerical significance in the first place; it would be mere methodological formalism to give attributal definition to aspects of typological variation that are numerically unimportant. Such aspects are best recognized simply as “observations”, which may serve as informal attributes for descriptive purposes where the occasion warrants. (Also best relegated to the status of observations are aspects regarded as having only secondary typological significance or which, although significant, are so impressionistic in nature that their formal codification into attribute sets would entail spurious accuracy. An example of the first is the distinction between straight, convex, and concave truncated pieces; an example of the second is the distinction between ordinary and atypical specimens of endscrapers.)

To these two demands contingency table analysis adds three more that are not as easily met. First,

it requires that care be taken to minimize the number of attributes in a given set, or at least to define them in such a manner that they can be collapsed into a minimum number where needed. The aim here is to avoid too much attenuation of artifact samples over the cells of the contingency table in which they are analyzed, which can obscure whatever patterning may be present and invalidate the statistical technique itself. Second, attributal analysis requires that, wherever possible, attribute sets be defined so as to partition tool morphology into broad components that can be retained in the mind's eye; one needs to be able to see the various permutations that tools assume when organized in a contingency table according to different crosscutting attribute sets rather than lose the picture in a haze of numbers. The point is that, despite its statistical component, attributal analysis calls as much for the disciplined visual imagination of the *typologiste expérimenté*, the seasoned journeyman typologist, as do traditional methods. Third, it means that the sets should be defined in a manner that allows related tools, or at least those belonging to the same typological group, to be attributally coded in common comparable terms.

Of course, given the nature of typological variation, not all important sets can meet the above criteria, and their use must consequently be restricted largely to attributal description alone. But in dealing with aspects of variation where attributal analysis is feasible, the trick is to ensure that the variation is attributally codified as comprehensively and economically as possible. The sets that generate statistically useful contingency tables and meaningful results are usually those that reduce to a single variable morphological variation whose definition at first sight might seem to call for two or three distinct sets. Anyone who makes the attempt will discover that designing good attribute sets of this nature calls for far more work than is involved in actually using them.

5.4.3 Example: codifying burin profiles

A useful illustration of the considerations involved in attribute set design is provided by the set we use for codifying standard burin "profiles," that is, the outline silhouettes described by the working end of the dihedral, break, and truncation burins. The set

has special significance because the aspect of burin morphology it codifies is generally considered to be second in importance only to the dihedral-break-truncation distinction itself. Equally significant, it is the essentially banal standard burin types this set codifies that are virtually ubiquitous to all Upper Paleolithic industries and that constitute by far the numerically richest typological group which the Solvieux assemblages hold in common. They therefore constitute the best, and sometimes the only, statistically trustworthy basis for describing and analyzing the assemblages on common typological grounds.

In its categorization of burin profiles Bordesian systematics falls down rather badly and, as a result, has failed to realize much of the potential inherent in standard burins for revealing patterned industrial variation. Here is how the profile, or silhouette, of the working end of burins is ordered in the older Upper Paleolithic type-list of de Sonneville-Bordes and Perrot (1954-56):

- Dihedral burins
 - symmetric
 - asymmetric
 - lateral
- Break burins
 - lateral
- Truncation burins
 - straight
 - oblique
 - concave
 - convex

This scheme has three basic faults. The first is that its profile types are defined too impressionistically, and they tend, as a result, to be used differently by different researchers. The second fault, methodologically much more serious, is that altogether different and incompatible systems are used for codifying dihedral and truncation burins. The subdivisions of the former refer to the overall outline of the working end, whereas those of the latter largely concern the configuration of the retouched truncation alone. Hence, an oblique truncation burin can possess an overall profile comparable to that of either a symmetric or asymmetric dihedral burin, while a concave or convex one can actually describe any of the three dihedral outlines. As a result, no meaningful comparison of profile distributions

between the two classes can be made, let alone more ambitious statistical forays into the realm of dynamic typology (that might call, say, for analyzing how the profiles interact with variations in blank morphology in the two burin classes). The third weakness, equally serious, is that the truncation profile types are not mutually exclusive categories, as they entail two altogether different dimensions of formal variation—the angle at which the truncation lies with respect to the midline of the blank and the shape of the truncated edge itself. Because many burins qualify for more than one of these profile types (for example, a specimen whose truncation is both oblique and concave), the categories yield rather ambiguous results even when used only for simple inventories.

The new type-list (Bordes 1978) at least attempts to correct for the second two weaknesses by recognizing one and the same simple distinction between axial and lateral profiles for both dihedral and truncation burins. But this distinction is too general to have more than limited typological value. Furthermore, the task of recognizing finer subdivisions within it is left to a simple drawing of schematic profiles of truncation burins alone (Bordes 1978, fig. 3). These profiles are idealized distinctions, of which some are numerically insignificant, and which—just as in the case of the old type-list—do not allow meaningful comparisons to be drawn between the truncation and dihedral burins.

These problems are resolved by the Burin Profile set adopted here, which is the result of considerable experimentation; earlier versions of it appear in an Masters thesis by Susan Blifeld (1977) and in a PhD dissertation by Linda (Taranik) Grimm (1977). While reflecting the same typological emphases built into Bordesian systematics, the Burin Profile set codifies all standard burins in terms of a single set of clearly defined attribute categories. These attributes allow for direct comparisons of dihedral, break, and truncation burins on common grounds, as well as for statistical analysis of patterning both within their profiles and between the profiles and other aspects of burin morphology.

The Burin Profile set is illustrated by a series of schematic drawings characterizing the five major variations in profile described by standard burin trigons (figure 5.3). What we call the “trigon” com-

prises what is regarded as the active part of a burin, as opposed to the support that bears it; the trigon extends from the burin's terminating chisel-shaped “biseau” to the nickpoints where its two fashioned edges intersect the lateral margins of the support. (These edges form two sides of the trigon's triangular outline; the third is an imaginary line drawn across the support connecting the two nickpoints.) As their names imply, the profile types making up this set summarize two different aspects of trigon geometry. (These aspects could, of course, be analytically dealt with as two distinct attribute sets in their own right if our aim here was not to design a profile set that is as comprehensive as possible.) The first aspect concerns whether the biseau lies closer to the midline of the piece or to its margin; in other words, it distinguishes between an axial (or medial) biseau and a lateral biseau. The second aspect concerns whether the closing angle at which the opposing sides of the trigon approach each other is narrow ($< 50^\circ$), medium (50° to 65°), or wide ($> 65^\circ$). Apart from their names, each profile type bears a number that can be coupled with the letters D (dihedral), T (truncation), and B (break) for convenience in recording and exposition. These profile types are mutually exclusive, comprehensive in scope, easily retained in the mind's eye, and defined in an explicit manner that allows them to be codified with reasonable consistency.

Coding is facilitated by fixing a large version of the template illustrated in figure 5.4 on a wall some meters from the observer so that the burin being coded can be held at arm's length. It is rotated and twisted against the backdrop of the template until the irregularities and curvatures of its trigon's edges are visually averaged out and the best overall assessment of biseau position and closing angle can be made. Of course, even where fairly rigid standards of type-design may lie behind their manufacture, the trigon shapes of burins may still depart from the ideal schematized profiles seen in figure 5.3. This departure may reflect accommodation to idiosyncrasies in the morphology of their supports, as well as breakage and rejuvenation to which they were subject during the course of their use-life. The typologist should not be frustrated by the arbitrariness such factors introduce into coding but instead strive to code consistently and attempt to discern how the

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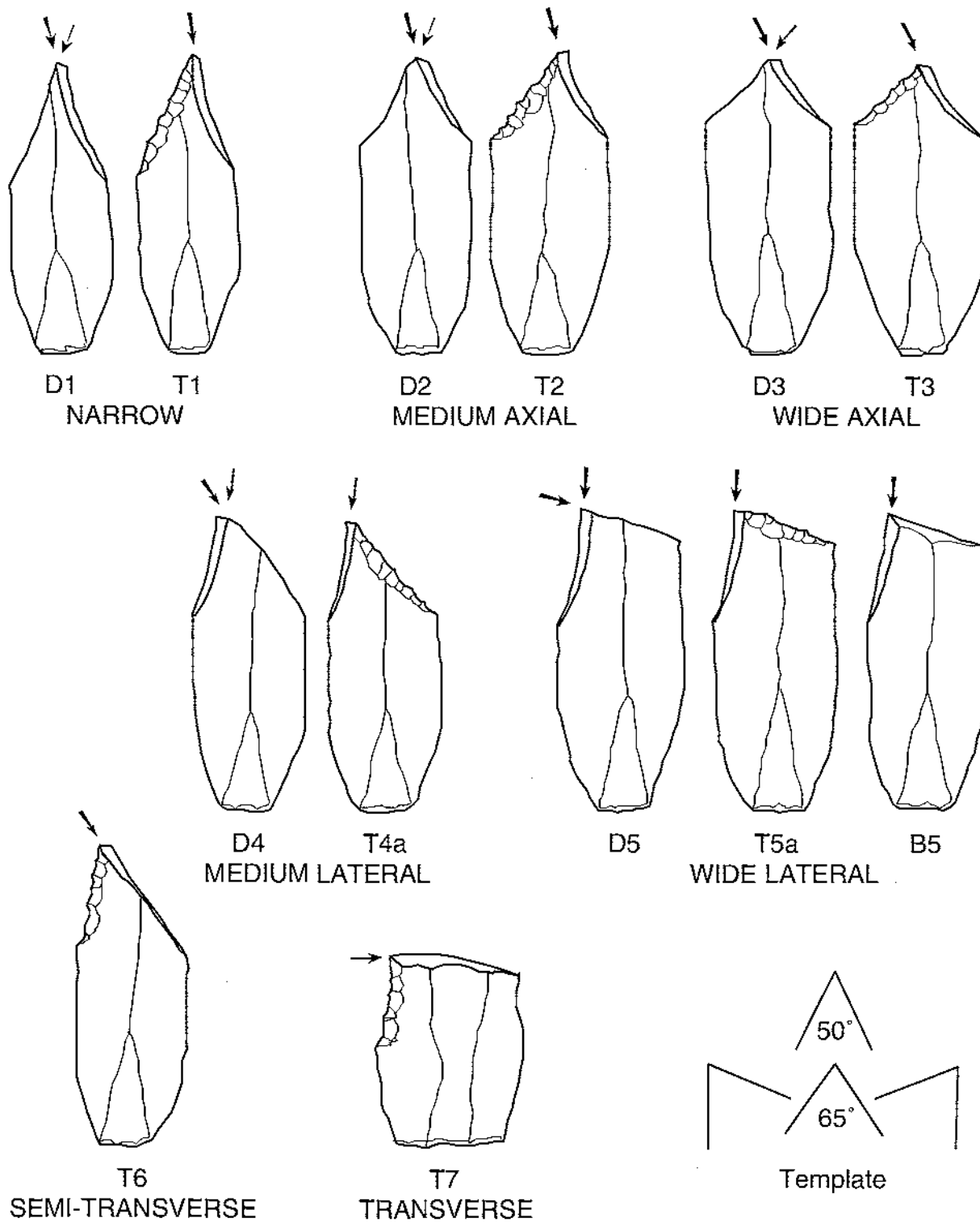


Figure 5.3. The Burin Profile types

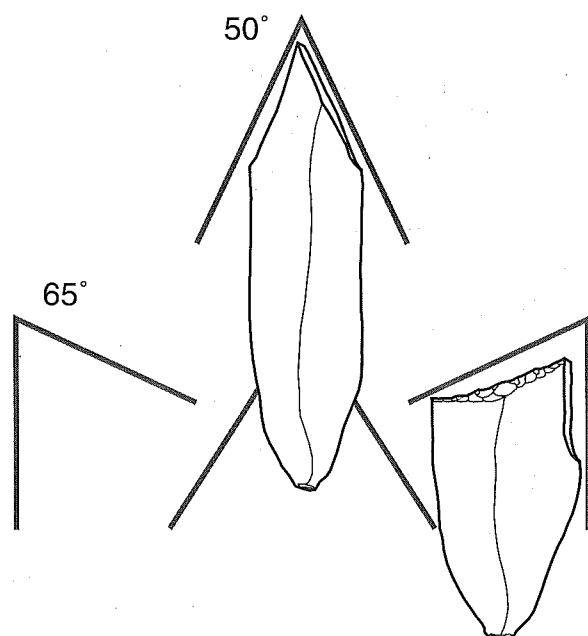


Figure 5.4. Coding burin profiles. The $< 50^\circ$ closing angle of the dihedral burin's trigon qualifies it for the D1 narrow profile type; the laterally positioned biseau and $> 65^\circ$ closing angle of the truncation burin qualifies it as a T5a wide lateral trigon.

ambiguities involved may help illuminate the dynamics at work in burin typology. Understanding why some burins defy easy codification can inform as much about their typological dynamics as understanding why most others do not.

Some of the profile types require comment. Because of their acute closing angle and because they tend to appear on slender blanks and possess elongated trigons, narrow (D1 and T1) burins exhibit a reasonably balanced outline even when their biseaux lie more or less laterally. All specimens having this closing angle are therefore regarded as effectively constituting axial burins. Together with pieces assigned to the medium axial profiles (D2 and T2), they typify the *burin d'axe* of conventional typology. The *burin d'angle*, on the other hand, is typified by the wide lateral (D5, T5, and B5) profiles. The remaining profile types mostly codify silhouettes that lie outside either of these ideal types and that as a result tend (as we have seen) not to be systematically or consistently categorized in conventional Bordesian practice. The lack of standardized categories for these latter areas of trigon

variation is the principal reason why conventional burin typology does not allow for an explicitly attributal approach to typological dynamics.

An exception is the generally recognized transverse (T7) profile, a special form of trigon restricted to truncation burins wherein the wide lateral profile again appears but the truncation and burinated facet reverse their normal positions on the blank. Although not mentioned above, the conventional typelist does, of course, include transverse burins, in fact distinguishing somewhat superfluously between those with straight (type 38) and concave (type 39) truncations. It bears noting in this connection that our Burin Profile set disregards whether a truncation is straight, convex, or concave. These distinctions in silhouette are, of course, largely irrelevant to dihedral burins and they are of secondary importance even to truncation burins. It suffices to treat them as observations rather than give them formal attribute status.

Finally, we follow conventional practice in recognizing a single profile (B5) for typical break burins and in coding all other break burins—those possessing other than wide lateral trigons—as atypical, adopted edge dihedral burins. This practice is not as arbitrary as it may seem. For one thing, most of the latter specimens are in practice difficult to distinguish from other forms of adopted edges or the maladroit burinated facets occasionally seen among dihedral burins. For another, given their mode of manufacture, typical break burins do, in fact, describe the *burin d'angle* silhouette codified by the B5 profile.

5.5 Attributal analysis

The ideas basic to what we term attributal analysis have long been known to many branches of science. They were introduced into artifact typology by Albert Spaulding (1953) and subsequently expanded in both method and theory and applied to stone tools by a handful of researchers, including the writer (Sackett 1966, 1989). Researchers disagree about how best to conduct attribute analysis and what its relative merits may be in comparison to other, supposedly competing, methods of quantitative artifact analysis. Much of this debate in our view is far off the mark, not reflecting empirically

viable issues but instead misunderstandings arising from the gap that separates theorists who produce the methodological literature and journeyman typologists who actually control the substantive data. Be that as it may, the format used here to pursue attributal analysis constitutes a workable compromise that meets the practical needs of the typologist without doing too much violence to the statistical niceties that exercise the theoretician. It is designed in short to be practicable, efficacious, and, indeed, artisanal—a kind of appropriate technology adapted to the needs and know-how of the typical journeyman lithic typologist.

The last point bears stressing, as a misconception holds that attributal analysis somehow calls for replacing the typologist with a number-crunching and expensive computer. This is far from the truth. For one thing, the role of the computer is restricted to mathematical operations easily done on a pocket calculator. (The approach was originally developed in fact using only a slide rule and a table of square roots.) More importantly, the format for attributal analysis we advocate is in most respects little more than an explicit and, in some ways, more rigorously organized expression of the logical operations that have always implicitly framed typological analysis. Just as M. Jourdain discovered that he had all along been speaking prose of a sort, the seasoned typologist should discover in what follows that he or she has all along been doing attributal analysis of a sort. Our format simply helps to do it better.

5.5.1 Contingency table analysis

The machinery of attribute analysis used here belongs to a realm of nonparametric statistics often referred to as contingency table analysis, which is particularly well suited to investigating interaction among variables that, like our attribute sets, as often as not constitute purely qualitative (nominal) expressions of artifactual variation as opposed to metric ones. Table 5.1 is a typical contingency table, one whose specific format appears in the following chapters. It involves a cross-tabulation of two attribute sets, Burin Profile and Support Type, for a sample of standard dihedral burins, in this case the extremely large one provided by the Early Magdalenian 3-A assemblage. (Note that this is a tool sample, which consequently includes all dihedral

burins in the assemblage, regardless of whether they appear on single pieces or as individual members of composite and multiple pieces.)

Burin Profile is the column variable, and the table's five columns represent each of the five profile types used to attributally categorize dihedral burin trigons. The row variable is Support Type, which is represented by just two attributes—one for relatively gracile (G) supports and the other for relatively robust (R) supports (how these are defined is explained in § 6.2.3). Along the bottom of the table are the horizontal (column) marginal percentages of the profiles, representing the individual, or univariate, frequency distribution of the Burin Profile set in the 3-A dihedral burin sample. The vertically aligned percentages along the right margin of the table constitute the univariate frequency distribution for the two attributes making up the Support Type set. To enhance the table's legibility, the horizontal and vertical marginal percentages are shown in italics. The cells within the table indicate the number of burins involved in each of the paired attribute combinations that result when the two sets are cross-tabulated into a joint bivariate distribution. The upper cell of the first column, for example, shows that 118 burins possess D1 narrow trigons carried on gracile G-supports; the lower cell of the last column indicates that D5 wide lateral trigons on robust R-supports account for 35 burins. The percentages inside the table are column percentages indicating the proportions in which the Burin Profile attributes distribute over the Piece Support attributes; thus, the lower cell of the third column indicates that 74.0% of burins with D3 wide axial profiles are carried on R-supports. Percentages in the table are again italicized.

Because its marginal frequencies display the individual frequency distributions of the two sets being cross-tabulated, a contingency table can serve as an economic device of statistical description. But our principal aim here is to search for order in the bivariate distribution contained within its cells: Do the attributes of the two sets combine at random in this dihedral burin sample or do they exhibit some kind of clustering or linkage instead? A row-by-row comparison of the individual column percentage distributions makes evident the pattern of interaction between the Burin Profile and Support Type

Table 5.1. Contingency table analysis of 3-A dihedral burins (tool sample). Cross-tabulation of Burin Profile and Support Type attribute sets.

	D1	D2	D3	D4	D5	
G-support	118 91.5	90 64.8	18 26.1	58 70.7	37 51.4	321 65.4
R-support	11 8.5	49 35.3	51 74.0	24 29.3	35 48.6	170 34.6
	129 26.3	139 28.3	69 14.1	82 16.7	72 14.7	491

$$\chi^2 = 93.15 (p < .001)$$

$$\phi = .436$$

sets, both with respect to each other and to the marginal percentages running down the right side of the table—which constitute a kind of average distribution of the two supports in the dihedral burin sample as a whole. Inspection indicates that medium-angled profiles, whether axial (D2) or lateral (D4), show percentage distributions that are fairly similar to each other and that also resemble the vertical marginal percentages. Hence, judging from their behavior in the table, these profiles seem to interact almost randomly with the support types. But the other profiles show some marked contrasts. Most important of these are the strong preference for gracile G-supports shown by D1 narrow profiles and the strong preference for robust R-supports shown by D3 wide axial profiles. In both cases, the percentages are the highest to appear in their respective rows, and at the same time, of course, they exceed the corresponding vertical marginal percentages. D5 wide lateral profiles also favor robust supports, but less strongly than do D3 profiles. In short, the medium-angled profiles notwithstanding, the bivariate distribution within the contingency table displays overall a strong pattern of nonrandom association.

Important additional information about this pattern is provided by two formal statistical measures that accompany the table. The first is a measure of statistical significance, which indicates the chances that the observed interaction pattern could be the product of sampling error. This is chi-square (χ^2), which produces the specific level of significance indicated within parentheses in table 5.1; the expres-

sion $p < .001$ in this case indicates that there is less than one in a thousand chances that the two univariate distributions could have combined randomly and still produced the bivariate distribution seen in the table. The second is a measure of association which indicates the strength or magnitude of nonrandomness. For this we use the phi (ϕ) coefficient, which is calculated directly from the chi-square score (phi is the square root of the chi-square score divided by the total number of tools analyzed in the table). Interpreting phi values can be tricky because, unlike their counterpart in parametric statistics, the correlation coefficient, they do not lend themselves to unambiguous interpretation. A phi of .400, for example, is not exactly twice as strong as one of .200; it is simply stronger. Moreover, caution must be exercised in drawing conclusions from phi values when comparing tables that differ in the number of rows and/or columns. Nonetheless, phi is a useful diagnostic tool once one has gained practical experience in its use. (For a discussion of alternative nonparametric measures of association in contingency tables, see Sackett 1989:62–63).

An instructive comparison to table 5.1 is provided by table 5.2, which is identical in format but concerns the much smaller standard dihedral burin sample from the Raysse Perigordian 2-III assemblage. Again, the chi-square score shows a high level of statistical significance, and the phi value is even stronger than that of the 3-A sample in table 5.1. The marginal distributions of the two tables differ notably, however, indicating that the two

Table 5.2. Contingency table analysis of 2-III dihedral burins (tool sample). Cross-tabulation of Burin Profile and Support Type attribute sets.

	D1	D2	D3	D4	D5	
G-support	18 90.0	8 53.3	3 16.7	9 64.3	13 37.1	51 50.0
R-support	2 10.0	7 46.7	15 83.3	5 35.7	22 62.9	51 50.0
	20 19.6	15 14.7	18 17.7	14 13.7	35 34.3	102

$$\chi^2 = 24.32 \text{ (} p < .001 \text{)}$$

$$\phi = .488$$

samples have dissimilar modalities of trigon shape and blank morphology. The trigons of 2-III dihedral burins tend to have broader closing angles, and they are more often carried on robust blanks. Yet within the 2-III contingency table, comparison of the column percentages with each other and with the vertical marginal percentage distribution reveals essentially the same pattern of attribute interaction we saw in the 3-A sample. Again, narrow (D1) profiles associate with gracile G-supports, as do axial (D3) profiles with robust R-supports. And, again, medium-angled profiles, whether axial (D2) or lateral (D4), appear to interact almost randomly with the support types. Hence, despite differences in the relative popularity of their attributes, we can conclude that one and the same pattern of typological dynamics underlies variation among 3-A and 2-III dihedral burins.

It is important to note that the similarity of interaction in the two contingency tables does not necessarily call for their column percentages to approximate one another closely. For these percentages will vary according to how the support types are proportionately represented in the two tables as a whole. (In this comparison they differ because robust supports account for half of the 2-III sample but only one-third of the 3-A sample.) What is important is not that the tables necessarily resemble each other on a cell by cell basis but rather that they show similar kinds of internal patterning when their cells are viewed in the ensemble.

5.5.2 What do the results mean?

Attributal analysis within a contingency table has shown us a pattern that is undoubtedly meaningful in a statistical sense. But whether this pattern is typologically meaningful and, if so, how and why, are altogether different questions. The following chapters provide numerous examples illustrating how one goes about making typological sense from contingency table data. Of particular importance is the investigation of the dynamic typology of standard burins in §§ 6.3.2 through 6.3.4, whose point of departure is this discussion and which is expressly designed to serve as a case study of quantitative attributal analysis. This investigation will show how the analysis proceeds through a logical succession of stages and how it can be aided appreciably by making explicit certain typological notions that usually remain implicit—especially what we refer to as mechanical and geometric contingencies, the principle of economy in spalling, and the scale effect, respectively. While a sound working knowledge of the analytic format is essential, the task will succeed only if it is informed by typological insight born of empirical experience. It is in no sense an exercise in number crunching.

The question of typological significance raises two issues that deserve brief mention at this point. The first is that statistical analyses of this kind rarely, if ever, entail truly high levels of nonrandom attribute association. In other words, a large number of the artifacts involved in any given sample

represent purely random attribute combinations. Partly, this is because stone tools, being at once overwhelmingly utilitarian in nature and subject to extensive breakage and rejuvenation, are inherently noisy in comparison to many kinds of artifacts involving other raw materials and techniques. One might expect that stronger attribute clustering would be found, say, between vessel shapes and design elements among ceramics. Even more important, however, is the fact that it serves no useful purpose to employ statistical analysis in instances where attribute interaction is truly strong, that is, where the pattern is apparent at a glance to any trained observer. This is why the analytic procedures involved in dynamic typology are ordinarily brought to bear upon morphological variation only within the conventionally recognized morphological types rather than between them. It does not take a contingency table to show, for example, how endscrapers differ from perforators, or dihedral burins from truncation burins.

This brings us to the second issue. Because it focuses upon variation within the recognized types, attributal analysis in the form we pursue it is less likely to concern interaction between two variables involving the shaped working end or edge of the tool itself, the active part, than it is to concern interaction between one variable involving the shaped portion and another involving the blank that carries it. The table 5.1 cross-tabulation of Burin Profile and Support Type illustrates in fairly typical fashion how this interaction dictates variations in the distinctive morphology of pieces. Although they hardly figure on the type-list or count sheets at all, blanks obviously play an integral part in the design of stone tools. The questions their interaction poses concerning the role of geometric and mechanical contingencies in stone tool variation tend to be the preoccupation of dynamic typology as it is pursued here.

This interaction raises an important issue of typological theory about which considerable confusion reigns. It is a convenient heuristic to relegate blank production to the 'technological' stage of tool production and to reserve typology, or at least type-design, to the shaping of the active part itself. Some such distinction along these lines may have value in the realm of ceramics, where decoration might be

viewed as an aspect of artisanal behavior distinct from that of forming the vessel itself. In stone tools, however, it is erroneous and misleading. Repeatedly in the analyses that follow, just as in the preceding examples, we statistically see a causal correlation between some aspect of the shaped active part of tools and the morphology of the blanks that carry them, both of which are equally integral aspects of type-design. Furthermore, our statistical frame does not usually indicate the direction the causality takes, in other words, the intentions of the artisans. It alone does not tell us the degree to which knappers were passively affected by the contingencies inherent in burin manufacture or, on the contrary, systematically took advantage of them to achieve the desired effect. In short, simply because a given typological pattern is based upon a mechanical or geometric contingency is not grounds for arguing that its use is any less subject to culturally dictated design norms. The knappers who made the burin profiles analyzed in table 5.1 also made the blades that carry them.

5.5.3 Some statistical details

Certain additional aspects of the machinery of contingency table analysis deserve mention. A statistical purist might regard the table purely as a device for obtaining the bivariate distribution needed to calculate the chi-square test of significance (as it is used, for example, in comparing two frequency distributions taken from the count sheets). But here we convert it into a format that graphically depicts attribute behavior in an immediate and compelling fashion and which at the same time imposes a kind of logic of inquiry upon typological analysis that gives it a sense of direction and a methodological rigor lacking in more implicit approaches. Designing this format has involved considerable experimentation over the years, which has necessarily entailed wrestling (not always successfully) with the refractory statistical issues raised by contingency tables (Sackett 1989 in passim). And some statistical compromises have been adopted to give the table a user-friendly format.

Chief among these compromises is the use of percentages to show interaction patterns within the table. It bears stressing that precisely because they are common sense measures, using percents calls for more than usual statistical common sense. We

have seen, for example, that for two tables to exhibit similar kinds of interaction patterns does not necessarily require that their actual column percentages be closely similar. Whether or not they do exhibit such patterns can be an entirely different matter, depending upon their respective proportional representation of the attributes accounting for the table's rows. It should also be noted that, while the vertical marginal percentages constitute a kind of average distribution for these attributes, direct comparison of any given column's percentages with the marginal percentages can sometimes be misleading. Because the burin samples in the two tables distribute fairly broadly over the profile types, it is reasonable to assume when inspecting them that a cell whose percent is higher than that of its marginal equivalent involves a positive association. When attributally analyzing some typological groups it is possible, however, that most of the sample could actually fall into a single column of the contingency table, in which case that column's percentage distribution would differ only slightly from the vertical marginal distribution even though it dominated the sample as a whole. Obviously, correctly interpreting percentage data depends upon careful inspection of the absolute frequencies from which they derive.

Another point is that the percentages figured in the contingency tables used in this monograph are always column percentages. Normalizing the table in this manner for the column attribute set, rather than the row attribute set, is simply a convention of presentation and is not meant to imply that they are to be viewed respectively as dependent and independent variables. In preparing each table, we calculated alternative percentage distributions for the two sets and only subsequently decided which of them was to serve as the column variable according to which of the two percentage displays seems to most clearly reveal patterning in the data.

Percentages can, of course, be misleading when they are generated from small samples. Hence, a convention must be adopted for deciding where to omit them altogether because of the possible distorting effects of sampling error. Our rule of thumb is that, to be represented by percentages, a sample must be large enough that, were its members distributed randomly, at least ten items would appear in each category of the table involved. For example, a

sample size of at least 100 items is required for percentages to be indicated in the ten cells making up the contingency table used for cross-tabulating Burin Profile and Support Type among dihedral burins (tables 5.1, 5.2). They are, therefore, omitted in the dihedral burin table for the 6-M sample, which comprises only 53 specimens (see table 9.19); this number is, however, sufficient for percentages to be retained for the marginal distributions. But the corresponding dihedral burin sample from the 4-B assemblage is so small, 21 specimens, that even the marginal percentages must also be omitted (see table 9.26).

It is the job of chi-square to assess the potential role of sampling error in the actual distributions from which the percentages are derived. But a trustworthy chi-square might not be obtainable where sample size is small and/or is distributed in a highly uneven manner in the contingency table. The problem is sometimes resolved by entering so-called corrections for continuity when calculating chi-square. (Here, as in most matters involving this statistic, we follow the practices advocated by Blalock [1960].) Often, however, we must simply omit the chi-square score along with the phi coefficient derived from it. This is true of the contingency tables for the 6-M and 4-B dihedral burin samples mentioned above. It is noteworthy that these tables still provide useful graphic displays, even though they are bereft of their statistical measures and either most or all of their percentages. Inspecting them reveals that the pattern of attribute interaction we have seen in the 3-A and 2-III samples definitely seems to recur among 6-M burins and that the behavior of the bivariate distribution of the quite small 4-B sample is at least consistent with it.

One additional issue deserves mention: multivariate attributal analysis, that is, the simultaneous statistical manipulation of three or more attribute sets. The issue has generated considerable debate and nearly an equal amount of confusion due in part to the fact that statistical sophistication does not always come joined with a sound sense of what is practicable or even desirable in lithic systematics. Readers who are interested in the question should pursue the matter (the discussion and bibliography provided in Sackett 1989:73-77 may constitute a useful starting point). Those who are not can rest

assured that truly interesting and important multivariate questions of lithic variation can usually be resolved by the bivariate techniques advocated here if care is taken to design attribute sets well and to tackle the analysis in a logical progression of steps. It bears pointing out that our discussion of dihedral burins actually constituted a three-way multivariate problem, because the two variables of Burin Profile and Support Type were joined by a third—assembly sample (that is, 3-A and 2-III). Matters were simply presented in such a way and in such an order that bivariate statistics sufficed to do the job. And this was only possible in the first place because, as has been noted, the Burin Profile set itself is designed to amalgamate the attributes of two distinct aspects of trigon variation—closing angle and biseau position—that at first glance might more logically seem to lend themselves to organization into two distinct sets. That they were not so organized is due to analytic foresight born of even more analytic experimentation. (The Support Type set also happens to be an amalgam of two different aspects of blank morphology, blank width and the blade-flake distinction, that are usually analyzed separately [§6.2.3].) It illustrates our earlier remark that the design of attribute sets tends to call for far more work than is entailed in actually using them once the system has been decided upon.

5.6 Use of an attributal approach by other researchers

Several others have experimented with an attributal approach to analyzing Paleolithic assemblages. What we have termed attribute description, now widespread among French prehistorians, often entails sets of sophisticated design. We should like to think that the move toward an analytic frame for attribute analysis along the lines of our own will be seen as simply the next logical step in their use. To the extent it is pursued in France, however, formal statistical analysis of attributes is largely restricted to researchers interested in the role of computers in archaeological databanks and the design of descriptive artifact codes for cataloging purposes. But when it comes to typology, such interests seem to take one in the direction of multivariate clustering techniques, which computers happen to do well but

which fail to provide an explicit picture of artifactual variation that a journeyman typologist is likely to find satisfactory (Djindjian and Vigneron 1980; Gaucher 1983).

A. Bietti may be the only European Paleolithic archaeologist who employs contingency tables and chi-square in a straightforward manner to test association patterns among attributes (1974–75; 1976–77:337ff; see also Sackett 1966). Like the writer, he took as his point of departure the pioneer work of Spaulding (for example, 1953), and his logic of inquiry seems to be essentially the same. His work reflects a sound appreciation of the utility of attributal analysis to everyday typological investigation. Our only criticism is that it does not go far enough. Particularly in view of his expertise as a lithic typologist and the excellent collections at his disposal, Bietti would achieve even more valuable results if he explored more rigorously the potential of his statistical format and, even more importantly, experimented more ambitiously with the design of appropriate attribute systems.

The United States has seen the attributal approach incorporated into the monumental industrial analyses of the lithic collections from the major rock shelter of Abri Pataud in the Black Perigord (for example, Bricker and David 1984; David 1985). The authors of these studies are colleagues of this writer, yet the Pataud and Solvieux systems evolved essentially in parallel with relatively little methodological exchange. The contrast between our two approaches is therefore fairly basic and of some interest.

In the Solvieux analysis, we tend to see patterned variation among stone tools essentially in the terms in which it is regarded by conventional artifact typology. We employ an attributal approach to give more rigorous definition to this patterning and to help explain the dynamics underlying it—especially as these dynamics involve interaction between the active part and the blank, that is, the support that carries it. Though designed with care, our attribute sets are relatively few in number and comprehensive in scope—qualities that pre-adapt them for cross-tabulation and analysis in a contingency table. The Abri Pataud researchers, on the other hand, accept conventional typology pretty much as it stands, arguing that the important new things to be learned

require going beyond its reach into the 'subtypological' level of variation among stone tools. Their approach calls for employing a large number of quite specific, narrowly defined attribute sets, frequently metric rather than nominal in character, and often concerning areas of typological detail that are conventionally ignored or treated only anecdotally. These sets tend to partition an artifact sample too finely for it to tolerate cross-tabulation and analysis in a contingency table. As a result, although their arguments are statistically sophisticated, the Pataud workers more often than not must base them upon elegant versions of attributal description. And when they do formally analyze attribute interaction, this interaction probably more likely involves patterning within the active part than between it and the support.

In sum, we use attributes to extend the reach of conventional typological analysis, while they use

attributes to create an independent, subtypological approach to artifact variation. In doing so, we go for the forest, they for the trees. Perhaps we run the danger of using too little information, but at least we retain an image of the artifact in the mind's eye. Perhaps they are in danger of using too much, and consequently of producing an overly fragmented picture in which the artifact is lost among the details of its component parts. By their standards, we may codify artifactual variation in terms so general as to obscure the meaningful details. By our standards, they codify variation in too many, often overlapping, ways, running the risk of mistaking redundancy of measurement for meaningful attribute patterning. They perhaps also codify it at too high a level of detail, running the risk of spurious accuracy. The next researcher who undertakes a large-scale attributal study might profitably begin by exploring this comparison in greater depth.

6

Typological System

We turn now to the terms and format in which the typological makeup of the Solvieux assemblages are analyzed in the chapters that follow. Each typological family is reviewed here with respect to its component morphological types, the attribute sets used in conjunction with them, and the way these are employed in its analysis. The major problems and results entailed in pursuing the family's dynamic typology are also discussed. This chapter then both describes the system in which the individual assemblages are analyzed and anticipates much of the principal results of this analysis. It helps provide structure and continuity to the chapters that follow, preventing the mass of piecemeal data with which they must deal from obscuring the more general typological patterns at work in Solvieux's industrial variation. At the same time, this chapter constitutes an essay on Upper Paleolithic typology and typological analysis in its own right, whose interest and significance should extend beyond that of the Solvieux assemblages themselves. Before turning to the typological groups themselves, we review combination pieces and the nature of blanks.

6.1 Combination pieces

Combination pieces bear two distinct tools, ordinarily at either end of the blank. They are referred to as "composite" when the tools belong to different typological groups (for example, scraper + burin), and as "multiple" when they are of the same group (for example, burin + burin). It is common practice

to refer to some multiples, particular the scraper + scraper combination, as "doubles." The term is also used here to refer to those multiple burins whose members belong to the same specific type (for example, dihedral + dihedral).

Combination pieces behave so consistently in the Magdalenian and Raysse Perigordian assemblages that one can speak of a generic pattern. In fact, with one exception, no statistically significant differences in either their relative frequencies or internal association patterns are seen among Solvieux's industries. The exception is the Raysse burin, a highly agglutinative type that has a marked propensity to join with itself and other burin types, thereby producing elevated frequencies of multiple pieces in any assemblage in which it appears.

Composites are dominated by the scraper + burin combination, which is not surprising because its component tools represent the numerically richest typological groups of the common assemblage of standard types. As standard burins always outnumber endscrapers by at least four to one, however, the two groups are disproportionately represented among composites: at least 20% of all endscrapers in an assemblage derive from this combination, whereas it accounts for little more than 5% of all standard burins. The latter, in contrast to endscrapers, show a marked propensity to form multiples among themselves. Dihedral and truncation burins enter into composite pieces in proportions roughly commensurate with their representation in the standard burin sample as a whole. Break burins,

although their relatively fewer numbers can make generalization difficult, seem particularly prone to join in combination pieces of all kinds. Within any given sample of multiple burins, truncation (and, when present, Raysse) burins are more likely to associate with their own kind in double pieces.

Tools belonging to the other standard typological groups represented among the composite categories on the type-list are too few to exhibit obvious combination patterns. It appears, however, that perforators and truncations join composites in the same proportions that standard burins do but avoid multiples with their own kind.

There is nothing distinctive about the blanks that carry combination pieces except that, for obvious reasons of geometry, they avoid extreme forms such as amorphous flakes and particularly narrow blades. Because the incidence of breakage among single piece burins and endscrapers tends to increase as blank width decreases, it might be expected that combination pieces would tend to be wider than average. That this seems not to be the case is presumably because wider blanks tend to be somewhat less regular in shape than narrower ones and consequently less likely to possess two ends suitable for carrying a tool. The tools found on combination pieces differ in no respects from their brethren on single ones, and they conform entirely to the typological dynamics appropriate to their group. This conformance, along with the lack of significant differences in their blank morphology, makes it reasonable to join the individual members of an assemblage's combination pieces with its single pieces to form tool samples for describing and analyzing the assemblage's typological makeup.

Do combination pieces have special functional significance? The popularity of the scraper-burin combination is intriguing in this regard, but its meaning is moot. It is also tempting to speculate that combination pieces represent an economy of effort in lithic technology. For example, an entirely plausible explanation of multiple, particularly double, pieces is that they represent a sequential use of a blank whereby a heavily worn or broken tool is replaced at the opposite end by a new one of the same or similar typology (Bricker and David 1984:75). The Solvieux assemblages fail to confirm this interpretation, however, as exhausted tools are

no more common among their combination pieces than among their single ones.

6.2 Blank system

Six attribute sets refer not to tool types themselves but to the blanks that carry them. Although the variation they codify barely figures on the type-list or count sheets at all, these sets crosscut most of the typological families and are integral to their design. Given the significance attached to the role of the support in our approach to typological dynamics (§ 5.5.2), the first three of these sets, which codify related aspects of geometric morphology of blanks, are regarded as basic. These are Blank Variety, Piece Width, and Support Type. The remaining two sets are Marginal Retouch and Flint Type (that is, mineralogy).

6.2.1 Blank Variety

The Blank Variety set is essentially an elaboration of the conventional distinction between blades and flakes: in short, a blank whose width is less than one-half its length is a blade, whereas one whose width exceeds this 50% ratio is a flake. Because the principal typological importance of blanks concerns their state at the time when the tools they bear were manufactured, coding requires that one attempt to extrapolate this original state from their current one. Experienced typologists believe they can do this with considerable accuracy, particularly with laminar blanks whose cross section and fairly regular subparallel margins and ridges indicate they were produced by a prismatic blade-core technique. Their task can be aided by the two templates illustrated in figure 6.1. The first distinguishes width/length ratios of 50%, the boundary line between blades and flakes; the second distinguishes widths that are equal to or greater than 80% of length, allowing one to separate particularly stubby "square" flakes (which in fact are as often roundish) from the more usual short but still axial standard flakes produced by Upper Paleolithic knappers.

Figure 6.2 illustrates the full Blank Variety attribute set used on the basic code sheets. This set provides a far more detailed breakdown than could practicably be employed once typological analysis progresses beyond its initial stage. But it shows the

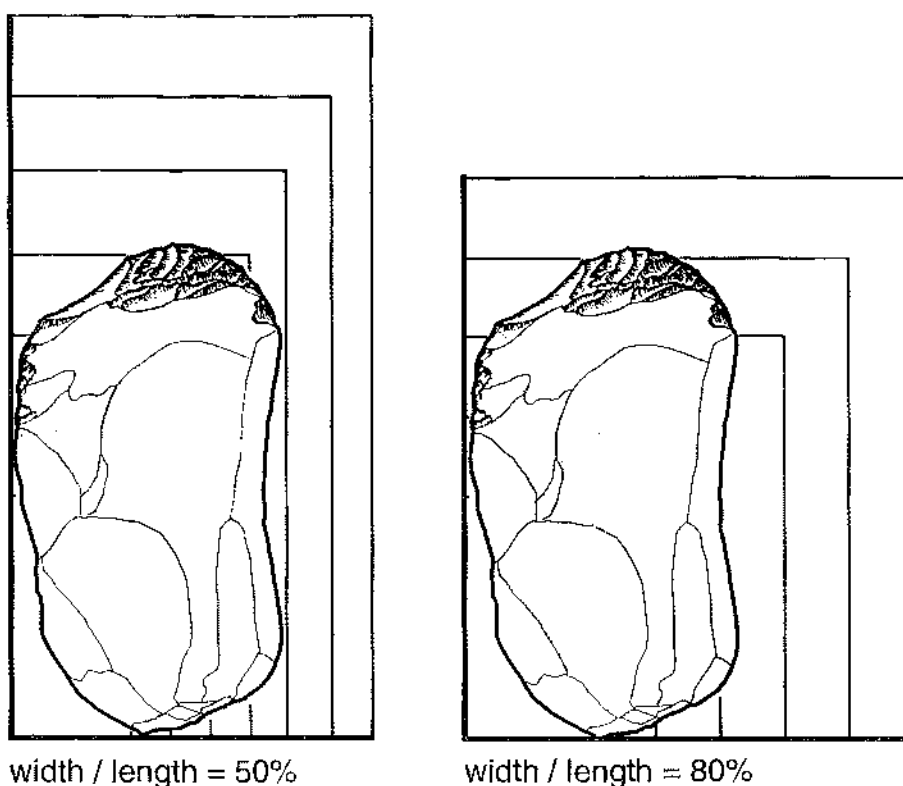


Figure 6.1. Templates for distinguishing the width/length ratios of blades and flakes. This endscraper has the dimensions of a standard flake.

decisions that need to be made if the noisy and ambiguous realm of observable variations among blanks is to be reduced systematically to the highly idealized typological distinction between blades and flakes. Particularly important is the subdivision of flakes into quasi-, standard, and square forms. As we have seen, the distinction between standard and square flakes is simply dimensional. But the quasi-flake is distinguished by its aspect. It refers to those ambiguous pieces that defy reasonably confident assignment because they combine the proportions of a standard flake with parallel margins and dorsal ridges appropriate to a blade. While some researchers assign it separate typological status as the 'flake-blade' (for example, Movius et al. 1968:4–5), we find the quasi-flake behaves like any other standard flake when cross-classified in contingency tables. Therefore it can pragmatically be regarded as part of the general flake domain of blanks for purposes of typological analysis (see chapter note 2).

Modifier designations may be appended to the blank categories during the coding operation, of

which two are particularly important. One is *nl* (nonlaminar), indicating blanks that dimensionally qualify as blades but do not constitute typical prismatic removals; most of these are either large spalls or core-rejuvenating crested blades. The other is *C*, indicating a chunky blank, one whose vertical thickness exceeds 1.25 cm at the point where it is intersected by the retouch that produces the active part of the tool.

6.2.2 Blank Width

The Blank Width set categorizes what may be defined as the maximum width of a piece taken perpendicular to its long axis, disregarding any irregularities in its margins. It attempts to characterize the effective, or essential, width of the blank as it appears to a practiced typologist's eye. Although this characterization, like most metric measurements of stone tools, involves an element of arbitrariness, it can be done satisfactorily so long as reasonably generous width intervals are recognized. Width is determined by placing the piece on the

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1. **Blade**—a blank whose length/width ratio at least ideally meets the 50% criterion. Blades are codified according to the following subcategories, which reflect their current condition and—where necessary—one's inferences regarding their original state at the time the tool they bear was manufactured:

- 1w Whole: retains butt (or in rare cases the original distal end) and meets 50% width/length ratio
- 1p Partial: end opposite tool is broken, but piece as a whole still meets the 50% ratio. (Of course, it is usually impossible in the case of these and other broken pieces to determine whether the break took place prior or subsequent to tool manufacture.)
- 1s Segment: broken and fails to meet the 50% ratio, but its general morphology suggests beyond a reasonable doubt that it was originally a blade
- 1ws Whole-short: butt is present and it fails to meet 50% ratio but morphology suggests originally a blade

2. **Bladelet**—a blade whose width is less than 1.5 cm

- 2a Width closer to 1.0 cm than to 1.5 cm
- 2b Width between 0.5 cm and 1.0 cm
- 2c Width is less than 0.5 cm

3. **Quasi-flake**—a piece whose width/length ratio falls into the 50% to 80% bracket but whose overall aspect suggests that the blank may originally have been a blade before the tool it bears was made. The purpose of this category is to code those ambiguous pieces that defy reasonably confident assignment by the typologist because they associate flake proportions with essentially blade-like morphology. (A similar function is played by the "flake-blade" recognized by Movius et al [1968:4-5] although its precise defining criteria are somewhat different from those used here.) In actuality, statistical analyses demonstrate that this category fairly consistently behaves like the following two unambiguous flake categories in dynamic typology, and thus on pragmatic grounds it can safely be regarded as part of the general "flake" domain of blanks.

- 3 The piece is broken (which of course is most often the source of the ambiguity it presents)
- 3w The piece is whole but retains its ambiguity; this subcategory differs from 1ws above in that the latter's general aspect more clearly suggests the original blank was a blade

4. **Standard flake**—the blank reasonably falls into the 50% to 80% bracket and, even if essentially laminar, its overall aspect fails to suggest it originally possessed blank dimensions.

- 4 End of piece opposite tool is broken
- 4w Whole: retains the butt
- 4ws Whole-short: width/length exceeds 80% but morphology suggests originally a standard rather than a square flake

5. **Square flake**—width exceeds 80% of length. These are normally whole and generally non-laminar in appearance. Some cases possess width actually exceeding length and comprise side-struck flakes whose outline is more triangular than squarish.

6. **Miscellaneous**—blocks, irregular spalls, and other atypical forms. These are sufficiently rare as not to require formal coding designations.

Figure 6.2. Coding Blank Variety

simple template shown in figure 6.3 and taking closer-to measurements at 1 cm intervals. In other words, blanks codified as 2 cm wide fall between 1.5 and 2.5 cm, while a 3 cm wide blank lies between 2.5 and 3.5 cm in width. The combination of closer-to measurements and 1 cm intervals allows for reasonably consistent coding while avoiding the spurious accuracy that more exacting attempts at measurement often entail.

Of course, the attributes of the Blank Width set bear a geometric and, given the inherent properties of flint, mechanically contingent relationship to those of the Blank Variety set. This relationship becomes apparent whenever they are cross-tabulated, as in the case of the standard burin sample from couche 3-A (table 6.1): despite numerous exceptions, blades clearly tend toward narrowness and flakes toward breadth. It is self-evident that the two sets interact so strongly because they happen to be closely related, indeed partially redundant, measures of the overall geometry of blank morphology. As we will see, this point is confirmed by the fully predictable and complementary manner in which they yield similar results in analysis when independently cross-tabulated with sets dealing with aspects of tool morphology, such as the outline profiles of burins, perforators, and truncated pieces.

6.2.3 Support Type

In view of this last point, the needs of general typological description and statistical analysis obviously would be well served by an attribute set for supports—that is, the blanks that carry tools—that combines the essential features of Blank Variety and Blank Width into a single expression of overall blank morphology. What is called for is a set of blank attributes that emphasizes blades and narrowness on the one hand and flakes and wideness on the other—in other words, gracile and robust support types, respectively. Inspection of the cross-tabulation of the Blank Variety and Blank Width sets presented in table 6.1 (as well as the many additional versions of this same table used for other piece samples¹, for example, tables 7.12, 7.15, 7.18, and 7.22), along with considerable additional experimentation that need not be detailed here, indicates that the best and most consistent results are obtained

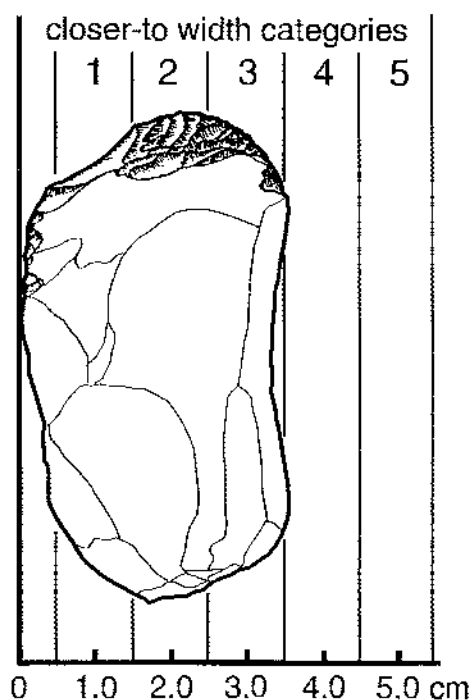


Figure 6.3. Template for determining blank width. This endscraper qualifies for the 3 cm width category.

by combining them in the most obvious manner into two support types:

G (gracile)-support:

all 2 cm-wide blanks (whether blades or flakes) plus 3 cm blades

R (robust)-support:

all blanks (whether blades or flakes) 4 cm wide or wider plus 3 cm-wide flakes. Where useful, this category can be subdivided into distinct R1 and R2 attributes, as indicated by the dashed line in table 6.1

It should be noted that the flake category here merges quasi-, standard, and square flakes into a single broad class. Unless otherwise indicated, the term “flake” is henceforth used generically to refer to this class.²

This Support Type set recommends itself because of its simplicity, economy, and comprehension and because of its analytic utility across nearly the entire spectrum of typological groups. It standardizes the comparison of support morphology between assemblages in a more meaningful fashion

Table 6.1. Cross-tabulation of Blank Variety and Blank Width among 3-A standard burins (piece sample)

	Blade	Flake	Square Flake	
2 cm	184 31.9	5 2.7	0 —	189 24.0
3 cm	283 49.1	82 44.8	5 17.9	370 47.0
4 cm	100 17.4	76 41.5	12 42.9	188 23.9
≥ 5 cm	9 1.6	20 10.9	11 39.3	40 5.1
	576 73.2	183 23.3	28 3.6	787

G-supports: 60.0%

R-supports: 40.0%

Average width = 3.10 cm

 $\chi^2 = 185.86$ ($p < .001$) $\phi = .486$

Note: Solid line demarcates G- and R-supports;
dashed line demarcates R1- and R2-supports

than either blank width measurements or the distinction between blades and flakes can do alone. At the same time, it meets all the criteria called for by the statistical demands of attributal analysis (§ 5.4.2).

Support Type has two additional properties that make it especially useful in the last regard. One is that it generates a frequency distribution that is reasonably balanced numerically, especially in comparison to the highly skewed distribution yielded by the blade-flake distinction basic to the Blank Variety set. This balance reduces the chances of distortion through sampling error or through failure to meet the continuity requirements of chi-square when working with contingency tables based upon samples of modest size. Its second special property stems from the fact that the attributes of Blank Variety and Blank Width complement each other in such a manner as to have an additive effect when they are joined to form the more comprehensive attributes making up Support Type. Considerable experimen-

tation indicates that a stronger interaction pattern is more likely to emerge in contingency table analysis when overall blank morphology is represented by the Support Type set than by either Blank Variety or Blank Width. In short, apart from the roles it plays in simplifying and standardizing the attributal definition of blank morphology, Support Type enhances the clarity of results obtained in analyzing typological dynamics.

6.2.4 Marginal retouch

Nicking, squilling, and nibbling, presumably the stigmata of both use and postdepositional abrasion, commonly appear on the margins of tool supports at Solvieux. Except in the case of bladelets, it can be ignored for purposes of morphological typology. Also safely ignored is more conventional retouch that appears only sporadically along the margins of tools or that regularizes their supports in immediate proximity to the butt. For a piece to be referred to as marginally retouched requires that enough of its

margin(s) be involved so that, had it not born a regular tool, it would still qualify as a marginally retouched piece as this is defined in § 6.10.

Continuous marginal retouch that meets this criterion occurs only rarely to moderately at Solvieux. It is mostly of the banal standard variety, whose specific expression depends as much upon the size and shape of the blank receiving it as upon the absolute magnitude of the spalling itself. For purposes of description, it can be divided into light and heavy types, the latter entailing both heavier spalling and greater invasion (that is, mounting) of the dorsal face. Only occasionally does the latter encroach sufficiently upon the cross section of the blank to attain the lower limits of Aurignacian retouch. Abrupt retouch also appears, which is the opposite of standard in the sense that its spalling is directed essentially vertically and it consequently bites into the edge of the margin without invading the neighboring portion of the dorsal face. Again, light and heavy types can be recognized, the former being distinguished from nibbling only with difficulty in the case of particularly gracile blanks.

6.2.5 Flint type

Several varieties of flint in Solvieux's couches are distinctive but rare. These include a coarse-grained gray variety found in local Campanian limestone, a rather striking white flint resembling porcelainite, and a number of distinctively banded flints aside from the rainbow type defined below. In contrast to some of the other Neuvic sites, jasper or chalcedony is rare, and silicified wood is absent altogether.

Three types of flint are numerically important: black, brown, and rainbow. Their description calls for more than usual attention to how they are modified by patination, which can cause any given type to assume quite different aspects from one couche to the next (or, indeed, in different parts of one and the same couche). Correctly identifying the types therefore calls for considerable hands-on experience.

Black flint appears throughout Solvieux. Except when altered by freezing, it is fine-grained and lends itself to delicate retouch. Its nodules, smaller than those of the brown flints discussed next, contain two zones: one of more or less unrelieved black and the other grayish and charged with dirty beige splotches representing inclusions of somewhat coarser tex-

ture. Essentially black when fresh, this flint attains a bluish-gray or even dirty white appearance when patinated. Black flint is ubiquitous to gravels in the Neuvic area (including Tertiary deposits on the plateaux, colluvial gravel lines, and river terraces), which presumably accounts for the smooth and worn cortex of its nodules. Two or three additional varieties of black that occasionally appear at Solvieux, in particular one with a salt-and-pepper aspect and somewhat coarse texture, presumably derive from local limestones.

Brown flint is also ubiquitous to Solvieux, as well as to the other Neuvic sites. This classic zoned brown *silex rubané* of the region, often referred to as Bergerac flint, derives from outcrops of Maestrichtian limestone. Its reasonably fine-grained texture and large nodule size make it especially favorable for knapping. The name of its common variety is Ivy League (a term that seems to have established itself in excavation records shortly after a site visit by Hallam L. Movius, Jr.). Ivy League nodules possess three distinct zones whose interfaces are highly irregular, convoluted, and occasionally diffuse. They may ideally be visualized as a dark brown or caramel colored zone at the center of the nodule, englobed within progressively thicker lighter brown and yellowish-brown zones. This flint patinates quickly, enhancing the differences among the zones and simultaneously entails major changes in color, sometimes in the direction of tan but often involving a generally bluish or even purplish aspect. Patination also brings progressive mottling that ultimately results in a vermiculated surface. The most likely source of Solvieux's Ivy League flint is a major detritus slope of decomposing Maestrichtian limestone located across the Isle River from Solvieux just upstream from Mussidan.

Rainbow is a similarly textured variety of Bergerac flint that is virtually restricted to one archaeological horizon, the Early Magdalenian couche A. Its specific source is unknown, but in view of its quantity in that couche, must lie somewhere in the Neuvic sector. Elsewhere in the sector it appears only at La Croix de Fer, which is also a raclette Magdalenian station. In contrast to Ivy League, the concentric zones of color that make up rainbow are sharply and regularly differentiated and often internally banded. A lavender zone, surrounded by a

thin but distinct band of white, invariably appears at the core of the nodule. This is, in turn, enveloped by broader zones of yellowish or tannish or brownish aspect within which distinct narrow bands appear against a lighter background. These are generally yellow, but reddened toward the exterior of the nodule. A distinct grayish zone sometimes encapsulates the whole. In rainbow, just as in Ivy League, colors are strongly altered by patination, but in rainbow this usually entails marked fading of their intensity. Because of such changes in color, the two varieties become more difficult to distinguish as the degree of patination increases. For individual pieces of rainbow to be correctly identified, the diagnostic white banded lavender zone must be present, or, to the more experienced eye, the more convoluted zone borders that typify Ivy League must be absent.

Sidewalk is a special flint type largely restricted to the Middle Magdalenian couche II. Its aspect is highly distinctive, ranging from blond to brown and densely spotted by mica grain inclusions (the reason why it appears in Gaussen's writings as *silex pailleté*). Paradoxically, these spots appear light and brilliant against a dark background in relatively fresh pieces, but with patination they darken to brown as the background progressively lightens toward creamy white. Sidewalk comes in very large nodules whose cortex is thick and corrugated and whose texture ranges from somewhat coarse to quite grainy. In view of the size attained by many tabular blocks of sidewalk in couche II, the source of this distinctive flint presumably lies not far from Solvieux. It is very rare or absent altogether in the other Neuvic sites.

6.3 Standard burins

Standard burins comprise the dihedral, break, and truncation forms that commonly appear in all regional Upper Paleolithic industries. They receive particular emphasis here because of their very banality, that is, because they constitute by far the numerically best represented typological group whose members are shared by all Solvieux type assemblages. In every case, they comprise 30% or more of the global piece sample, at least 40% of the global tool sample, and always exceed 60% of the

banal assemblage as this is inventoried in the common toolkit (§ 5.3.4). They therefore constitute the best basis, in fact the only consistently trustworthy statistical one, for comparing the assemblages on common typological grounds. They can provide measures of similarity and difference among the Solvieux assemblages that are just as strongly expressed, as well as entirely consistent with, those based upon the full type-list (including the *fossiles directeurs*). For these reasons they call for extended treatment here.

6.3.1 General

The system

Our system for standard burins is designed not to introduce a new body of notions but rather to give more rigorous organization to those already established in the literature and, in turn, to illuminate their typological dynamics. Conventional burin typology basically entails taking into account simultaneously two different domains of formal variation. One concerns the distinction between dihedral, truncation, and break burins. These three classes are referred to here as burin "varieties," and for analytic purposes can be regarded as comprising what is called the Burin Variety attribute set. The other domain is the outline form or silhouette of the working end, or trigon, of the burin. We have seen that conventional practice fails to provide a common or consistent format for codifying the trigon, which is why we designed the Burin Profile set described in § 5.4.3. A third domain is called for by our analysis of the typological dynamics of standard burins—the morphology of the blanks upon which burins are fashioned. That conventional practice fails to deal with this systematically is a serious oversight in our view. The nature of the blank accounts for much of the patterning observable within the burin varieties and profiles when they are studied individually, and it also mediates between the two when their joint behavior is taken into consideration. Blank morphology is represented here by the Support Type attribute set defined previously (§ 6.2.3).

These three sets—Burin Variety, Burin Profile, and Support Type—together provide a considerably more comprehensive and refined system for typological analysis than can be achieved by type-list

categories. Hence, the standard burin types recognized on the Solvieux list serve only for inventory purposes on the count sheets. They are nonetheless defined in more rigorous and systematic fashion than is usually the case, however, in terms of specific combinations of the attributes that make up the Burin Profile set (see figure 5.3).

Atypicality and other observations

All standard burin samples include specimens that fail to conform to the conventional dihedral/truncation/break divisions. Although morphologically distinctive, they are usually of minor importance numerically. We therefore follow the customary practice of regarding them as atypical forms of the major varieties rather than distinctive ones in their own right. They might be regarded as typological suburbs scattered around the densely populated centers occupied by typical burins.

Atypicality is a subjective assessment and one difficult to quantify, because what could be judged as atypical in one burin sample might be characteristic of another. There are, however, certain conventions for recognizing atypicality. Thus, the range of atypical forms of dihedral burins can usually be exhausted by the following not always mutually exclusive terms. In a "minimal" dihedral burin, one or both burinated facets is rudimentary in the sense that it lacks the length and/or degree of encroachment appropriate to the blank. In a "maladroit" specimen, one or both facets is particularly crude or malformed; common here is a "chopped" facet made by one or more heavy spalls that hinge off in close proximity to the biseau. An "exhausted" specimen may once have been typical, but it was subsequently rejuvenated so frequently, extensively, or poorly as to have assumed an atypical form. In a dihedral burin on an "adopted edge," one side of the trigon is a pre-existing surface of the blank. Most often this is a broken edge (whose placement and/or obliquity does not qualify it for a B5 break burin) or a naturally beveled margin, or "flank," that lies sufficiently acute to the ventral plane to create an acceptable biseau at the point it is intercepted by the opposing spalled facet. Admittedly, some specimens that suggest either of these conditions may be intentionally spalled facets that lack the characteristic

ripple marks, shape, or orientation that characterize their more typical brethren.

Because their manufacture offers greater opportunities for controlled spalling, atypicality is rarer among truncation burins. But it does occur, often in minimal, maladroit, and exhausted forms analogous to those seen among dihedral burins. Among truncation burins the counterpart of the adopted edge is the "miscellaneous retouched edge," which can comprise ordinary marginal retouch, a former scraper front, or the margin of a core rejuvenation crested blade. An additional atypical category peculiar to truncation burins is the "one-blow truncation," consisting of a single heavy flake scar involving the thickness of the piece; the ventral edge of the scar may be lightly modified by retouch, but this retouch is insufficiently encroaching to accommodate the full width of the burinated facet that intersects it.

It will suffice to regard these distinctions as observations rather than trouble to organize them into formal attribute sets. Other observations include, but are not limited to, whether a burinated facet bears single or polyhedral spalling, whether a biseau is wide enough (≥ 1 cm) to qualify as "chunky," and whether the trigon of a truncation burin is symmetric or asymmetric. For obvious reasons of geometry, this last distinction largely concerns skewness in axial medium- or wide-angled (T2 and T3) profiles.

Break burins

The break burin recognized on the type-list possesses the broad lateral (B5) profile of a *burin d'angle*. Burins on breaks whose trigons describe other profiles are regarded as atypical forms of dihedral burins. This practice is pragmatically justifiable in that the latter are never numerous and often cannot be distinguished with confidence from dihedral forms that are poorly spalled or made on adopted edges. The conventional break burin with a B5 profile does seem to stand out as a distinct morphological type, on the other hand, both in terms of its typological divergence from regular dihedral and truncation forms and its quantity. Its numbers tend to be at least as great as the average among individual profile types in the other two burin varieties.

Because they are restricted to a single profile type, break burins cannot be subjected to the analytic format used to define the dynamic typology of dihedral and truncation burins discussed below. Their dynamics can, however, be easily summarized. They make up quite a heterogeneous lot whose only consistent typological theme is expediency. For example, in those burin samples where dihedral and truncation forms tend to associate differentially with G- and R-supports, break burins combine with them in strictly random fashion. Moreover, they appear proportionately more often on multiple and composite tools than do the other two burin varieties. Such things give them an opportunistic, ad hoc air. It is noteworthy in this connection that break burins play their least important numerical role in Solvieux's technologically most proficient burin sample, that of the Early Magdalenian I/II assemblage, even though they are five times as common here among multiple and composite pieces than are dihedral and truncation burins. On the other hand, they are more than twice as common in burin samples of the Raysse Perigordian industry, where standards of execution seem to have been more relaxed.

6.3.2 Dihedral burin dynamics

We now analyze how the trigon profiles and support types interact among dihedral and truncation burins. Our database comprises the very large samples provided by the Early Magdalenian 3-A assemblage. Although closely reasoned, the argument of this sec-

tion can be followed easily if it is read in conjunction with both the earlier review of contingency table analysis (§ 5.5) and the richly illustrated analytic descriptions of 3-A standard burins provided in the next chapter (§§ 7.2.2 and 7.2.3).

Table 6.2 is the contingency table for 3-A dihedral burins. The sample is the same as that used to introduce the format of attributal analysis (see table 5.1), but in table 6.2 a third row has been added (increasing its number of cells from 10 to 15). The reason for this expansion is that the robust R-support category has been divided into two subtypes: R1-supports and R2-supports. This expanded table provides interesting details about the interplay of burin profiles and supports that are obscured in the more condensed table 5.1. (Given that R2-supports account for less than 4% of the total, obviously it is only the very large size of the 3-A sample that allows us to use the expanded format; had a smaller sample been used, the third row would be so lightly populated as to impair the value of the table.) Chi-square indicates an extremely high level of statistical significance, and the phi value is relatively strong. Obviously, the pattern of interaction seen in table 6.2 is well worth talking about.

Inspection of the table begins with the three axial profiles (D1, D2, D3), whose dynamics are revealed by their relative popularity and their specific interaction with the support types. The percentage distribution along the bottom of the table shows that the D1 narrow and D2 medium axial types considerably outnumber the D3 wide axial

Table 6.2. Dihedral burin dynamics: 3-A tool sample.
Cross-tabulation of Burin Profile and Support Type.

	D1	D2	D3	D4	D5	
G-support	118 91.5	90 64.8	18 26.1	58 70.7	37 51.4	321 65.4
R1-support	11 8.5	47 33.8	43 62.3	23 28.1	29 40.3	153 31.2
R2-support	0 —	2 1.4	8 11.6	1 1.2	6 8.3	17 3.5
	129 26.3	139 28.3	69 14.1	82 16.7	72 14.7	491

$$\chi^2 = 98.75 \text{ (} p < .001 \text{)}$$

$$\phi = .448$$

type. In fact, they account for well over half of the entire sample, which is, of course, consistent with the traditional *bec de flûte* conception of the dihedral burin. The interaction between the profile types and support types becomes evident in a row-by-row inspection of the individual column percentage distributions. This inspection reveals a clear-cut pattern of positive association between trigons with narrow closing angles (D1) and gracile G-supports, and between wide closing angles (D3) and robust R1- and R2-supports. Not surprisingly, although numerically important, the intermediate medium-angled profile (D2) combines essentially at random with the three support types: its column percentage distribution closely resembles the vertical marginal percentage distribution for the table as a whole.

This pattern reflects the geometric and mechanical contingencies inherent in stone tools, which constitute a kind of built-in material logic grounded in the properties of their raw material, how they were knapped, and to some extent, how they were subsequently modified by use-wear and/or rejuvenation. We see at work here what can be termed the PRINCIPLE OF ECONOMY in lithic typology, which governs much of the process of driving off the lamellar spalls that produce the opposing facets which frame the trigon of a dihedral burin. Obviously, this spalling is accomplished with the greatest ease and predictability when a minimum amount of the blank is removed in the process. A detailed explanation of precisely what is going on here in the artisanal domain is best left to more experienced stone knappers than the writer. It is sufficient for our purposes simply to recognize that fairly stringent limits exist regarding the amount that can be removed and the degree to which burination can be controlled successfully (figure 6.4).

Thus D1 profiles appear predominately on relatively narrow G-supports, from which the necessarily long spalls required to obtain the angle can be struck without actually removing much material or even without much, if any, prior preparation. But the facets produced by burination must become shorter and their closing angle proportionately wider if a dihedral burin is to be spalled on a more robust support with equal control, that is, if no appreciably greater amount of material is to be removed. Even granting some amount of preparatory nonlamellar

shaping of the trigon, we can expect that burin facets, as a rule, will correspondingly decrease in length and diverge at a correspondingly broader angle as blank robustness increases (particularly with respect to width). Not surprisingly, R-supports are found in less than one-tenth of the D1 specimens, in about one-third of those assigned to the D2 profile, and in more than two-thirds of those with D3 profiles. At the same time, burins bearing D1 and D2 profiles are plentiful and relatively well made, whereas D3 burins are far less numerous and, as we will see, far more likely to be asymmetric and/or atypical. A wide axial profile cannot in fact be easily achieved by the controlled lamellar spalling that at least ideally typifies dihedral burins.

The principle of economy also regulates the dynamics of dihedral burins bearing lateral profiles (D4 and D5). It is not surprising that the D4 medium lateral type shows at least some tendency to associate positively with G-supports. Even though one of its burin facets lies on or near the lateral margin of the blank, the opposing facet of its trigon must still be reasonably long if the closing angle is not to exceed 65° (the upper limit of a medium closing angle). Its controlled spalling therefore calls for blanks whose width does not exceed the average. An additional factor contributing to the modest association between the D4 profile type and G-supports is,

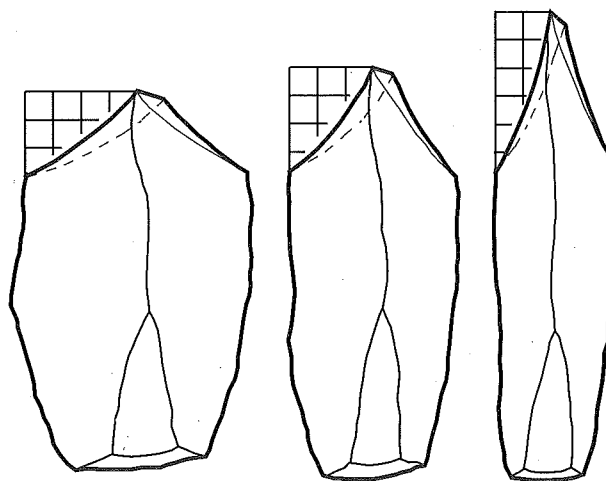


Figure 6.4. Principle of economy in burination. Assuming that the same amount of material is removed by spalling, dihedral burin facets will diverge at correspondingly narrower angles as blank width decreases.

however, that more than one-third of its members display what can be designated "quasi-lateral" trigons. These are specimens whose biseaux are positioned medially but whose trigons are heavily asymmetric in a manner that creates the overall silhouette of a *burin d'angle* rather than a *burin d'axe*. Quasi-lateral D4 burins can be robust, in which case polyhedral spalling is usually required to obtain the profile. But more often than not, they occupy supports that are sufficiently gracile that a single reasonably heavy spall can begin axially and yet still carry its facet far enough down the margin of the piece to produce the *d'angle* silhouette.

Such pieces illustrate a second principle of stone tool dynamics, the SCALE EFFECT, which works in tandem with the principle of economy and, in the case of gracile supports, plays an equally important role in governing typological form. Of concern here is that the outline geometry of smaller specimens tends to be more strongly affected by a given amount of spalling than that of larger ones. Thus, whereas the principle of economy concerns the absolute size a specific spall can attain and still be removed with control in a given typological situation, the scale effect concerns the relative impact such a spall will have in determining a specific piece's form.

Now, because asymmetry is common among medium-angled trigons in general and because drawing the line between ordinary asymmetric axial profiles and true quasi-lateral ones can be a fairly arbitrary business, the D2 and D4 profiles tend in practice to overlap. This intergradation is especially apparent in gracile burin samples, where the observable difference between the two profiles is relatively slight in any case and where, because of the scale effect, the two can account for fully half of their respective classes (as opposed to one-third in the fairly robust 3-A sample). It is also seen in more robust samples, however, in this case because many of their quasi-lateral D4 forms represent the respalling (that is, rejuvenation) of burins that originally had D2 silhouettes. In view of all this, it is reasonable to conclude that the distinction between D2 and D4 profiles is primarily useful for descriptive typology. Analytically, however, the two profiles should be regarded simply as alternative expressions of a pattern of typological dynamics

that involves medium-angled burins as a group. This conclusion is born out by close inspection of table 6.2, which shows that the two profiles interact with the support types in similar ways—a similarity that is especially apparent when viewed in contrast to the ways in which the other profile types interact with the supports.³

The D5 wide lateral profile stands comfortably apart from D4. Its dynamics are straightforward if somewhat complex. Assuming that the blank has previously been broken transversely in preparation, the two margins of the trigon to be spalled already describe a wide lateral outline: its burination may consequently require the removal of only a minimum amount of material. Hence, the D5 profile can, in theory, accommodate any kind of blank, which is why it appears proportionately much more often upon G-supports than does its broad axial counterpart, the D3 profile. Nonetheless, D5 still tends to favor R-supports; owing to the principle of economy, it is the only profile that is feasible if a dihedral burin is to be made on certain kinds of blanks. For in the case of many flakes and of especially large blades, controlled burination may be possible only if the burin facets are spalled more or less directly upon the preexisting margins of a transversely broken blank. In other words, a D5 wide lateral profile may call for a minimum of spalling with respect to the geometry of the piece as a whole, but it still will in fact require the removal of considerable material in the case of a particularly wide and/or stocky support.

Some specimens assigned to the D5 profile have quasi-lateral trigons, but they are much less frequent here than in the D4 profile. The reason is that average piece width is sufficiently wide among D5 burins to prevent ordinary burination, or even most respalling called for by rejuvenation, to encroach sufficiently toward the midline to produce an axially positioned biseau. Quasi-lateral forms account for only one-tenth of the members of this profile type, and few of them pose the question of intergradation with other profiles.

6.3.3 Truncation burin dynamics

Analysis of the 3-A truncation burin sample begins with the cross-tabulation table presented in table 6.3, which has the same format as the one used

Table 6.3. Truncation burin dynamics: 3-A tool sample.
Cross-tabulation of Burin Profile and Support Type (burins with
T6 and T7 profiles omitted).

	T1	T2	T3	T4	T5	
G-support	15 93.8	31 70.5	22 32.4	25 69.4	56 59.0	149 57.5
R1-support	1 6.3	13 29.6	37 54.4	10 27.8	31 32.6	92 35.5
R2-support	0 —	0 —	9 13.2	1 2.8	8 8.4	18 6.9
	16 6.2	44 17.0	68 26.3	36 13.9	95 36.7	259

$$\chi^2 = 31.77 (p < .001)$$

$$\phi = .350$$

for dihedral burins. Omitted here are the transversal T6 (semi-transverse) and T7 (transverse) profiles, which raise special questions to which we will return. The pattern of interaction between the profile types and blank types seen among dihedral burins recurs among truncation burins with only minor variations in emphasis. Yet the relative frequencies of the profiles themselves differ markedly. Truncation burins tend toward profiles with lateral biseaux (51% as opposed to 31% among dihedral burins) and wide closing angles (63% as opposed to 28%). These differences account for the shift in emphasis toward the right in the overall distribution of profile types, with wide lateral (T5) now the most important numerically. Not only are the axial profiles (T1 through T3) more poorly represented as a group than are their dihedral counterparts (D1 through D3), but their respective individual proportions also differ—increasing, rather than decreasing, in passing from the T1 to the T3 profile.

What accounts for these shifts? It is intriguing that the differences in the overall profile distributions between dihedral and truncation burins are essentially those we have seen within dihedral burins when we regard their profiles in terms of the individual support types. Thus, among dihedral burins, gracile blanks associate with narrower closing angles and/or axial biseaux, whereas robust blanks associate with wider closing angles and/or lateral biseaux. Is it possible then that the general shift toward wider closing angles and lateral biseaux

in the truncation burin sample (43% versus 35%) occurs simply because it contains a notably higher proportion of robust R-supports than the dihedral burin sample? The answer is no. For examination of the two contingency tables (6.2 and 6.3) reveals that the shift is as marked among truncation burins on gracile blanks as among those on robust ones. Hence, we must conclude that, while the design requirements of truncation burins might favor the choice of more robust blanks, differences in blank morphology in and of themselves do not account for the different distributions of the profile types among truncation and dihedral burins.⁴

What is going on here is that the dynamics of truncation burins involves geometric and mechanical contingencies somewhat different from those operating among dihedral burins. Truncation burins tend toward wider closing angles and lateral biseaux both because they can do so and because they need to do so. They can because the manufacture of a truncation more often than not entails the removal (whether by intentional breakage or heavy non-lamellar spalling) of a considerable amount of material before the abrupt truncation retouch itself is applied. They need to because this truncation must occupy a fairly substantial vertical section of the blank if this retouch is to have sufficient bite to achieve the proper form. Together these two factors mean that the truncation as a rule departs fairly abruptly from the lateral margin to encroach upon the thickness of the blank, usually at a relatively low

level of obliquity (at least in comparison to that of the corresponding edge of the trigon of the average dihedral) and more often than not traversing the full width of the piece. Hence, when the burin facet is in turn spalled from it, the result is a profile whose closing angle is more likely to be relatively wide and whose biseau is more likely to be positioned close to the lateral margin. This tendency toward biseau laterality is reinforced by the principle of economy we have seen at work in lamellar spalling, for a burinated facet proceeding down the lateral margin of a blank requires the removal of less material than one encroaching more heavily upon the thickness of the piece.

The individual profile types require brief comment. Unlike their dihedral counterparts, narrow (T1) truncation burins are comparatively rare and mostly atypical. This is because the profile calls for the truncation either to be made near the thin flank of the blank or to encroach heavily upon it in a form that nearly approaches backing retouch. As a rule, the first solution is inadequate and the second impracticable. The middle axial (T2) profile, on the other hand, seems to permit the truncation sufficient bite on the thickness of the piece to allow altogether typical specimens to be made in appreciable quantities. Contrary to its behavior among dihedral burins, the wide axial (T3) profile is even more numerous and its members mostly typical, even though it associates strongly with comparatively robust R-supports, including several particularly stocky R2 forms. We have seen that such blanks rarely lend themselves to the dihedral lamellar spalling called for by a D3 trigon but that they easily accommodate the manufacture of this profile in a truncation burin.

Again, as is the case among dihedral burins, the medium lateral (T4) profile has a heterogeneous membership, comprising specimens approximating the ideal silhouette as well as quasi-lateral forms (which are actually in the majority here). The former can often be relatively robust, but the latter usually resemble the rather gracile quasi-laterals found among D4 dihedral burins. Intergradation between the T2 and T4 profiles is at least as great as that between D2 and D4 burins, and it is not surprising to find that their association patterns with the support types are here essentially identical. One could in fact collapse the two truncation burin profiles into

a single category in the contingency table without significantly changing its chi-square score. Therefore, like their dihedral burin counterparts, they should be regarded as complementary expressions of the dynamics of medium-angled burin trigons in the ensemble; it is useful to recognize distinct T2 and T4 profiles for purposes of typological description, but they are not truly distinct classes.

The wide lateral (T5) trigon is the best represented profile among truncation burins. It lends itself to essentially any kind of blank, as we have seen, and it is not surprising, therefore, that its column percentages within the contingency table do not differ significantly from the table's vertical marginal percentage distribution. Still, a very substantial number of its members occupy R-supports. That several of these are R2-supports reflects what has already been noted for the profile's dihedral analog (D5): in accordance with the principle of economy, this profile is often the only one that can be achieved with reasonable ease and control on a particularly robust blade or flake.

Let us turn to the complete 3-A truncation burin sample, which includes the transversal (T6 and T7) profile types (table 6.4). Here the overall quantitative divergence from dihedral burins becomes even more marked, with a further increase in R-supports over the abbreviated sample seen in table 6.4 (47% versus 42%) and, of course, an increased proportion of lateral biseaux (59% versus 51%).

Burins having a semi-transverse (T6) profile are few and mostly atypical. This is because a blank sufficiently gracile to carry the profile's relatively narrow closing angle rarely has a sufficiently robust flank to accommodate the heavy and abrupt retouch of a normal truncation. Some T6 specimens are narrow-angled transversal burins on a minimal truncation that consists simply of a lightly retouched flank. The biseaux of many others have been spalled on what appears to be only the remnant of a truncation that once belonged to an altogether different profile (most likely T2 and T4) and that only assumed a semi-transverse form as the result of extensive rejuvenation. Not surprisingly, given its heterogeneous makeup, the T6 profile interacts essentially at random with G- and R1-supports, while the relative narrowness of its closing angle virtually precludes its being found on R2-supports.

Table 6.4. Truncation burin dynamics: 3-A tool sample.
Cross-tabulation of Burin Profile and Support Type.

	T1	T2	T3	T4	T5	T6	T7	
G-support	15 93.8	31 70.5	22 32.4	25 69.4	56 59.0	12 57.1	5 14.3	166 52.7
R1-support	1 6.3	13 29.6	37 54.4	10 27.8	31 32.6	9 42.9	12 34.3	113 35.9
R2-support	0 —	0 —	9 13.2	1 2.8	8 8.4	0 —	18 51.4	36 11.4
	16 5.1	44 14.0	68 21.6	36 11.4	95 30.2	21 6.7	35 11.1	315

$$\chi^2 = 93.42 (p < .001)$$

$$\phi = .545$$

Transverse (T7) burins, on the other hand, make up a distinct and comparatively well-populated class. They also pose an interesting typological question: Are they actually a distinctive type of truncation burin, as is implied by the separate status given them on Bordesian type-lists and the typological indices, or are they simply an alternative form of wide lateral (T5) profile that happens to be made at right angles to the technological axis of the piece? They seem to be both. As table 6.4 indicates, the transverse trigon is dominated in general by R-supports and associates in particular with R2 forms (nearly half of which are square flakes)—in other words, stocky supports whose flank can be sufficiently thick and robust to receive the bite of a proper truncation. The majority of such blanks may still accommodate an ordinary T5 profile. But the morphology of a substantial number of them is such that the orientation of the technological axis would be of little importance to a knapper faced with choosing which edge to truncate and which to burinate. The decision would simply depend upon how the individual piece lent itself to the different kinds of spalling each of these entail. In this perspective, it seems reasonable to regard a transversal (T7) burin simply as a form of wide lateral (T5) truncation burin that has been adapted to the special morphology of stocky supports.

6.3.4 Discussion

Do the typological dynamics of 3-A burins actually express a pattern that is generic to Upper Palcolithic

industries as a whole? Or, to put the question in more practical terms, is it at least reasonable to claim that burins from the other assemblages at Solvieux are designed and manufactured along the same lines and that our analysis of 3-A burins therefore provides a key to explaining their typological variation?

If so, then our other burin samples should meet three major expectations. First, the overall interaction pattern between profile types and blank types seen among their dihedral and truncation burins should remain essentially the same as those in the 3-A samples. Second, their truncation burins as a group should contrast to their dihedral burins, as a group, in possessing higher percentages of lateral biseaux, wide closing angles, and perhaps, R-supports. Third, the actual proportional distributions of their profile types should shift in a predictable manner away from those of the 3-A samples, depending upon the modalities of the blank morphology of the burins involved. At least we should expect, on the basis of the principle of economy, that a sample possessing a comparatively stockier morphology (in other words, higher frequencies of R-supports than found among 3-A burins) will exhibit lower frequencies of axial forms overall and a higher proportion of wide-angled trigons.

But the converse need not hold true, that is, that a more gracile blank morphology (higher frequencies of G-supports) will necessarily entail fewer wide-angled profiles and greater numbers of axial

forms. For it is reasonable to expect that this shift may be offset by the greater role played by the scale effect in such samples, which serves to mitigate the impact of the principle of economy and consequently somewhat relaxes the dynamics of interaction between trigon profile and support morphology. For example, while gracile supports may lend themselves to the spalling of narrow-angled trigons, they can still as easily be spalled into wider ones. (This point is particularly well illustrated in § 8.2.2 by the dihedral burins from couches I and II.) But the opposite does not hold: robust supports tend to carry wider trigons precisely because they do not lend themselves to narrower ones. In contrast to their robust counterparts, therefore, particularly gracile burin samples need not exhibit burin profile distributions significantly different from those of 3-A itself.

We will see that these expectations are met by all Magdalenian and Raysse Perigordian assemblages at Solvieux. To be sure, the quantitative patterns that characterize the typological dynamics outlined here can be partially obscured by sampling error in the case of numerically small samples. And each sample is distinguished from all the others by certain peculiarities in its blanks, tool design, and the degree and kind of rejuvenation to which its burins have been subjected. But none of this masks the fact that one and the same pattern of dynamics is at work among the standard burins from Solvieux—a generic pattern that transcends the industrial traditions to which they belong. In fact, the only major aspect in the behavior of standard burins that correlates with tradition, the ratio of dihedral and truncation burins, is not a matter of typological dynamics at all. In the Magdalenian assemblages, dihedral burins outnumber truncation burins, whereas the ratio is reversed in identical fashion among the Raysse Perigordian assemblages even though they vary among themselves in blank morphology. Whatever may be its explanation, the pattern obviously involves factors other than the ones we are dealing with here.⁵

Solvieux furnishes one major exception that proves the rule: the numerically rich burin sample of the Beauronnian industry. The typological dynamics of this sample involve kinds of blank production, type design, and techniques of manufacture that dif-

fer fundamentally from the dynamics generic to the Magdalenian and Raysse Perigordian industries (§ 10.3). Beauronnian burins have an internally consistent logic of their own, of course, but it is not the logic of Upper Paleolithic standard burins defined above.

Finally, what has all this to do with type design and the inherent cultural significance of our results? This question was introduced in § 5.5.2, but now some additional points can be made. For one thing, given that our attribute sets represent truly distinct aspects of burin morphology, it is reasonable to conclude that the statistical interactions seen in our contingency tables reflect patterning that is somehow real beyond the confines of the statistical format itself. (They are not, in other words, the product of variables that simply constitute overlapping, redundant measures of one and the same area of morphology—variables whose statistical correlations can be strong but have no typological significance.) For another, our analysis has also advanced a considerable distance in explaining how variations in trigon profiles depend heavily upon variations in the morphology of supports, and in showing that an understanding of the first is dependent upon an appreciation of the second. We would be justified, therefore, in claiming that our profile types are more than arbitrarily imposed divisions and at least approximate what a taxonomist would refer to as 'natural' divisions in the realm of typological variation.

It would appear that narrow (D1, T1), wide axial (D3, T3), and wide lateral (D5, T5) deserve recognition as real typological categories. Although the distinction between medium axial (D2, T2) and medium lateral (D4, T4) is useful for descriptive purposes, these types must be merged into a single generic "medium" profile (that disregards the position of the biseau) if we are to have a category that stands on its own to the same degree as the above four; it should probably incorporate the semi-transverse (T6) as well. And, although we recognize its basic affinity to T5, the full transverse (T7) probably deserves to stand alone because of its special relationship to blank morphology.

To say, however, that these types are meaningful in the world of industrial variation is not to say that we claim any special understanding of their

meaning to the artisans who made and used them. This is an altogether different issue, one to which we will return at the end of this monograph. All that matters at this point is to affirm that knowledge of the types' more basic meaning to those who made and used them is not a prerequisite to our using them for describing and finding order in industrial variation.

6.4 Special burins

Special burins are either rare forms whose typological and/or industrial significance remains unclear (as in the case of Corbiac burins and burin-points) or they are highly individualistic *fossiles directeurs* that are restricted to specific industries (as in the case of Noailles and Raysse burins). The following special burins are recognized on the Solvieux type-list (see figure 5.1).

Corbiac burin (type 34a)

The burinated facet of a Corbiac burin is struck from the lateral margin of the piece so as to yield a trihedral rather than a squared or chisel-shaped biseau. It is ordinarily produced by a single spall struck from a margin that is either unretouched or bears only minimal fine or flat retouch and that lies as often on the left side of the piece as the right. Bordes, who defined the type (1970), apparently regarded it as a form of atypical dihedral burin, as the new type-list includes it as one of the forms eligible for inclusion in type 36 (multiple dihedral burin). Others regard it as a kind of transverse burin (for example, Demars 1977:106). We believe the category is best kept distinct because it incorporates enough heterogeneity to suggest that more than one kind of tool is involved. Some Corbiac burins do appear to have been intentionally manufactured in accordance with the defining criteria, but others suggest dihedral and truncation burins that were either poorly spalled in the first place or so heavily rejuvenated as to mask their original character. For this reason, when these burins do combine into multiples, they are assigned to type 46 (multiple mixed burin). In any event, Corbiac burins appear only in small numbers in the Solvieux assemblages, and they have no obvious industrial significance. Our results question whether the type has any general utility.

Burin-point (type 34b)

The standard definition of the burin-point is provided by Movius and David's (1970) classic article on Raysse burins, and the Solvieux evidence is consistent with their assumption that the two types are restricted to the same industries. In a burin-point, the original biseau of what began as a conventional truncation or dihedral burin has been mostly or totally removed by tertiary modification struck from the dorsal-proximal edge of the burin facet in such a manner as to convert the piece into a more or less pointed, rather than chisel-ended, tool.

Noailles burin (type 43)

The Noailles burin is a diminutive truncation (or occasionally break) burin diagnostic of Upper Perigordian (Vc) or Noaillian industries, whose distinctive configuration is as obvious to an experienced typologist as it is difficult to define formally (Tixier 1958; David 1985:114–120). Solvieux's modest but taxonomically important component of Noailles burins is reviewed in chapter 9.

Raysse burin (type 44)

Only in recent years, thanks to the Abri Pataud researchers, has the Raysse burin's specific typological dynamics and importance as a major *fossile* been clearly appreciated. Defying description as a static entity, it must instead be defined in terms of the progression of operations that leads to the form in which we recover it. As in the case of Noailles burins and burin-points, this task may be deferred until we take up Solvieux's Raysse Perigordian assemblages in chapter 9 (§ 9.5).

A note on terminology is in order at this point. What to call this type has involved much contention regarding priority (see Brezillon 1968:182–183). Bordesian type-lists often refer to it as a Bassaler burin in recognition of the Correzean site where its distinctiveness was first recognized (Couchard and de Sonnevill-Bordes 1960). An understanding of its quite special design came subsequently, with the work of Louis Pradel and, in particular, of H.L. Movius and N. David. These researchers chose to call it a Raysse burin in recognition of a site in the Vienne that furnished Pradel's type-collection. We prefer the latter term because it is under this name that the form's special dynamics were brought to

light (Movius and David 1970) and its industrial significance most thoroughly explored (David 1985).

6.5 Endscrapers

Scrapers constitute the second most popular tool group in the banal assemblage at Solvieux, although running a poor second to standard burins. They fall into three principal classes—endscrapers, flake scrapers, and carinate-nosed scrapers—among which the first overwhelmingly predominates. The other two are relatively rare and can best be dealt with together under the rubric of “miscellaneous” scrapers (§ 6.6).

6.5.1 General

Type-list categories

As the more specialized endscraper types are rare or nonexistent at Solvieux, our type-list recognizes only a few of those that appear on conventional Bordesian lists. Type 1a, which comprises the bulk of any given sample, includes all specimens that do not qualify for any other type. Type 1b houses those that otherwise qualify for the first category save for the fact that they happen to be made on flakes rather than on blades. This category helps define the zone of intergradation between endscrapers and true flake scrapers; some researchers confound the two by categorizing all scrapers on flakes as flake scrapers, even when they retain an essentially endscraper morphology.

Type 1b virtually excludes pieces on square flakes, however, as it is nearly impossible on geometric grounds to fashion what qualifies as an endscraper on a blank whose length barely exceeds—and may even be less than—its width. In this connection, our list ignores whether a piece's lateral margins diverge or converge in approaching the front (as in the case of the fan-shaped scraper recognized on conventional type-lists). The reason is that endscraper margins are overwhelmingly parallel or subparallel in all Solvieux samples and that departures from this rule simply entail the natural contours of the blank; these departures are neither numerous nor consistent enough in form to suggest purposeful type design.

All double endscrapers are assigned to type 2 regardless of any other special attributes they may possess, such as marginal retouch. Single endscrapers bearing marginal retouch are assigned to type 9. To qualify for membership, a specimen must possess at least one margin meeting the requirements of a partially retouched edge as defined for the marginally retouched piece group (§ 6.10).

General pattern

Much of the behavior seen in endscrapers at Solvieux is generic to the Magdalenian and Rayssac Perigordian industries. They appear in similar global proportions on both the piece and tool count sheets, with what little between-assemblage variation that does exist crosscutting the industrial distinctions. They show remarkable consistency from one assemblage to the next in their proportions to standard burins (1:4). The contrast to burins in their behavior in combination tools has already been noted (§ 6.1): they are half as likely to join with their own kind in multiples (that is, double endscrapers, type 2), while at the same time being four times more prone to join with members of other typological groups to form composites (these overwhelmingly fall into type 17, the scraper + burin combination).

Another constant among endscrapers involves marginal retouch. Within any given assemblage, endscrapers consistently bear significantly more of it than do standard burins or, indeed, members of any other typological group (apart from marginally retouched pieces themselves). It is true, of course, that the spalled facets that intersect one or both margins of burins may have obliterated retouch they may have carried prior to burination. Yet the contrast remains valid and is indeed accentuated by the facts that double endscrapers are consistently more likely to bear marginal retouch than single endscrapers and that the latter, in turn, bear more retouch than endscraper composites (which, of course, usually involve burins). Thus, it seems that the presence of two fronts on a blank (a double piece) promotes the appearance of marginal retouch, whereas the appearance of a tool from another typological group (a composite piece) acts, as it were, to discourage it.

Despite its affinity for endscrapers at Solvieux, marginal retouch is still not particularly common among them, and it plays no dynamic role in shaping either their blanks or front contours (about which more later).

Attribute system

The essentially two-dimensional geometry of endscrapers easily lends itself to complex systems of attribute coding (for example, Movius et al. 1968: 9–17). Yet they remain fundamentally simple in design, and, at least in the Solvieux samples, they obviously constitute one and the same tool made according to one and the same plan. Hence, we employ a relatively simple typological system for their description and analysis consisting of three components. One of these is the system of blank attribute sets defined previously. The second is a Front Contour set that codifies the outline profile described by the retouched bevel, or “front,” that constitutes the defining feature of the tool class. The third component involves several ancillary observations.

The Front Contour set presumably concerns the principal focus of endscraper typology because, like the trigon profile set among burins, it deals with the outline shape of the active part of this essentially two-dimensional tool. Three general attributes suffice for this set, due both to statistical restrictions arising from the relatively small sample sizes available at Solvieux and to the somewhat special nature of variation involved: round, shallow, and irregular. These contours are gauged by posing the front on the template illustrated in figure 6.5, which consists of a series of concentric arcs divided so as to distinguish those fronts that fail to describe more than 120° of a circle (shallow) from those that range from 120 to 180° (round).⁶ In round and shallow endscrapers, the nickpoints where the front intersects the blank’s lateral margins, as well as the front’s own leading edge, tend to fall on or near the same arc. Irregular fronts, in contrast, are ones whose outline defies coding by means of the template. Included in this category are the rare shouldered and nosed endscrapers encountered at Solvieux. Most of its members are, however, either reasonably well-made fronts that happen to be highly irregular or, what is more often the case, specimens that have

either been extremely crudely fashioned or heavily modified by use.

Supplementing the above are observations that, if systematically made, constitute an informal front contour modifier set in their own right. Most of these concern the many fronts that lend themselves to coding by the template but still fail to approximate arcs of a circle. A round front, for example, may be symmetric but elongated either into a parabolic form or pointed ogive. Much more common, and especially peculiar to shallow specimens, are asymmetric fronts wherein both nickpoints, as well as the most forwarding projecting point of the front, fall on or near the same arc line, but the latter is

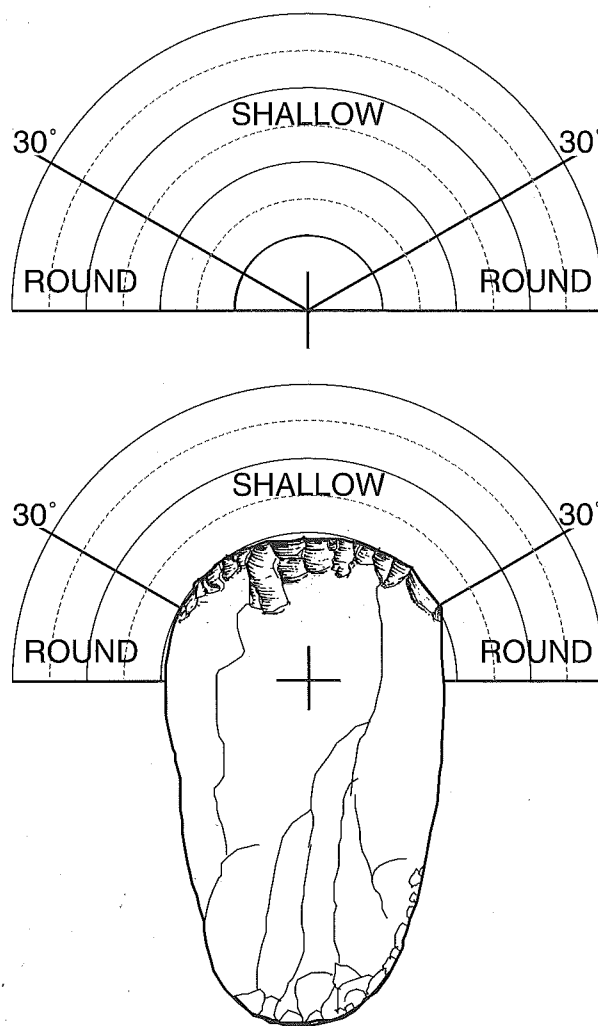


Figure 6.5. Template for codifying endscraper front contours

deflected considerably away from the midline of the piece. A special variety of asymmetry is a skewed front whose nickpoints fall upon quite different arcs and whose front as a whole is markedly canted toward one side. (If not canted, such fronts would probably qualify as parabolic or ogival rounds.) Rights and lefts may be recognized in both cases. In the first, the most forward projecting point of the front lies proximate to the right margin, and the front itself consequently faces toward the left. In a right asymmetric, the situation is simply reversed. Asymmetric fronts, as a rule, display signs of usage suggesting they are the product of wear rather than of intentional design on the part of the artisan.

Among endscrapers, as elsewhere, atypicality usually involves either *maladroit* workmanship in the original production of a piece or crudity resulting from its subsequent breakage and opportunistic rejuvenation or use-wear. Two additional types of atypicality peculiar to endscrapers are "minimal" and "partial" fronts. In the former, light retouch substitutes for the relatively heavy spalling that produces the robust bevel characteristic of endscrapers. In the latter, the spalling fails to extend over the full length of the distal edge of the piece which, as indicated by both the marginal nickpoints and use-wear, must have served as the effective front of the implement.

6.5.2 Endscraper dynamics

Our analysis of the dynamics of endscraper typology, like that of standard burins, focuses upon the outline profile of the active part, the front. Endscraper contours yield weaker and certainly less straightforward patterns of attribute interaction than do burin profiles.

Three factors are responsible. One is that endscrapers are inherently simple tools whose design requirements are general and admit considerable variability in their specific expression. The bulk of the material removed in manufacturing an endscraper is carried away simply by breaking the blank more or less perpendicular to its long axis, and the short and fairly abrupt spalls that, in turn, create the beveled front encounter relatively little in the way of mechanical or geometric restraints in comparison to the controlled lamellar spalling seen among burins. The second factor is that endscrapers are subject to

considerable use and breakage, as a result of which they presumably lose during the course of their use-life much of whatever designed patterning they possessed at the time of their manufacture. Third, they are less amenable to formal attributal analysis than are burins because of their smaller sample sizes. This means that their interpretation must proceed more upon piecemeal inspection in the light of their general quantitative trends than upon formal contingency table analysis. One happy consequence of this for the reader is that discussion of endscraper dynamics is far less encumbered by statistical tables than the burin analysis called for.

In any event, a basic pattern of endscraper dynamics is clear. At the general level, endscraper samples are more laminar than burin samples, presumably because fronts are more easily accommodated by blades than by more irregular forms of flakes. Square flakes, as we have seen, are virtually absent because they fail to qualify on geometric grounds as viable supports for an endscraper front. More interesting, if less obvious, is the specific interaction between blank morphology and front contour. The cross-tabulation of contours and blank varieties in the 3-A sample (see table 7.14) shows that round fronts tend to associate with more gracile blades, whereas shallow fronts show some preference for more robust flakes. These interactions express the principle of economy in spalling: the shallow category includes a certain number of endscrapers on large, but geometrically regular, flakes of sufficient breadth that controlled spalling of their front called for a relatively flatter arc (whose manufacture entailed the removal of proportionately less material than would have a rounder one). The association of diverse fronts with flakes seen in table 7.14 is particularly strong, largely because the size and configuration of stocky flakes allows for, and indeed may promote the manufacture of, somewhat irregular fronts.

But this is not all there is to it. Hands-on inspection indicates that use-wear often played a more important role than blank morphology in determining endscraper front contours. Fronts with round contours exhibit relatively little usage. Shallow contours, on the other hand, tend to show much: their fronts are often blunted; they may be undercut by crushing wear (*écrasement*) that leaves intact only

the dorsal extremities of the original spall facets; or they may exhibit a more obvious break upon which some amount of fresh spalling or simply use retouch is superimposed. Unlike a burin biseau, an endscraper front is more often 'rejuvenated' by continued use than by intentional reworking. As a result of such wear, the leading edge of the front retreats into a flatter, shallower (and often asymmetric) profile. Presumably, therefore, unless they were made on fairly wide blades, endscrapers in pristine condition tended to be round, and it was only later, as a result of use-wear, that many of them became shallow. This process is carried a step farther in the case of irregular contours. In at least half of the endscrapers bearing them, the stigmata of wear have created what is patently a broken front, even though use-spalling indicates that the piece continued to be used after it had sustained major damage.

Of course, blank morphology and use-wear work in concert. For example, flakes associate with diverse contours not simply because they promote the manufacture of irregular fronts in the first place but because their robust fronts welcome the particularly heavy subsequent usage that can convert a regular round or shallow contour into an irregular one. Yet most often the interplay of use-wear and blank morphology is seen in relatively gracile samples where the scale effect comes into play. Here, not surprisingly, diverse contours are very poorly represented, both because most blanks are insufficiently wide for them to be purposefully fashioned and because the heavy use-wear required to create them accidentally would more likely simply break off the entire front. Equally important, the role of blank morphology in determining shallow contours is largely nullified in gracile samples, where there are simply too few stocky blanks to give the principle of economy in spalling much opportunity to come into play. The great majority of endscraper fronts were created round, but, owing to their slimness, needed to be subjected to only a modest degree of usage to become converted to shallow contours.

All of these factors are variously reflected in table 7.13, which depicts front contour percentages for the four endscraper samples that are sufficiently large to yield reasonably trustworthy distributions. While between-sample variation is only moderate, a

chi-square test of the actual counts from which the percentages are generated indicates a statistically significant ($p < .01$) level of patterning for the table as a whole. A detailed understanding of this table will emerge in the chapters that follow. Suffice it here to note that it both illustrates and confirms our picture of endscraper dynamics if one keeps in mind the following facts: 3-A endscrapers are quite robust but exhibit only moderate use-wear; I/II endscrapers similarly show only light usage but entail quite gracile blanks; 2-III endscrapers have stocky blanks and their fronts exhibit heavy use-wear; and, finally, 6-M endscrapers are gracile but also heavily used.

Ironically, the earliest published attempt at lithic dynamic typology along the lines pursued here focused upon endscrapers, and it succeeded in revealing a significant amount of attributal patterning that was clear-cut, strongly expressed, and involved altogether different dynamics (Sackett 1966). But that study differs from the current one in two key respects. First, the sample involved is extraordinarily large, consisting of 1198 endscrapers from a single assemblage (representing the lower Aurignacian level at Abri Castanet). Second, and more important, nearly three-fourths of this sample displays heavily encroaching Aurignacian retouch. This retouch sculpted in a marked and consistent fashion both front contours and the outline profiles described by endscraper supports, simultaneously masking the subtler variations in contour due to support morphology and use-wear that dictate the more weakly expressed dynamics of the Solvieux samples.

6.6 Miscellaneous scrapers

Miscellaneous scrapers comprise those relatively rare tools at Solvieux bearing scraper fronts that do not qualify as endscrapers.

Flake scraper (type 3)

Flake scrapers comprise flakes that bear fronts displaying neither the orientation nor configuration of true endscraper fronts. They are infrequent, generally have an opportunistic air, and in no case suggest the presence of a standardized type. As has been

noted, type 1b is designed to segregate these makeshift forms from regular endscrapers that happen to be made on flakes.

Carinate and nosed scraper (type 11)

Carinate and nosed scrapers are fashioned upon blocks or elevated blanks, ideally by multiple lamellar spalling. They are unimportant at Solvieux. Apart from the handful of well-made specimens provided by the Aurignacian industry (couche D), these are mostly blocks and thick flakes bearing relatively amorphous heavy spalling. Many of the latter may simply be nuclei whose striking platforms happen through accident or subsequent use to approach the form of rough scraper fronts: traditional typologists would have termed them *rabots* (see Brézillon 1968:345).

6.7 Standard perforators

Perforators are divided into two subgroups: standard forms, which comprise the banal perforators that appear in all Upper Paleolithic industries, and special forms (§ 6.7.2), which are either restricted to specific industries or possess a somewhat special typological nature, or both.

6.7.1 The system

Given their relatively small numbers and morphological diversity, it is neither possible nor necessary to design very exacting attribute sets for perforators. In addition to the usual ensemble of general blank sets, our system orders them into two admittedly fluid crosscutting sets: Perforator Type and Perforator Profile. These concern, respectively, the form taken by the retouched projection and its positioning on the blank.

Perforator type

The form assumed by the projection may be assigned to one of three types that correspond to the three basic categories of standard perforators recognized on the type-list: percoir, bec, and thorn. In a percoir (type 23) the projection is reasonably disengaged from the body of the piece and is relatively narrow and elongated. In a bec (type 27), on the other hand, it is broader and stubbier than the percoir. While many becs seem to have been intention-

ally fashioned, others suggest percoirs blunted by usage. (The term "rounded bec" may be used for particularly stubby projections that give the impression of having been broken percoirs whose stumps were later modified by use-retouch.) Finally, in a thorn (type 28), the projection is small but sharp enough to prick one's finger if applied with a modest amount of pressure.

When used in typological description, all three types can be modified by observations referring to their general size and the details of their configuration. One observation consistently made concerns a kind of atypicality peculiar to perforators wherein one of the edges forming the projection is purposefully retouched in the ordinary manner but its opposite member is a natural plane or break simply bearing the stigmata of use.

Perforator profile

The projecting members of any of the above three types assume the following four forms: end, pointed, corner, and side.

End. Regardless of whether it emerges from the support medially or laterally, an end perforator is oriented parallel to the axis of the piece.

Pointed. Technically a subgroup of the end category, because it is geometrically impossible to achieve in the other two profiles. Here, the perforator is not disengaged from the blank but is instead produced by the intersection of two retouched edges that converge without a significant break in contour from the lateral margins of the piece. Pointed perforators can intergrade with the pointed blades assigned to type 101a (§ 6.11), but usually the two can be distinguished. A true point tends to be shaped by the converging retouch while a perforator is simply outlined or, so to speak, cut out by it. Moreover, the retouch in a perforator is restricted to the projection itself, whereas the retouch that shapes points is usually a continuation of marginal retouch involving much of one or both sides of the piece.

Corner. The perforator occupies the distal extremity of the piece but is oriented more or less at right angles to its axis; in other words, it points laterally. Sometimes a corner percoir (and occasionally an end percoir) reproduces the deflected outline of a *Zinken*, but never displays the special spalling peculiar to that form (Brézillon 1968:379). The term is

consequently avoided here even though French typologists sometimes use it to refer to the outline alone.

Side. A side perforator is similar to a corner perforator in being oriented more or less perpendicular to the axis of percussion. But it projects from the lateral margin of the blank rather than from its extremity.

6.7.2 Perforator dynamics and patterns

Investigating the typological dynamics of perforators is hampered by the small samples usually involved, which are subject to the vagaries of sampling error. Ambiguity also arises because the distinctions among the types, in particular that between percoirs and becs, are fluid and no doubt heavily influenced by the life history of the tools; many a robust bec began its career as a gracile percoir. Still, certain attribute combinations are more likely to appear than others due to the obvious geometric and mechanical contingencies inherent in perforator typology. Thus, percoirs tend toward the end profile, and becs toward pointed and corner profiles—associations that obviously reflect the constraints and opportunities the different profiles offer the shaping retouch that disengages the projection. Blank morphology plays an even more obvious role wherein blades associate with end and pointed perforators while flakes associate with side perforators; thorns as a rule appear on flakes rather than blades. A detailed discussion of these patterns can best wait until the couche 3-A perforators are reviewed (§ 7.6), as they constitute the only sample from Solvieux large enough to submit to formal contingency table analysis. The trends are obvious ones, in any case, arising largely from geometric contingencies and are consequently visible to inspection in the other perforator samples.

Several constants in the behavior of standard perforators remain to be noted. They tend to be equally popular in all Magdalenian and Raysse Perigordian assemblages, accounting for 5% or slightly less of the common toolkit. Unlike standard burin varieties, neither the perforator types nor profiles vary proportionally in any consistent fashion within or between industries. For the types and profiles depend largely upon blank morphology, which crosscuts the industries. The care taken in manufac-

turing perforators concentrates upon the active part, the projecting member; the blanks that carry them tend to be somewhat less regular in form than those used for other typological groups, and they only rarely bear marginal retouch. Finally, perforators behave in a distinctive manner with respect to combination pieces. Though less gregarious than end-scrapers (perhaps due to their more irregular blanks), perforators do join with members of other tool groups to form composite pieces (types 20, 21, and 22a). But they never combine among themselves to form double pieces, even in strongly laminar industries where suitable blanks are common.

6.8 Special perforators

Special perforators depart from the banal standard forms. None of the three recognized here are numerically important, but two of them serve as *fossiles directeurs* at Solvieux.

Micropercoir (type 24)

A micropercoir is a miniature perforator fashioned at the end of a bladelet, ordinarily in the form of an end-percoir. The type is rare and essentially confined to the couche 3-A assemblage, where it is presumably closely related to the star perforator.

Star perforator (type 25)

A star perforator is a small flake from whose margin emerge two or more perforators reminiscent of a pointed star (*percoir en étoile*). It is diagnostic of the Early Magdalenian and is restricted to couche 3-A.

Bec burinant alterne (type 29)

Apparently first defined by Bordes (1961:37), the bec burinant alterne is a perforator formed by the intersection of two opposing retouched notches that respectively occupy the dorsal and ventral faces of the piece. Despite its peculiar form of manufacture, this type appears to be intentionally designed to reproduce the standard perforator outline shapes. It is rare at Solvieux.

6.9 Truncations

The standard varieties of truncated pieces of concern here are ubiquitous to Upper Paleolithic industries.

The Solvieux truncation, a highly specialized type which is unique to the 2-IV Beauronnian industry, is detailed in § 10.2.

Standard truncations are a varied and refractory lot. Any sizable sample yields numerous carefully made specimens that conform to a reasonably clear-cut pattern and consequently merit recognition as a distinct category of morphological typology. Yet, due perhaps to its very simplicity, this group seems to have elicited much perfunctory work from Upper Paleolithic artisans that can bring a relatively high degree of atypicality to it even in an otherwise well-made assemblage. By default, moreover, it is also the resting place of worn-out or poorly made specimens that once belonged to other typological groups—in particular, atypical endscrapers, broken perforators, and improperly spalled truncation burins. Not surprisingly, truncations can only yield patterned results if one attacks them with a fairly generalized attribute system.

6.9.1 The system

Our system consists of the standard ensemble of blank attribute sets and two sets referring to the outline profile described by the truncation, Truncation Type and Truncation Contour, along with some pertinent observations. Basic, of course, are the two truncation sets.

Truncation type

The three categories of this set—*traverse*, *oblique*, and *medial oblique*—classify the basic profile of the truncation and correspond to the three basic forms of standard truncations on the type-list. In the *traverse* form (type 57) the truncation crosses the piece more or less perpendicular to its long axis from one margin to the opposite margin or at least to a point closer to the latter than to the *midline*. An *oblique* truncation (type 58) is similar except that it rises obliquely, lying at an angle exceeding 20° to a perpendicular to the long axis. In the *medial oblique* form (type 59), in contrast to the *oblique* type, the endpoint of a medial oblique truncation lies closer to the *midline* than to the opposite margin. To be considered typical, the truncation must nonetheless be of normal length, that is, to approximate the width of the piece at the latitude of its marginal *nickpoint*.

Truncation contour

Cross-cutting the truncation types is a set of profile attributes codifying whether the line described by the truncation is straight, concave, or convex. This set is quite secondary in importance to the first. It is included here in part simply to clarify the confusion generated by the conventional type-list, which orders truncations into the same four outline categories used for truncation burins (§ 5.4.2). These categories are not mutually exclusive because they mix distinctions about truncation contours with distinctions about truncation angles (the aspect dealt with separately by our Truncation Type set).

These two attribute sets are complemented by some observations concerning atypicality among truncations. One observation is whether the truncation is partial, that is, bears retouch on only a portion of the edge involved; such pieces are given, perhaps undeserved, separate type status on the new type-list. Other signs of atypicality concern whether a truncation's retouch is particularly perfunctory or *maladroit*, and whether there are indications that a piece being classified as a truncation may, in fact, be a broken or particularly atypical specimen of an altogether different tool, such as an endscraper, perforator, or truncation burin.

6.9.2 Truncation dynamics and patterns

Due to their heterogeneity, truncations lend themselves less easily to generalization than do endscrapers and perforators. While their numbers at least approximate those of the latter, their blanks tend to resemble those of endscrapers in both morphology and distribution of flint types. Truncations differ only in an appreciably lower incidence of marginal retouch. They show no constant trend with respect to forming composites, but contrary to endscrapers, they seem definitely adverse to forming doubles.

Truncations exhibit rather clear-cut patterns of attribute interaction arising from the dynamics of their geometry and blank morphology. This generic pattern is revealed in table 6.5, which cross-tabulates the truncation types and support types in a composite sample made by pooling the individual samples of the four assemblages possessing at least modest numbers of standard truncations. For purposes of subsequent comparison with these

samples, it should be noted that this composite distribution comprises 63.2% G-supports, 75.2% blades, and has an average piece width of 3.0 cm. The pattern is obvious if not strong. Traverse profiles, which account for half of the pooled sample, combine at random with the support types. Presumably, they are spalled directly upon transversely broken blanks, and few blanks are so stocky or wide as to resist breakage of this kind. That medial oblique truncations associate with R-supports reflects the obvious geometric fact that a stocky blank is more likely than a gracile one to provide sufficient room for a truncation to have substantial length and still fail to cross the width of the piece. Conversely, regular oblique truncations tend to associate with G-supports because manufacture of this type calls for removing less material on a gracile blank than it would on a stocky one. In both of these associations we see the principle of economy at work.

Blank morphology alone does not account for the truncation type distributions of the individual samples pooled in table 6.5. It has been noted that truncations constitute, so to speak, a noisy system, any given sample of which includes several atypical and exhausted specimens that in their pristine state probably belonged to other tools groups whose typological dynamics are different from those of legitimate truncations. At the same time, varying standards of manufacture and use among the different assemblages also influence truncation shapes independent of blank morphology itself. (We will

see that, as usual, this is particularly true of the 2-III sample [§ 9.2.6].)

Truncation contours behave somewhat consistently, too. Convex profiles are comparatively rare and largely restricted to the medial oblique type. This simply reflects the obvious fact of typological geometry: unless its angle of retouch and general configuration are particularly characteristic of a real truncation, a convex profile is likely to cause a piece to be classified as an endscraper. A potential exception is the medial oblique category, whose truncation is not disposed like a typical endscraper front and whose form may even lend itself to convexity. A secondary pattern suggested by inspection is that concave contours show some tendency to appear on particularly stocky and thick blanks bearing traverse truncations. Just as in the case of truncation burins, this association suggests that providing the edge to be spalled on such blanks calls not for snapping them but rather for striking them in such a manner as to leave a concave one-blow truncation, which may or may not receive additional subsequent spalling. Oblique truncations can also be concave in a manner creating a projecting end that carries the piece toward the zone of intergradation between truncations and perforators.

6.10 Marginally retouched pieces

Marginally retouched pieces constitute one of the more troublesome typological groups in Bordesian systematics. Many assemblages include a significant number of whole pieces that bear substantial continuous retouch on one or both of their margins and no active part that qualifies them for membership in any other typological group. In other words, marginally retouched pieces as such do exist. But for inventory purposes it is customary to include fragmentary as well as whole pieces in the group, presumably to make it numerous enough to provide a statistically trustworthy, if somewhat rough and ready, index of marginal retouch in the assemblage as a whole. The problem here, of course, is that, unless they retain their distal end, there is no obvious means of determining whether fragmentary retouched pieces are not, in fact, regular tool supports whose active parts have been broken off. Yet they must be counted in this study if Solvieux

Table 6.5. Standard truncations: pooled Magdalenian and Raysse Perigordian tool samples. Cross-tabulation of Truncation Type and Support Type.

	Traverse	Oblique	Medial Oblique	
G-support	38 60.3	32 80.0	9 40.9	79 63.2
R-support	25 39.7	8 20.0	13 59.1	46 36.8
	63 50.4	40 32.0	22 17.6	125

$$\chi^2 = 9.77 (p < .01)$$

$$\phi = .280$$

assemblages are to be compared on common grounds with those already reported in the literature.

Much effort has been devoted to the problem of designing a reasonably rigorous coding procedure to control for, or at least minimize, the ambiguities presented by fragmentary pieces. The effort has met with only partial success, and our system should be regarded as a working compromise. It is actually an elaboration of one proposed, but apparently never used, by the Abri Pataud researchers (Movius et al. 1968:8-9). It simply aims to render more explicit, and hence more consistent, the decisions that typologists make intuitively when sorting pieces bearing marginal retouch.

To be included within the group, the piece should bear retouch on at least one-quarter of its margin. (This criterion may not appear to be very stringent, but to be more demanding would require rejecting large numbers of broken pieces which, despite their fragmentary condition, exhibit a significant amount of retouch.) If the retouch extends over more than half of that margin, it is designated continuous; if between one-half and one-quarter (the lower limit), it is termed partial. Pieces that qualify are grouped into three categories with these distinctions in mind: whole, quasi-whole, and fragments. A whole piece is entire, enabling the extent of retouch to be determined with confidence. A quasi-whole piece is incomplete but retains enough of its original blank so that the distinction between partial and continuously retouched margins can be gauged with an acceptable amount of accuracy. Quasi-whole pieces are subdivided according to whether they represent distal, medial, or proximal portions. Whole and quasi-whole pieces are assigned to type 61.

Finally, there are fragments (type 62), pieces too fragmentary for us to determine whether their margins originally bore continuous or only partial retouch. They are simply scored as to whether their retouch meets the one-quarter criterion or, in the case of pieces even too short for this to be determined, whether it is interrupted by the break (which indicates, of course, that the retouch originally continued further). If the latter is not the case, these fragments may be eliminated altogether for not meeting the one-quarter criterion. If the retouch is interrupted, however, one may choose to count them

but duly note that the one-quarter criterion cannot be proved. Care must be taken not to include fragments that are retouched only in immediate proximity to the butt and do not clearly meet the one-quarter criterion. Such shaping retouch is common in most industries and seems to be independent of regular marginal retouch.

6.11 Points

Points are tools that terminate in a point formed by two intersecting retouched edges and that are at the same time distinct in form from endscrapers, perforators, and truncations. The bulk of them fall into type 101a, pointed blade, and they tend in any given assemblage to be few in number and heterogeneous in form. The sole exception is the relatively large sample of 33 specimens from couche 3-A (§ 7.10). Discussion of this sample will serve as the frame of reference for describing the much smaller point samples from the remaining assemblages. Standing apart from these are 7 specimens from couche II which constitute a distinct type known as a Solvieux point. They are categorized under this name in type 101b and are reviewed in the couche VII discussion (§ 8.7).

6.12 Gravettian pieces

Members of this backed family center upon Gravette points, typical specimens of which are assigned to type 51. Gravette micropoints, or microgravettes (type 52), possess essentially the same morphology as Gravette points but are less than 5 cm long. In theory, because it is possible to confuse mesial fragments of Gravette points and microgravettes with backed bladelets (§ 6.13.1), researchers often assign Gravette fragments to type 48, the catchall category for backed pieces. But the two types happen to distribute in mutually exclusive fashion in the Solvieux industries: where there are Gravette points there are no characteristic backed bladelets and vice versa. Hence, mesial backed fragments are classified here into types 51 and 52 depending upon their size. A special category, type 48, is reserved for the Gravette "technopiece." This type bears heavy, but incomplete, backing retouch whose configuration indicates that, in all likelihood, the piece represents

a Gravette point broken during manufacture. It often exhibits the shouldered or constricted outline known as a *pièce à cran*.

The thickness of the backs of Gravettian pieces is at least one-third, and often exceed two-thirds, of their width. Because this width normally falls below the 1.5 cm minimum recognized for blades in the Piece Width set, a special system of three width categories is used for them. Accompanying each width class is an estimate of what was originally the blank width:

- a Present width = 1.0 cm (original blank estimated at > 1.25 cm)
- b Present width = 1.0 to 0.5 cm (original blank estimated at between 1.25 and 0.75 cm)
- c Present width = 0.5 cm (original blank estimated at < 0.75 cm)

Original blank size is estimated in the case of backed pieces because it helps one arrive at a decision when codifying specimens whose current width is uneven and/or straddles two of the present width categories.

Only the Rayssé Perigordian assemblages at Solvieux possess a Gravettian element; the details of their morphology are reviewed in chapter 9 (§§ 9.2.9, 9.3.8, and 9.4.3).

6.13 Bladelets

Microoliths from Solvieux fall into three distinct classes: backed bladelets, bladelets with fine direct (obverse) retouch, and bladelets bearing fine inverse (indirect) retouch. Each is virtually restricted to one or two industries, but it is convenient to review them all together here so as to make clear the distinctions between them. All, by definition, are less than 1.5 cm wide, and their widths are expressed by the *a*, *b*, and *c* width classes defined above for Gravette points.

6.13.1 Backed bladelets

Backed bladelets are *lamelles à dos*, that is, bladelets bearing a continually retouched vertical back. Their ends may be broken, unmodified, or truncated, and they lack the special shaping retouch characteristic of Gravette points. In addition, to qualify for this class, a piece's backed edge must exceed 1.5 mm in

height, and this height must constitute between 35% and 65% of the current width of the piece.

In those Solvieux assemblages that possess these microoliths, the vast majority fall into type 85a, backed bladelet, which meets the essential definition of the type and involves no additional special features. If only a segment of this most common form is present, constituting no more than an estimated one-third of the original specimen, the piece is assigned to type 86, fragment of backed bladelet. Type 85b, special backed bladelet, houses certain forms that are given individual type status on conventional type-lists but which do not warrant it at Solvieux because of their rarity. These include backed bladelets which are truncated at one or both extremities, which oppose the backed edge with a denticulated margin, or which are pointed. The point of the last is formed naturally by the intersection of the backing retouch and the opposite margin, which remains unmodified; even if some amount of shaping retouch is entailed, the piece does not resemble a Gravette point.

Two potentially troublesome zones of intergradation lie on the borders of backed bladelets. One involves Gravette points. As has been noted, intergradation does not arise in practice because the two forms are mutually exclusive in Solvieux's industries. There are, nonetheless, some interesting contrasts when Solvieux's only sizable sample of backed bladelets, that from the Middle Magdalenian couche I/II composite series (see table 8.9), is compared to its only sizable sample of Gravette points, from the Rayssé Perigordian couche 6-M assemblage (see table 9.23). The sidedness of the backing is significant: some preference exists toward the right among Gravettian points, whereas backed bladelets show a strong bias toward the left. The manner of backing retouch also differs significantly in that only 9% of backed bladelets carry bidirectional retouch compared to 34% of Gravettian points. In the latter, by the way, such retouch is as common among microgravettes as Gravettes, whereas among backed bladelets it tends to associate with larger piece size. Finally, black flint accounts for 66% of the backed bladelets and only 45% of the Gravettian pieces.

The second zone of intergradation is of greater practical concern. It involves pieces that are

reminiscent of backed bladelets but, because they fail to meet the dimensional requirements, are assigned to type 94 (bladelet with fine direct retouch). Most of these are thin and quite narrow, and most or many of them may simply be diminutive backed bladelets; this is certainly true of those appearing in Middle Magdalenian assemblages like couches I and II (§ 8.8.2). They must, of course, be singled out for comment. But the dimensional rules cannot be relaxed to allow for their coding as backed bladelets, as such forms also appear in assemblages lacking typical backed bladelets altogether.

6.13.2 Bladelets with fine direct retouch

Bladelets with fine direct retouch possess a margin that bears continuous abrupt or semiabrupt retouch, but they fail to meet the dimensional requirements of a backed bladelet. While the two types overlap, the average member in this class usually has a quite different aspect, and is not, in fact, a backed piece at all. Its retouched edge is considerably less than 1.5 mm in height, and the thickness of this edge is equivalent to only 10% or less of piece width. In one assemblage, 3-A, such bladelets make up a quite homogeneous population suggesting a distinctive type (§ 7.11). They are quite heterogeneous, however, elsewhere at Solvieux.

6.13.3 Bladelets with fine inverse retouch

Bladelets with fine inverse retouch bear on one margin abrupt or semiabrupt retouch that has been spalled from the dorsal face. They do not intergrade with any other group of bladelets and are largely restricted at Solvieux to a rather special sample from couche IV, which will be detailed subsequently (§ 10.5). They ought not to be confused with the Dufour bladelet (*lamelle Dufour*), which at least ideally opposes the inversely retouched margin to one that is obversely retouched. If defined in this strict sense (of a *lamelle à retouche alterne*), Dufour bladelets do not appear at Solvieux.

6.14 Ad hoc tools

Upper Paleolithic type-lists are monopolized by artifact classes whose relatively standardized forms are the product of design and intentional retouch. To

these standard morphological types, the lists add a handful of forms referred to here as "ad hoc tools." These supplemental pieces bear opportunistic retouch or the stigmata of appreciable use-wear. Although not intentionally shaped, they tend to exhibit recurring forms that indicate some amount of selection of the blanks involved. The ad hoc group conventionally includes notched and denticulated pieces along with sidescrapers, which in most Upper Paleolithic industries involve not the carefully fashioned types sometimes encountered in the Mousterian but simply crude, if regular, denticulated pieces that happen to assume the appropriate geometry. Splintered pieces (*pièces esquillées*) also may be considered ad hoc tools. For some reason, they are quite rare at Solvieux and altogether absent elsewhere in the Neuvic sector.

Judging from the amount of knicking and squilling observable in any collection of debitage, the above forms constitute only a fraction of the actual component of ad hoc tools that exists in any given industry. We simply attempt to follow what appear to us to be the conventional, if largely unstated, canons for assigning pieces to these categories. This will allow comparisons to be made between the counts for Solvieux assemblages and those of the industries discussed in the literature. Inventorying ad hoc pieces in this restricted manner tells us very little about the functional dimension of lithic technology. But not to inventory them would distort the quantitative descriptions and comparisons of Solvieux's industries.

6.15 Diverse pieces and uncounted artifacts

The diverse category comprises pieces that are intentionally shaped by retouch but do not qualify for any regular category on the type-list. They are few in number and unique in form.

Altogether distinct from these are the uncounted artifacts described for some of the assemblages. These specimens were recovered as an integral part of the couche under review but they are nonetheless believed to be intrusive from a closely approximate or now destroyed couche attributable to another industry. For obvious reasons, they usually comprise *fossiles directeurs*.

Notes

1. This cross-tabulation calls for a piece sample because the supports of combination pieces would wrongly be counted twice if it were a tool sample.
2. Close examination of table 6.1 and its numerous counterparts in other burin samples indicates that quasi-flakes tend not surprisingly to occupy a dead part of the contingency table where attribute interaction approaches randomness. In other words, unlike blades and regular flakes, they show marked proclivities toward neither narrowness nor wideness. Grouping quasi-flakes with standard flakes rather than with blades seems to make sense on typological grounds, however, and it obviously makes statistical sense. For one thing, experiment shows that statistical results tend to be somewhat clearer when quasi-flakes are not grouped with blades. For another, and much more importantly on practical grounds, grouping them with flakes provides greater balance to the numerical distribution of G-supports and R-supports. The crucial importance of this balance to the success of contingency table analysis is explained in § 5.4.2.
3. The point can be demonstrated in more formal statistical terms: the overall strength of association in table 6.2 would lower only slightly if the D2 and D4 profiles were collapsed into a single combined category (and their members consequently merged into a single column). Were any other pair of profile types to be collapsed instead, however, the degree of association in the table would be significantly reduced.
4. Here, again, we have been pursuing a multivariate issue, in this case a three-variable problem involving the Burin Profile, Support Type, and Burin Variety (that is, dihedral versus truncation) sets. No additional explicit statistical manipulation has been called for, due in part to the logical progression in which we have approached the issue and in part to the pattern of attribute interactions involved. How this three-variable problem could have been solved, had it been necessary, again using only the bivariate contingency table techniques with which the reader is already familiar, is shown in Sackett (1989:73–77).
5. Needless to say, our analysis has also failed to account for why Upper Paleolithic artisans made two such different varieties of burins in the first place. Few researchers seem to have addressed the question, apart from attributing the distinction to 'stylistic' preferences—an explanation that in and of itself explains nothing. A detailed attributal examination by Nicholas David of the Noaillian assemblages from Abri Pataud reveals differences in the morphology and positioning of biseaux in the two burin types suggesting a functional distinction (1966:228–233). While this may not be consistent with what has been observed in more informal fashion among Solvieux burins, the general thrust of David's argument remains viable. The writer sometimes wonders whether the question of use-life might not also be involved. It is possible to imagine that, all else being equal, loss of a biseau to breakage on a truncation burin may entail less overall damage to the trigon (and hence require less drastic rejuvenation spalling and concomitant change of profile) than breakage of a dihedral's biseau. The idea has never been tested. One may be inclined to reject the stylistic explanation as simply a means of avoiding the issue, but functional explanations falter in that they do not account for two basic facts: first, morphological variation observable within dihedral and truncation burins is greater than

any average differences seen between them; second, the nature of this variation itself differs greatly among assemblages that are closely related industrially but that happen to have employed different kinds of supports in manufacturing burins. We will see that this latter point is nicely illustrated in chapter 9 by Solvieux's three Raysse Perigordian assemblages, where—among other things—the dihedral burins of one (2-III) are actually stockier than the truncation burins of another (6-M).

6. We are indebted to Nicholas David for the conception of this template (see Sackett 1966).

7

Early Magdalenian Industry Couche 3-A

The sample of 2184 pieces from couche A in locality 3 is the largest Early Magdalenian assemblage recovered in the Perigord since the pre-World War II excavations at the vast rock shelter of Badegoule (Cheynier 1939). No doubt it will serve as a key *série de référence*, or type-assemblage, for this rich and complex industrial tradition. More important to our immediate needs, its artifactual wealth makes it an excellent vehicle for establishing the canons and format of our approach to typological analysis, as well as a useful frame of reference when reviewing the other Solvieux assemblages in the chapters that follow.

This chapter begins with background information on the 3-A assemblage's general aspect, technology, and distribution of single and combination pieces. The typological groups are then reviewed in the order in which they appear in the Tool Count of table 7.3, whose format is specifically tailored to accommodate the typological makeup of Solvieux's Magdalenian and Raysse Perigordian assemblages (§ 5.3.2). Readers may wish at this point to review the general summary of the 3-A industry that closes this chapter (§ 7.15). A substantial discussion of how it fits into and illuminates our understanding of Magdalenian industrial evolution is found in § 11.1.

Unlike the Raysse Perigordian assemblages discussed in chapter 9, couche 3-A is not accompanied by ancillary lenses warranting detailed examination

in their own right. Couche 4-A, a slightly higher Early Magdalenian horizon appearing in locality 4 (§ 3.3.1), does deserve mention, however. The small collection of 48 pieces recovered from 4-A adds nothing to our knowledge of the industry, and in fact approximates what one might find in a random sample of its size drawn from 3-A itself. The primary contribution of 4-A, apart from reminding us that couche 3-A is most likely a palimpsest of similar, more closely packed horizons, has been to provide a sound industrial context for the intact member of the pair of Early Magdalenian lamps found in Solvieux Centre (§ 4.4.2).

7.1 Preliminaries

The count sheets for the 3-A series (tables 7.1 through 7.4) show that the industry is characterized by robust, well-proportioned blades. These blades carry marginal retouch far more often than do the supports of other Solvieux assemblages. In overall quality of workmanship the industry ranges from stolid competency to a kind of rugged handsomeness, definitely more adroit than the Raysse Perigordian assemblages if not as well fashioned as those of the Middle Magdalenian. The latter's closer approximation to elegance may largely be the product of considerably more gracile blanks, which require less heavy spalling and therefore promote a

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Table 7.1. Piece Count: Early and Middle Magdalenian assemblages

		3-A		I/II	
		N	%	N	%
Scrapers					
1a	Endscraper on blade	83	3.80	36	6.52
1b	Endscraper on flake	10	0.46	5	0.91
2	Double endscraper	8	0.37	3	0.54
3	Flake scraper	10	0.46	6	1.09
9	Endscraper on retouched blade	36	1.65	11	1.99
11	Block/Aurignacian scraper	6	0.27	1	0.18
Composites					
17	Scraper + burin	44	2.01	14	2.54
18	Scraper + truncation	3	0.14	—	—
19	Burin + truncation	6	0.27	2	0.36
20	Perforator + truncation	1	0.05	—	—
21	Perforator + scraper	2	0.09	—	—
22a	Perforator + burin	4	0.18	—	—
22b	Point + burin	—	—	2	0.36
22c	Point + scraper	1	0.05	1	0.18
Perforators					
23	Percoir	34	1.56	5	0.91
24	Micropercoir	5	0.23	3	0.54
25	Star perforator	6	0.27	—	—
27	Bec	22	1.01	7	1.27
28	Thorn	10	0.46	2	0.36
29	Bec burinant alterne	3	0.14	1	0.18
Burins					
30	Axial dihedral burin	270	12.36	129	23.37
31	Lateral dihedral burin	116	5.31	67	12.14
32	Lateral break burin	35	1.60	8	1.45
34a	Corbiac burin	10	0.46	1	0.18
34b	Burin-point	3	0.14	—	—
36	Double dihedral burin	36	1.65	10	1.81
37	Axial truncation burin	100	4.58	13	2.36
38	Lateral truncation burin	108	4.95	10	1.81
41	Transverse burin	27	1.24	5	0.91
42	Double truncation burin	16	0.73	—	—
46a	Multiple mixed burin (std/std)	26	1.19	9	1.63
46b	Multiple mixed burin (std/special)	2	0.09	—	—
Truncations					
57	Traverse truncation	23	1.05	8	1.45
58	Oblique truncation	8	0.37	8	1.45
59	Medial oblique truncation	6	0.27	1	0.18
60	Bitruncated piece	1	0.05	—	—
Marginally retouched pieces					
61	Whole	78	3.57	4	0.72
62	Fragment	40	1.83	3	0.54
Ad hoc tools					
72	Notched piece	91	4.17	21	3.80
73	Denticulate piece	42	1.92	31	5.62
74	Splintered piece	1	0.05	—	—
75	Sidescraper	5	0.23	—	—
Raclettes					
76a	Raclette	628	28.75	—	—
76b	Raclette fragment	99	4.53	—	—
Bladelets					
85a	Backed bladelet	9	0.41	56	10.14
85b	Special backed bladelet	—	—	21	3.80
86	Fragment of backed bladelet	—	—	5	0.91
94	Bladelet with direct retouch	66	3.02	34	6.16
95	Bladelet with inverse retouch	1	0.05	—	—
Points					
101a	Pointed blade	33	1.51	2	0.36
101b	Solvieux point	—	—	6	1.09
Diverse pieces					
105	Diverse	12	0.55	1	0.18
Totals		2184	100.01	552	99.99

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Table 7.2. Piece Group Count: Early and Middle Magdalenian assemblages

	3-A		I/II	
	N	%	N	%
Scraper group				
Endscrapers (1, 2, 9)	137		55	
Other scrapers (3, 11)	16		7	
	<u>153</u>	7.01	<u>62</u>	11.23
Composite group				
Scraper + standard burin (17)	44		14	
Scraper + special burin (17)	0		0	
Other composites (18-22c)	17		5	
	<u>61</u>	2.79	<u>19</u>	3.44
Perforator group				
Standard (23, 27, 28)	66		14	
Special (24, 25, 29)	14		4	
	<u>80</u>	3.66	<u>18</u>	3.26
Standard burin group				
Dihedral (30, 31, 36)	422		206	
Break (32)	35		8	
Truncation (37, 38, 41, 42)	251		28	
Multiple mixed (standard) (46a)	24		9	
	<u>732</u>	33.52	<u>251</u>	45.47
Rayse burin group (44)	0	0.00	0	0.00
Miscellaneous burin group				
Other special burins (34a, 34b)	13		1	
Multiple mixed (standard + special) (46b)	2		0	
	<u>15</u>	0.69	<u>1</u>	0.18
Gravette group (48b, 51, 52)	0	0.00	0	0.00
Truncation group (57-60)	38	1.74	17	3.08
Marginally retouched group (61-62)	118	5.40	7	1.27
Raclette group (76)	727	33.29	0	0.00
Bladelet group				
Backed bladelet (85-86)	9		82	
Retouched bladelet (94-95)	67		34	
	<u>76</u>	3.48	<u>116</u>	21.01
Point group				
Pointed blade (101a)	33		2	
Solvieux point (101b)	0		6	
	<u>33</u>	1.51	<u>8</u>	1.45
Ad hoc/diverse group (72-75, 105)	151	6.91	53	9.6
Totals	<u>2184</u>	100.00	<u>552</u>	99.99

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Table 7.3. Tool Count: Early and Middle Magdalenian assemblages

	3-A		I/II	
	N	%	N	%
Standard burins				
Dihedral burin (30, 31)	491	21.06	229	39.48
Lateral break burin (32)	58	2.49	18	3.10
Truncation burin (37, 38, 41)	315	13.51	33	5.69
Special burins				
Raysse burin (44)	—	—	—	—
Noailles burin (43)	—	—	—	—
Busked burin (35)	—	—	—	—
Corbiac burin (34a)	12	0.51	1	0.17
Burin-point (34b)	3	0.13	—	—
Scrapers				
Endscraper (1, 9)	193	8.28	68	11.72
Flake scraper (3)	10	0.43	6	1.03
Carinate/nosed scraper (11)	7	0.30	1	0.17
Standard perforators				
Percoir (23)	37	1.59	5	0.86
Bec (27a)	27	1.16	7	1.21
Thorn (28)	10	0.43	2	0.34
Special perforators				
Micropercoir (24)	5	0.21	3	0.52
Star perforator (25)	6	0.26	—	—
Bec burinante alterne (29)	3	0.13	1	0.17
Truncations				
Traverse truncation (57)	34	1.46	9	1.55
Oblique truncation (58)	9	0.39	9	1.55
Medial oblique truncation (59)	6	0.26	1	0.17
Marginally retouched pieces				
Piece with continuous retouch (61)	118	5.06	7	1.21
Points				
Pointed blade (101a)	33	1.42	4	0.69
Solvieux point (101b)	—	—	7	1.21
Gravette points				
Gravette technopiece (48)	—	—	—	—
Gravette/microgravette point (51, 52)	—	—	—	—
Bladelets				
Backed bladelet (85)	9	0.39	82	14.14
Bladelet with direct retouch (94)	66	2.83	34	5.86
Bladelet with inverse retouch (95)	1	0.04	—	—
Raclettes				
Raclette (76)	727	31.19	—	—
Ad hoc (72-75)	139	5.96	52	8.97
Diverse				
Diverse (105)	12	0.51	1	0.17
Totals	2331	100.00	580	99.98

Table 7.4. Common Toolkit: Early and Middle Magdalenian assemblages

	3-A		I/II	
	N	%	N	%
Standard burins				
Dihedral burins (30, 31)	491		229	
Lateral break burins (32)	58		18	
Truncation burins (37, 38, 41)	315		33	
	<u>864</u>	61.06	<u>280</u>	64.67
Scrapers				
Endscrapers (1, 9)	193		68	
Other scrapers (3, 11)	17		7	
	<u>210</u>	14.84	<u>75</u>	17.32
Standard perforators				
Percoirs (23)	37		5	
Becks (27a)	27		7	
Thorns (28)	10		2	
	<u>74</u>	5.23	<u>14</u>	3.23
Truncations				
Traverse (57)	34		9	
Oblique (58)	9		9	
Medial oblique (59)	6		1	
	<u>49</u>	3.46	<u>19</u>	4.39
Marginally retouched pieces (61-62)	118	8.34	7	1.62
Retouched bladelets				
Direct fine retouch (94)	66		34	
Inverse fine retouch (95)	1		0	
	<u>67</u>	4.733	<u>34</u>	7.85
Pointed blades (101a)	33	2.33	4	0.92
Totals	<u>1415</u>	99.99	<u>433</u>	100.00

higher degree of standardization. Still, atypicality and rejuvenation are decidedly more common in 3-A than in I/II, suggesting the Early Magdalenian knappers had a somewhat more expeditious approach to stone tool technology.

Couche 3-A pieces are heavily patinated and, following the rule at Solvieux, are predominately of black and brown flint. Only two-thirds of the brown are of the usual Ivy League variety; the remaining third is of rainbow, which at Solvieux is essentially restricted to couche 3-A. But given the great variation and overlap with regard to aspect and color shown by their principal zones when patinated, the two varieties often cannot be distinguished on individual pieces. One must be content to assign their members simply to a generic brown flint type. About 8% of the assemblage involves varieties of

banded and zoned Bergerac flints that seem to fall outside the Ivy League-rainbow spectrum but which also belong to this generic brown, along with a few rare black and gray types.

The flint types vary disproportionately from one typological group to the next (table 7.5). To some extent this distribution reflects the properties of the flints themselves. The finer grained black, for example, not surprisingly dominates the bladelet group here as in every other Solvieux assemblage. On the other hand, presumably because it occurs naturally in appreciably larger nodule sizes, brown is the flint of choice for the more robust blades used both for tools and as blanks used to produce the waferlike supports required for raclettes. Their special properties seem to be irrelevant in the case of many typological groups, however, where the two flint

Table 7.5. Percentage distribution of flint types among major typological groups of the 3-A assemblage

	Standard Burins	End-scrapers	Perforators	Truncations	Marg Ret. Pieces	Pointed Pieces	Retouched Bladelets	Raclettes
Brown	52.0	65.0	64.6	65.8	77.1	97.0	14.5	92.0
Black	43.0	27.0	26.8	26.3	14.4	3.0	82.9	7.0
Other	4.9	8.0	8.5	7.9	8.5	—	2.6	1.0
N	732	137	82	38	118	33	76	727

types are worked into virtually identical kinds of blanks (for example, endscrapers, perforators, and truncations).

The distribution of piece types among the principal typological groups of the common assemblage is shown in table 7.6. The types vary proportionately from one group to the next in a pattern that appears to be generic to Solvieux's Magdalenian and Raysse Perigordian industries (§ 6.1).

7.2 Standard burins

Standard burins make up 61% of the common toolkit and 34% of the global piece count. The first figure approximates that of the other Solvieux assemblages; the second, like that of all standard typological groups in 3-A, is considerably lower than average, being proportionately reduced by the assemblage's extremely large raclette component.

7.2.1 General

Dihedral burins account for 57% of the standard burin tool sample, truncation burins for 36%, and break burins for 7%. The dihedral/truncation burin ratio is a less extreme version of what is seen in the Middle Magdalenian assemblages and the reverse of the Raysse Perigordian series, where truncation burins are twice as common as dihedrals. Standard burins follow the rule in being twice as likely as endscrapers to join with their own kind in multiple and double pieces but only one-fourth as likely to join with members of other typological groups in composites (table 7.6). A more detailed look at burin composites is provided in table 7.7. Again, following the generic pattern, the bulk of composite pieces involves burin + scraper combinations wherein dihedral and truncation burins join in numbers com-

Table 7.6. Percentage distribution of piece types among standard typological groups of 3-A assemblage

	Standard Burins	End-scrapers	Perforators	Truncations
Single	83.2	69.7	90.4	77.1
Multiple	9.9	4.3	0	2.1
Composite	6.9	25.9	9.6	20.8
N	786	185	74	48

Table 7.7. Association pattern of 3-A burin composite pieces

	Dihedral Burin	Break Burin	Truncation Burin	
Endscraper	23 —	4 —	17 —	44 81.5
Truncation	3 —	0 —	3 —	6 11.1
Perforator	1 —	1 —	2 —	4 7.4
	27 50.0	5 9.3	22 40.7	54

mensurate with their proportions in the burin sample as a whole. There is an apparent, if not statistically significant, increase in the proportion of break burins.

Table 7.8 indicates how the standard varieties combine among multiple burins. The table contains an additional row of cells to accommodate two multiples involving Corbiac burins. When counted as individual tools, the varieties appear in essentially

Table 7.8. Association pattern of 3-A multiple burins

Dihedral	24 [20.0]			
Break	10 [9.1]	2 [1.0]		
Truncation	20 [28.9]	4 [6.6]	16 [10.4]	
Corbiac	1 [1.0]	0 [0.2]	1 [0.7]	0 [0.01]
	Dihedral	Break	Truncation	Corbiac

Note: Expected frequencies are shown in brackets

the same proportions here as among composite pieces (dihedral 51.3%, break 11.7%, truncation 37.0%). Thanks to the relatively large sample size of 154 tools, the apparent proportionate increase of break burins can in this case be shown to be statistically significant. The number of pieces of each kind of multiple that would be expected if the individual types happened to pair at random is shown in brackets in table 7.8. Dihedral and, especially, truncation burins tend to combine with their own kind more often than chance would dictate; reciprocally, the dihedral + truncation combination is proportionally underrepresented. Despite their greater propensity to join in multiple pieces, break burins seemingly combine at random both with themselves and with dihedral and truncation burins.

Table 7.9 indicates how blank varieties and widths distribute in the burin sample and combine into the support types. Well-made blades are common (73%), and three-quarters of the flakes are quite laminar and would qualify as flake-blades in the terminology of many researchers. Yet even the blades possess a robustness that increases their average width considerably, accounting for the relatively low proportion of G-supports (60%) in comparison to other Solvieux burin samples that possess a strong blade component (for example, I/II and 6-M). This robustness especially typifies specimens of brown flint, whose larger nodules were obviously taken advantage of in producing burin blanks. Thus, G-supports account for 65% of burins in black flint

Table 7.9. Blank morphology of 3-A standard burins. Cross-tabulation of Blank Variety and Blank Width.

	Blade	Flake	Square Flake	
2 cm	184 31.9	5 2.7	0 —	189 24.0
3 cm	283 49.1	82 44.8	5 17.9	370 47.0
4 cm	100 17.4	76 41.5	12 42.9	188 23.9
≥ 5 cm	9 1.6	20 10.9	11 39.3	40 5.1
	576 73.2	183 23.3	28 3.6	787

G-supports: 60.0%

R-supports: 40.0%

Average width = 3.10 cm

$\chi^2 = 185.86$ ($p < .001$)

$\phi = .486$

Note: Solid line demarcates G- and R-supports; dashed line demarcates R1- and R2-supports

but only 52% in brown. Apart from lacking amorphous and, especially, square flakes, blanks from the combination piece subsamples vary little from the norms for single burins. Those carrying multiple burins tend to be somewhat more gracile, presumably because blanks that can accommodate a burin at each end are more regular in shape and parallel sided than most. Composites, on the other hand, most likely because they are dominated by the scraper + burin combination, somewhat favor the stockier blanks typical of 3-A endscrapers. These differences are unimportant typologically, however, because they are not marked enough to affect significantly the distribution of trigon profiles in the two subsamples, which is essentially the same as that of single burins.

It is relatively easy to code the profiles of 3-A burins, in part because few pieces are truly chunky or irregularly shaped despite the stockiness of many of their supports. Neither thick and polyhedral biseaux nor flat-faced burin facets are common.

Table 7.10. Dihedral burin dynamics: 3-A tool sample.
Cross-tabulation of Burin Profile and Support Type.

	D1	D2	D3	D4	D5	
G-support	118	90	18	58	37	321
	91.5	64.8	26.1	70.7	51.4	65.4
R-support	11	49	51	24	35	170
	8.5	35.3	74.0	29.3	48.6	34.6
	129	139	69	82	72	491
	26.3	28.3	14.1	16.7	14.7	

$$\chi^2 = 93.15 (p < .001)$$

$$\phi = .436$$

About 9% of all pieces in the burin count carry at least some marginal retouch, although the percentage of those with enough to satisfy our definition of a marginally retouched piece is somewhat less. Assessing retouch among burins is difficult because an appreciable amount of their margins has often been obliterated by burinated facets. Still, burins are obviously less often retouched than members of other typological groups, especially end-scrapers. Retouch distributes randomly with respect to the burin varieties and the blanks that carry them.

We next turn to an analytic description of 3-A's standard burins. It illustrates the detailed discussion of burin typological dynamics already provided (§§ 6.3.2 through 6.3.4), showing how the patterns somewhat ideally presented in that analysis are expressed in the laboratory. What follows is designed to be read in tandem with that earlier discussion.

7.2.2 Dihedral burins

Table 7.10 is a cross-tabulation of the Burin Profile and Support Type sets in the 3-A dihedral burin sample. This same table was used to introduce contingency table analysis (see table 5.1), and is nearly the same as that used in our discussion of burin typological dynamics in § 6.3.2 (see table 6.2), except that it has been simplified by collapsing the R1 and R2 subtypes of supports into a single R-support category. This merging of attributes removes one row from the table and reduces the number of its cells by one-third. A more detailed cross-classification was called for in our original discussion of burin dynamics. But we use this reduced format in our analytic descriptions of the Solvieux standard burin samples

because most of them are much smaller than the 3-A sample, and consequently they are far more likely to be distorted by sampling error if presented in the larger table.

While typical D1 narrow burins can appear on robust R-supports (plate 3a), most are relatively gracile (plate 3b, c), including those involved in multiple pieces (plate 3d, e). Because of the narrowness and length of its trigon, a *bec de flûte* profile is effectively realized even when the biseau is positioned closer to the margin than to the midline of the piece (plate 3f, g). This is why all narrow trigons are regarded as being axial. Breakage is common among the gracile blanks appropriate to this profile (plate 3i). This last example in fact approaches the limits of an acceptable piece for purposes of analysis; were it much shorter, it would be included in the group of fragmentary trigons omitted from the inventory because they cannot be confidently assigned to either a profile type or type-list category. The group includes 12 fragmentary tips of dihedral burins and six of truncation burins. Eight additional somewhat curious pieces were not inventoried; they appear to be broken dihedral burins that were consequently truncated as if in preparation for rejuvenation but were left unspalled and seemingly discarded. Most, if not all of them, originally possessed D1 profiles (plate 3j).

One-fifth of D1 burins are typical in the sense that one side of their trigon is only perfunctorily spalled or consists of a broken edge or the unmodified flank of the support. Also regarded as atypical are pieces that were either poorly made in the first place or simply broken and rejuvenated into a

profile that, for better or worse, now approximates the narrow category more satisfactorily than any other (plate 3h). The category also includes a few diminutive specimens whose trigon, strictly speaking, may not achieve a D1 silhouette but whose effective overall profile nonetheless does so because of the narrowness of the support carrying it (plate 3k).

As its popularity suggests, the D2 medium axial profile approaches the ideal for 3-A dihedral burins. It accommodates a considerable range of blank size and shape, and associates at random with G- and R-supports. Although it includes asymmetric specimens (plate 3o), two-thirds of its members bear reasonably symmetric trigons (plate 3l, m, n); the one illustrated in plate 8d belongs to a burin-scraper composite. Less than a quarter of D2 burins are atypical. The most interesting atypical specimens involve asymmetric trigons whose spalled edge opposes either a relatively steep flank (plate 3q) or an ordinary unmodified edge (plate 3p). In the latter case the facet must be canted onto the ventral face to approach the edge at a sufficient angle to produce a substantial biseau.

The D3 wide axial profile is much less common. Typical specimens tend to exceed only slightly the defining closing angle of 65° , to be made on robust blanks, and to be distributed evenly between symmetric (plate 3r, s) and asymmetric (plate 4a, b, c distal) trigons. The trigon in plate 4c is made on a fairly chunky flake that called for extensive spalling and originally may have possessed a different profile. Crudely chopped facets are common among atypical specimens (plate 4e), as are trigons that oppose a spalled facet to a broken edge (plate 4d). That nearly half of all D3 burins are atypical attests to the difficulty of systematically spalling wide axial dihedral trigons.

Lateral profiles constitute less than one-third of the sample, of which slightly more than half carry D4 medium trigons (plate 4f, g). We saw in § 6.3.2 that this profile tends to intergrade with its axial counterpart D2 in the case of relatively gracile pieces. Thus, the decision to code certain pieces as typical D4 rather than as an asymmetric D2 can be arbitrary, depending upon only a slight difference in how the piece is oriented when projected against the

trigon template for codifying (plate 4h). Compounding the problem of intergradation, more than a third of the D4 specimens exhibit quasi-lateral trigons. These can be robust (plate 4j) but they are more often relatively gracile (plate 4i, k, l), because burination is more likely to encroach heavily onto the width of narrower pieces, producing the medial biseau that distinguishes a quasi-lateral trigon. This process contributes to the modest tendency of the D4 profile to associate with G-blanks. Atypicality is displayed in the same manner and extent here as in the D2 profile. One edge of the trigon may consist of a minimally spalled facet (plate 4n), for example, or it may have a chopped and reworked appearance suggesting it underwent a profile change during its career (plate 4m).

A D5 wide lateral trigon can be produced on essentially any blank, and many are in fact gracile (plate 5d, e). Yet this is the only dihedral profile type that easily lends itself to robust supports like stocky blades (plate 5a) and square flakes (plate 5b), which explains the modest but still significant association between D5 trigons and R-supports seen in table 7.10. Moreover, it is due to the preponderance of such blanks, which can undergo fairly heavy spalling and still retain a laterally positioned biseau, that quasi-lateral forms account for only one-tenth of the burins assigned to this profile. The piece illustrated in plate 5c is an interesting example, with its axial biseau resulting from a succession of spalls progressively encroaching upon the ventral face of the blank. About two-fifths of D5 burins are atypical, consisting mostly of either crudely spalled stocky blanks or more gracile burins that likely once possessed other profiles but were rejuvenated into the D5 form after having suffered heavy usage.

7.2.3 Truncation burins

Table 7.11 is a simplified version of the cross-tabulation used in our earlier discussion of truncation burin dynamics (table 6.4). We have seen that the first five (T1 through T5) truncation burin profiles interact with the support types in essentially the same fashion as their dihedral counterparts, although their frequency distribution shows marked shifts in emphasis because of the different dynamics involved in truncation burin manufacture (§ 6.3.3).

Table 7.11. Truncation burin dynamics: 3-A tool sample.
Cross-tabulation of Burin Profile and Support Type.

	T1	T2	T3	T4	T5	T6	T7	
G-support	15 93.8	31 70.5	22 32.4	25 69.4	56 59.0	12 57.1	5 14.3	166 52.7
R-support	1 6.3	13 29.6	46 67.7	11 30.6	39 41.1	9 42.9	30 85.7	149 47.3
	16 5.1	44 14.0	68 21.6	36 11.4	95 30.2	21 6.7	35 11.1	315

$$\chi^2 = 54.10 (p < .001)$$

$$\phi = .414$$

T1 narrow trigons are few and mostly atypical, as the edges of blanks gracile enough to accommodate the profile rarely provide sufficient bite for a proper truncation. Fairly heavy continuous marginal retouch often substitutes for it (plate 5f), or the truncation is minimal and barely meets the full width of the biseau (plate 5g). A narrow truncation is often accompanied by a minimal burin facet (plate 5h).

T2 medium axial burins are more numerous and better made; they more often than not occupy G-supports (plate 5i, j). A particularly good example, paired with another truncation burin on a multiple piece (plate 5k), illustrates that the R-supports used for this profile are stocky but nonetheless laminar blanks. Symmetric trigons like those illustrated constitute about two-thirds of the group. The distinction between asymmetric T2 and quasi-lateral T4 trigons can be fairly arbitrary when a gracile support is involved (plate 5l).

The T3 wide axial profile is especially compatible with truncation burin dynamics and therefore, unlike its dihedral counterpart (D3), is numerous. Symmetric trigons (plate 5m, n, o, p) are slightly more common than asymmetric ones (plate 6a, b). A distinctive feature exhibited by most of the illustrated pieces is the dorsally twisted burin facet, which seems to be a stylistic peculiarity of 3-A burins. It recurs occasionally among other truncation burin profiles in the series and may occasionally appear even on wide dihedral burin trigons (plate 4d). Although the T3 profile lends itself to R-supports, these are usually the husky and handsome blades that characterize 3-A flint knapping rather than actual flakes (plate 6c). On gracile sup-

ports the profile often seems to have resulted from extensive rejuvenation of a burin that formerly belonged to some other profile (plate 6d, perhaps 6e). Such reworked burins bearing only a significant remnant of their original truncation are referred to as being overstruck.

T4 medium lateral profiles are varied but well made (plate 6f, g, h). Two-thirds are quasi-laterals which, like their dihedral D4 counterparts, favor G-supports (plate 6k). Narrower ones are sometimes overstruck (plate 6i, m). Even when carried on an R-support a T4 quasi-lateral can be difficult to distinguish from an asymmetric T2 trigon (plate 6j, l).

The T5 wide lateral is the best represented of all truncation burin profiles in the 3-A series. It lends itself to essentially any kind of blank. Specimens on G-supports are not uncommon (plate 6n, o, p), although the type shows a slight preference for more robust R-supports. Among the latter, single specimens are usually carried on broad, stocky flakes (plate 6q, plate 7b) rather than on blades (plate 7a), although, not surprisingly, the latter dominate among combination pieces (plate 4c proximal, plate 6r). Nearly a quarter of the members of this profile technically constitute quasi-laterals, which sometimes intergrade with asymmetric T3 profiles. But because of their substantial average width, they more often retain an overall broad lateral aspect (plate 5k proximal). For the same reasons as its dihedral counterpart (D5), this profile type has more atypical members than the preceding truncation burin profiles. These members still account for only one-fifth of the group (plate 7c, d).

T6 semi-transverse burins are few and diverse. Some are legitimate transverse burins that happen to possess relatively narrow closing angles because the support's flank is steep enough to receive a typical truncation (plate 7e). Often, however, a more conventional low-angled lateral margin is involved that simply bears some noninvasive light retouch that serves as a minimal truncation (plate 7f). Equally common are overstruck burins that have achieved semi-transverse status only by default, heavy rejuvenation having resulted in a more or less laterally positioned biseau on what is only the marginal remnant of its original truncation (plate 7g).

The T7 traverse profile, in contrast, constitutes a reasonably clear-cut type whose dynamics are closely tied to stocky flakes (§ 6.3.3). Some occupy robust blades whose flanks are sufficiently thick to receive steep and encroaching retouch equivalent to that of an ordinary truncation (plate 7i, j). Most transverse burins, however, occupy square flakes and are directly analogous to T5 burins, except for the orientation of their truncation with respect to the support's axis of percussion (plate 7h, l).

7.2.4 Break burins

Break burins are restricted by definition to a single profile, the B5 wide lateral; the few burins on breaks whose trigons describe other profiles are classified as atypical dihedral burins. That even B5 break burins may have a general kinship to dihedrals is suggested by the fact that, in the 3-A sample, the two varieties possess equal proportions (65%) of G-supports. The range of blanks is especially broad (plate 7k, m), however, and B5 trigons sometimes appear on irregular blanks that could not easily accommodate either a regular dihedral or a truncation burin (plate 7n). Break burins are more likely than the other standard varieties to appear on multiple (plate 6o proximal) and composite (plate 8g) pieces.

7.3 Special burins

Special burins are numerically insignificant. More than half—comprising one Noailles and 17 Raysse burins—presumably represent contamination from couche 4-B and are therefore not included in the assemblage count. They are discussed in § 7.14. Fif-

teen additional specimens do warrant inclusion here, however.

Corbiac burin

There are 12 Corbiac burins, of which two join other types of burins in multiple pieces. Eight, including the latter two, meet the standard definition of the type, consisting of a single burin facet spalled from an unmodified or only lightly retouched margin. This group is evenly divided between left- and right-handed forms. At least half of them are altogether typical (plate 8a, c), but the rest suggest poorly rejuvenated standard burins. The four remaining specimens constitute a specialized class of their own, consisting of polyhedral, flat-faced burins spalled from the left margin (plate 8f), which in all but one bears fairly extensive retouch. Were it not for the peculiar configuration of the biseau, which essentially continues the line of the lateral margin and therefore retains the diagnostic trihedral form, the retouched specimens could fairly be regarded as atypical transverse burins.

Burin-point

Only one of the three single specimens inventoried as burin-points approximates the normative definition. In the other two, tertiary modification takes the form of extensive dorsal polyhedral dihedral spalling superimposed over what originally seems to have been a D4 medium lateral dihedral burin. The angled outline described by their quasi-biseaux is decidedly that of a burin-point, however. One specimen is striking (plate 8e), in addition to which both of its margins bear retouch; its opposite end would qualify as a proximal point (type 101a) had it not retained a bulb of percussion on its ventral face.

7.4 Endscrapers

Endscrapers account for 6% of the global piece count and 14% of the common toolkit. The latter approximates the average for Solvieux's Magdalenian and Perigordian industries; the former is disproportionately low because raclettes account for more than one-third of the global count. In this connection, many pieces bearing raclette retouch describe the outline form of endscrapers, and typologists are

often inclined to assign them to this class (for example, Bordes 1984:280). We do not follow this practice. When viewed in the context of the extremely large sample of over 700 raclettes provided by the 3-A assemblage, it is obvious that such forms are an integral part of the range of variation inherent in raclettes themselves and should be classified accordingly.

7.4.1 General

The distribution of piece types among 3-A endscrapers reflects the generic pattern at Solvieux (see table 7.6). Although endscrapers are only half as likely as standard burins to form double pieces with their own kind, they are four times as likely to enter into composites with other tool classes; 90% of their composites involve burin + scraper combinations. Blades are more common among endscrapers than among burins, but they are also wider, which accounts for the lower proportion of G-supports seen in table 7.12. That robust blanks tend to be less regular in shape than narrower ones is presumably why endscraper doubles and composites are somewhat more likely than single pieces to occupy G-supports.

Brown flint is more common among endscrapers than among burins (see table 7.5). Yet surprisingly, in view of the greater stockiness of endscrapers, it and black flint are worked into closely similar blanks. Black supports tend to be only slightly narrower than brown ones. Flint types distribute at random among the piece types. Marginal retouch is particularly common among endscrapers (25%) as compared to standard burins (9%) and truncations (12%). Equally interesting is its distribution over the piece types among endscrapers: its proportion is 28% for single pieces, jumps to 63% among double pieces, and drops markedly to only 6% for composite pieces. Seemingly, then, the presence of two fronts on a blank (double pieces) seems to promote the appearance of marginal retouch, whereas the appearance of a tool from another typological group (composite pieces) seems, as it were, to discourage it.

7.4.2 Analytic description

The 3-A sample is typified by well-made endscrapers carried on robust, handsome blades (plate 8j;

plate 9g, 1, n; plate 10e). Only a handful of those on flakes assume the stubby outline that would prompt some typologists to classify them as flake scrapers (plate 9b, c, d). Pieces on square flakes are virtually absent altogether for geometric reasons previously discussed (§ 6.5.1). The square flakes recorded in table 7.12 represent burin + scraper composites on which the scraper front more closely approximates that of an endscraper than a flake scraper; it would have been reasonable to classify them simply as burins whose blanks happen to carry secondary scraper fronts. 3-A endscrapers are generally parallel-sided. When their margins do happen to converge (plate 10d) or diverge (plate 9j) in approaching the front it is due to the natural contours of the blank rather than to intentional shaping by retouch. True fan-shaped scrapers here, as elsewhere at Solvieux, are virtually absent, whether retouched or not. An interesting piece contour that occurs occasionally among 3-A endscrapers involves a cantilevered front fashioned on the rather abrupt distal narrowing that sometimes appears on 3-A's particularly broad blanks (plate 8h, i). These forms are not to be

Table 7.12. Blank morphology of 3-A endscrapers. Cross-tabulation of Blank Variety and Blank Width.

	Blade	Flake	Square Flake	
2 cm	24 —	2 —	0 —	26 14.0
3 cm	75 —	7 —	1 —	83 44.6
4 cm	41 —	22 —	1 —	64 34.4
≥ 5 cm	11 —	2 —	0 —	13 7.0
	151 81.2	33 17.7	2 1.1	186

G-supports: 54.3%

R-supports: 45.7%

Average width = 3.34 cm

Note: Solid line demarcates G- and R-supports;
dashed line demarcates R1- and R2-supports

confused with shouldered scrapers because, unlike them, the constriction that bears the front is not itself the product of shaping retouch.

The active part of endscrapers, the front, has received considerable attention during the course of the Solvieux analyses, but it yields only modest, if subtly complex, results (§ 6.5.2). The distribution of 3-A endscraper contours is shown in table 7.13, along with those of the three other Solvieux endscraper samples large enough not to be seriously distorted by sampling error. The 3-A distribution does not closely resemble any of the other three, yet it nicely approximates the distribution that results when they are averaged together: round 52%, shallow 40%, and irregular 8%. The reason for its essentially modal behavior is the particular manner in which 3-A endscrapers combine what we have seen as the two key variables in front contour dynamics: blank morphology and use-wear (see § 6.5.2). The first of these is shown in table 7.14, where the front contours are cross-tabulated with the blank varieties, which in the case of endscrapers yields more

clear-cut patterning than the support types. The second, use-wear, defies precise statistical definition and is probably best expressed in terms of a between-sample comparison. The 3-A endscrapers display only a moderate degree of use-wear, affecting no more than one-fifth of their fronts, which is somewhat more than that seen in the I/II sample and notably less than that of the 2-III and 6-M samples.

Irregular fronts are relatively rare. Here, as elsewhere, they constitute something of a residual category, half of whose members consist of fronts too broken to be assigned with any degree of confidence to round or shallow. The remainder comprise endscrapers that were either poorly fashioned in the first place or broken and only indifferently rejuvenated. A few possess gracile supports (plate 9a), but more often than not they appear on flakes whose morphology promoted the manufacture of fronts that are atypical in form and spalling (plate 9b, c). Table 7.14 shows a positive interaction between irregular fronts and flakes. The sample has relatively few flakes, in fact, which—along with the lack of heavy usage among 3-A endscrapers—seemingly accounts for the relatively modest proportion of specimens with irregular fronts.

Round fronts, on the other hand, are well represented (plate 8g, j; plate 9f, i, l). Common among them is a feature that, along with quality and large size, is stylistically diagnostic of 3-A endscrapers: their fronts are often quite thin in spite of the overall robustness of their supports (plate 8j; plate 9n). Because of their thinness, it is frequently necessary to recognize as part of the front the somewhat lighter retouch that continues on one or both sides of its heavier abrupt spalling (plate 8j, plate 9i, l). Such fronts possess an effective round contour even though only their central portion displays substantial beveling retouch. The same result, of course, is often produced by marginal retouch (plate 8b, plate 9f, plate 10b), although not invariably (plate 10c).

Many round fronts depart from the arc of a circle. Some assume an ogival (plate 9j) or elongated (plate 9i, plate 14j proximal) silhouette. Regular asymmetry is considerably rarer on round than shallow fronts but appears nonetheless (plate 9n). Inspection shows that it is often produced by use-wear, which modifies fronts that originally seemed to have described a more regular curve.

Table 7.13. Percentage distribution of endscraper front contours in principal Magdalenian and Rysse Perigordian assemblages (tool samples)

	3-A	I/II	2-III	6-M
Round	54.9	64.7	45.7	45.0
Shallow	36.3	30.9	37.0	51.7
Diverse	8.8	4.4	17.3	3.3
N	193	68	81	60

Table 7.14. Endscrapers: 3-A tool sample. Cross-tabulation of Front Contour and Blank Variety.

	Round	Shallow	Irregular	
Blade	93	54	10	157
	87.7	77.1	58.8	81.4
Flake	13	16	7	36
	12.3	22.9	41.2	18.7
	106	70	17	193
	54.9	36.3	8.8	

$$\chi^2 = 8.22 (p < .05)$$

$$\phi = .206$$

Shallow fronts can be entirely typical and found on endscrapers that are in essentially mint condition (plate 8h; plate 9e, k; plate 10c, d). And they can be as thin as round ones (plate 9g). Yet, as discussed in § 6.5.2, a notably higher proportion of shallow contours display use-wear that obviously transformed into a flatter arc what was originally a rounder contour (plate 10a). Usage in particular promotes regular asymmetry, which is more than twice as common among shallow fronts as round ones (plate 8d proximal, plate 9m), or the more extreme form of asymmetry known as skewness (plate 9h), which is nearly three times more common. But many shallow fronts are primarily attributable to the principle of economy operating on blank morphology. Their weak but still significant association with flakes, as shown in table 7.14, involves accommodating the front to the geometry of stubby flakes (plate 9d). It also seems that the sheer size of 3-A blanks is great enough to promote shallow fronts, which can be spalled on particularly wide blanks with greater control than round ones (plate 9g, k; plate 10c).

7.5 Miscellaneous scrapers

Given their small numbers and especially their diversity, pieces with fronts apart from endscrapers are not characteristic of the 3-A industry. Instead, they simply represent the extremes of the range of typological variation that is likely to be sampled by a numerically very large assemblage.

Three of the ten pieces inventoried as flake scrapers are reasonably carefully worked standard flakes that possess a robust front occupying the end, as well as one entire margin, of the piece (plate 10l). The remaining seven are simply chunky square flakes carrying an abrupt front whose configuration appears to have been more or less opportunistically adapted to the contours of the blank and that otherwise displays no consistent shape (plate 10j).

Two of the six pieces inventoried as atypical carinate scrapers may simply be nuclei whose platforms have been slightly regularized by retouch to form a kind of rabot (plate 10k). The remainder are chunky or blocklike specimens shaped like carinate scrapers but lacking the systematic lamellar spalling that would qualify them as typical representatives of the class (plate 10h). This group in any case does not

suggest the presence in the 3-A assemblage of the numerically small but supposedly typical carinate scraper element occasionally reported in Magdalenian industries. Finally, one rather well-made shouldered carinate scraper fashioned on a blade is still elevated enough to bear quasi-lamellar spalling (plate 10g). While reminiscent of the muzzled scrapers that commonly occur in later Aurignacian assemblages, here it stands alone.

7.6 Standard perforators

7.6.1 General

Standard perforators constitute a modest yet significant proportion of the couche 3-A series, accounting for more than 5% of its common toolkit. None of their 74 members combine to form multiple pieces, but seven do derive from composites, of which three are percoirs and four bees (see table 7.6). Their blank morphology offers an interesting comparison with that of other 3-A typological groups (table 7.15). The flint types occur in proportions identical to those seen in endscrapers (see table 7.5), and no size differences are apparent within the sample between blanks obtained from black and brown flint. Yet the robust blades that typically appear among endscrapers and burins are rare. While perforators belonging to composites not surprisingly occupy gracile and parallel-sided blades, single ones are strongly nonlaminar and their supports do not appear to have been chosen with any obviously rigorous standards of shape or dimension in mind apart from their usually small size. They are nearly two-and-one-half times as likely as single burins to occupy standard and square flakes, and many of their supports are broken and seem to have been so at the time of manufacture. That only a single specimen bears marginal retouch is consistent with the somewhat rough and ready character of perforator blanks.

While the artisan's concern appears to have focused almost totally upon their projecting member, the vast majority of perforators were fashioned with reasonable care. The stigmata of breakage are, of course, common, and many pieces now classified as bees no doubt began their careers as percoirs. Atypicality itself, however, mostly entails a form

Table 7.15. Blank morphology of 3-A standard perforators. Cross-tabulation of Blank Variety and Blank Width.

	Blade	Flake	Square Flake	
2 cm	22 —	6 —	5 —	33 44.6
3 cm	17 —	9 —	5 —	31 41.9
4 cm	3 —	2 —	1 —	6 8.1
≥ 5 cm	0 —	1 —	3 —	4 5.4
	42 56.8	18 24.3	14 18.9	74

G-supports: 67.6%

R-supports: 32.4%

Average width = 2.74 cm

Note: Solid line demarcates G- and R-supports;
dashed line demarcates R1- and R2-supports

specific to perforators, where the projection opposes a retouched edge to a natural edge or break that already has the desired contour and is consequently modified only by use-wear.

7.6.2 Analytic description

The 3-A sample is the only one at Solvieux numerically large enough to permit some formal statistical analysis of attribute interaction. The trends seen in its typological dynamics patently involve geometric contingencies (§ 6.7.2). Most significant are the predilection of percoirs for an end profile and of becs for pointed and corner profiles (table 7.16). The reasons are obvious. For one thing, the relatively narrow and elongated percoir is easiest to disengage by retouch when oriented along the axis of the piece, whereas a pointed form, by definition, is more likely to approximate the broader outline appropriate to a bec. For another, a projection disengaged on the corner of the piece is more likely to describe the stubby outline of a bec unless the

Table 7.16. Standard perforators: 3-A tool sample. Cross-tabulation of Perforator Type and Profile Type.

	Percoir	Bec	Thorn	
End	20 54.1	3 11.1	5 50.0	28 37.8
Pointed	1 2.7	8 29.6	0 —	9 12.2
Corner	10 27.0	12 44.4	4 40.0	26 35.2
Side	6 16.2	4 14.8	1 10.0	11 14.9
	37 50.0	27 36.5	10 13.5	74

retouch forming its lower margin encroaches very deeply into the cross section of the blank. As for thorns, their number is so small that sampling error may influence their apparent associations seen in table 7.16, although they are consistent with the contingencies built into perforators. Pointed thorns, of course, are too diminutive to qualify for the category.

Blank morphology is not insignificant in perforator dynamics. A modest trend is apparent for percoirs and becs to associate with blades and thorns with flakes. More important, however, is the relationship between blank morphology and the positioning of the perforator. When Perforator Profile and Blank Variety are cross-tabulated (table 7.17), a clear pattern emerges wherein end and especially pointed perforators associate with blades, while corner and especially side perforators associate with flakes. In this case, blank varieties rather than support types are used, as the important feature here is the overall configuration of the blank rather than its dimensions. Once again, the role played by geometric contingencies is apparent.

Perforators are conveniently described and illustrated when organized according to the four profile classes: end, pointed, corner, and side.

End perforators

End perforators are dominated by percoirs, whose 23 members account for nearly 40% of the total

Table 7.17. Standard perforators: 3-A tool sample. Cross-tabulation of Perforator Profile and Blank Variety.

	End	Pointed	Corner	Side	
Blade	21 75.0	9 100.0	12 46.2	0 —	42 56.8
Flake	7 25.0	0 —	14 53.9	11 100.0	32 43.2
	28 37.8	9 12.2	26 35.1	11 14.9	74

$$\chi^2 = 24.08 (p < .001)$$

$$\phi = .570$$

sample. Two of the few perforators to be made on robust supports like those commonly seen elsewhere in this assemblage are particularly handsome end percoirs (plate 12a, n). More typical are perforators fashioned on relatively narrow blades (plate 11q), some of which are almost small enough to qualify as micropercoirs (plate 11a). Even end percoirs are sometimes made on square flakes, such as an atypical specimen in which a broken edge forms one side of the projection (plate 11o). Related in form is a specimen executed in raclette retouch (plate 12k), which also appears on three other perforators in the sample. (These perforators are the only tools shaped by raclette retouch in the 3-A assemblage whose forms seem to warrant assignment outside the raclette group.) End becs, on the other hand, are rare and of the rounded type that suggests a reused broken percoir (plate 11v). Nearly half of the small collection of thorns are end perforators, yet even they mostly occupy flakes and are sometimes quite small (plate 11p).

Pointed perforators

Pointed perforators are essentially limited to becs; their numbers otherwise include a single atypical percoir and no thorns at all. As typical specimens show (plate 11s, t), pointed becs can approximate the outline of a pointed blade (type 101a), but their retouch is limited to the projection itself. In the case of the specimen illustrated in plate 11t, this retouch is minimal indeed, and the profile is largely dictated by the natural contours of the blank. This class includes a robust and rather crude member whose right side presents the only instance of continuous

marginal retouch found among 3-A perforators (plate 11r).

Corner perforators

Corner perforators are well represented among percoirs, becs, and thorns. The projections of corner percoirs are, for obvious mechanical reasons, shorter than those often encountered among end percoirs (plate 11d, u), except for one quite robust elongated example (plate 12i). A corner profile particularly lends itself to becs (plate 12m). Corner thorns are fashioned on small flakes or blade fragments (plate 11n).

Side perforators

Contrary to what their name may imply, side perforators are rarely fashioned on the margin of laminar blanks. Instead, they simply occupy square flakes and blade fragments and happen to be oriented more or less perpendicular to the axis of percussion. This is true of all percoirs in this class, which tend to be small (plate 11k, m). Some side becs are essentially identical (plate 11l), but others occupy rather massive flakes (plate 12l).

7.7 Special perforators

The couche 3-A assemblage includes a relatively large and varied sample of the special perforator forms appearing on the Solvieux type-list.

The five specimens counted as micropercoirs consist simply of diminutive pieces on bladelets, none of which bear marginal retouch or other modification reminiscent of the retouched bladelet group (plate 11c, e). One specimen is more properly designated a microbec rather than a micropercoir (plate 11b).

Four of the six star perforators are typical specimens of this diagnostic Early Magdalenian *fossile directeur*. All bear two projections (plate 11f, g, h, i), the last of which might reasonably be termed a star bec. The remaining two specimens might, on technical grounds, be classified as double perforators because their projections occupy the opposite ends of the piece; however, their diminutive size and general aspect indicate they are a variety of star perforator (plate 11j). Indeed, nearly all members in the first two rows of perforators illustrated in plate 11

share a family air. Diminutive perforators on the whole, not just the star variety, should probably be regarded as diagnostics of Early Magdalenian industries. They are, of course, very rare elsewhere at Solvieux.

The three specimens inventoried as *becs buri-nantes alternes* comprise a pointed thorn, a side bec, and an end percoir (plate 11w). The latter two are rather carefully fashioned and do not differ in general configuration from their counterparts among standard perforators.

7.8 Truncations

Although they account for only 3.5% of the common toolkit, truncations are numerous enough to provide a valuable picture of morphological patterning in this amorphous and refractory typological group.

7.8.1 General

The proportion of truncations involved in combination pieces is only slightly less than that of burins, but here, as among endscrapers, the bulk involve composites (see table 7.6). As the piece count shows, truncations, unlike endscrapers, seemingly combine at random with members of the other typological groups. The essential information concerning truncation blanks is furnished in table 7.18. Apart from exhibiting a clear differentiation among gracile and robust forms (in contrast to the perforator sample), the distributions of blank widths, varieties, and support types are intermediate between those of standard burins and endscrapers, with a bias toward the latter. Combination pieces do not vary significantly from singles in blank morphology. Truncations show a strong preference for brown flint (see table 7.5). But like endscrapers and perforators, and in contrast to burins, brown and black flint are knapped in essentially the same dimensions among truncations and give statistically indistinguishable distributions of G- and R-supports.

As is true of most typological groups in 3-A, the truncation sample shows more marginal retouch than appears in comparable samples in other assemblages. Here, 12% of the specimens are sufficiently retouched to qualify, which is half the amount seen

Table 7.18. Blank morphology of 3-A standard truncations. Cross-tabulation of Blank Variety and Blank Width.

	Blade	Flake	Square Flake	
2 cm	10 —	0 —	0 —	10 20.8
3 cm	17 —	5 —	1 —	23 47.9
4 cm	4 —	6 —	2 —	12 25.0
≥ 5 cm	1 —	2 —	0 —	3 6.3
	32 66.7	13 27.1	3 6.3	48

G-supports: 56.3%

R-supports: 43.8%

Average width = 3.21 cm

Note: Solid line demarcates G- and R-supports;
dashed line demarcates R1- and R2-supports

on 3-A scrapers and approaches more closely the 9% recorded for burins.

7.8.2 Analytic description

The basic contingency table for truncations appears in table 7.19, which cross-tabulates their profiles with the support types. Although its cell frequencies are too attenuated to qualify for testing by chi-square, the general trends exhibited by the percentages are at least consistent with the generic pattern of truncation dynamics shown in table 6.5 (§ 6.9.2). Obliques associate with G-supports and medial obliques with R-supports, while traverse profiles combine at random with the support types. The last profile type is so well represented presumably because the sample is comparatively weak in both particularly gracile blanks (which promote oblique profiles) and particularly stocky blanks (which promote medial oblique profiles).

At least one-third of the specimens either have questionable typological origins or are decidedly

Table 7.19. Standard truncations: 3-A tool sample. Cross-tabulation of Truncation Type and Support Type.

	Traverse	Oblique	Medial Oblique	
G-support	18 —	6 —	3 —	27 55.1
R-support	16 —	3 —	3 —	22 44.9
	34 69.4	9 18.4	6 12.2	49

atypical. Six could be truncation burins that were unfinished or did not receive an effective spalled facet; three or four could be becs whose points were broken off; and one or two might be highly atypical or heavily reworked endscrapers. The remaining atypical pieces either bear only partially retouched truncations or simply happen to be particularly crude or maladroit.

Nonetheless, the majority look as if they were intended to conform to a basic design even if the design lends itself to a wide range of specific expression. Variation among traverse truncations, the dominant type, is particularly great. While some are quite gracile, like one that associates with a bec on a composite piece (plate 12h), they often occupy relatively stocky flakes (plate 12g). Departures from the ideal typical form are not uncommon, such as inverse lateral retouch descending from the truncation (plate 12j) or a truncation fashioned by inverse retouch (plate 12d). Traverse specimens are predominately straight (74%). However, a double piece (plate 12c) illustrates two concave-traverse truncations; the manner in which the lateral point of its superior truncation is broken suggests the possibility of its originally having been a bec.

Oblique truncations are comparatively rare. A particularly handsome specimen illustrates a straight-oblique profile whose left margin bears light abrupt retouch or use-wear (plate 12e). Its robustness serves as a reminder that the association we have demonstrated between oblique truncations and gracile blanks is a statistical generalization that admits numerous exceptions. Light and rather perfunctory marginal retouch appears on another straight-

oblique truncation coupled with an endscrapper (plate 8b proximal). Because they intersect the lateral margins at a steep angle, highly oblique truncations can be difficult to distinguish from atypical becs (plate 12b). Medial oblique truncations often occupy somewhat broader blanks, and they tend toward convex profiles (plate 12f). Because of their irregular supports, most medial oblique truncations not surprisingly constitute single pieces.

7.9 Marginally retouched pieces

Only in the 3-A series do marginally retouched pieces constitute a numerically substantial group at Solvieux, accounting for more than 5% of the global assemblage and common toolkit.

Whole and quasi-whole pieces

The 78 whole and quasi-whole specimens involved here are inventoried in table 7.20. Almost three-quarters of them bear retouch on only one side. This subsample is about equally divided between whole and quasi-whole pieces, which have virtually identical proportions (3:2 ratio) of continuous and partial retouch. Although not indicated in the table, the retouch appears more than twice as often on the left margin than on the right. Continuous retouch is involved in 57% of the subsample of specimens bearing retouch on both margins; in 19% the sides share partial retouch; in the remaining 24% continuous and partial retouch are mixed. Blank morphology is of some interest. Brown flint is particularly favored (see table 7.5). Its large nodule size is taken advantage of (just as in the case of burins) to produce an especially high proportion of robust blades (table 7.21). The total absence of square flakes is obviously a matter of typological geometry; any blank in this category bearing an appreciable amount of retouch is likely to be coded as a flake scraper.

Plate 13 illustrates how the data inventoried in table 7.20 translate into concrete typological variation. Standard retouch dominates both whole (plate 13a, b, i, j [the first ending in a hinge fracture]) and quasi-whole (plate 13c, d, e, f, n) pieces; in two of the latter (plate 13c, e) it is particularly invasive. Few specimens bear other than standard retouch. Abrupt retouch is restricted to three pieces, of which

Table 7.20. Inventory of 3-A marginally retouched pieces: whole and quasi-whole

PORTION		DISTRIBUTION OF RETOUCH					
		One Margin		Both Margins			
		> 1/2	< 1/2	> 1/2	< 1/2	mixed	
Whole		16	11	4	1	1	33
		—	—	—	—	—	42.3
Quasi-whole	Distal	3	2	2	0	0	7
		—	—	—	—	—	9.0
	Proximal	9	6	2	2	1	20
		—	—	—	—	—	23.1
	Mesial	6	4	4	1	3	18
		—	—	—	—	—	25.6
		34	23	12	4	5	78
		43.6	29.5	15.4	5.1	6.4	

the best example is a whole blade (plate 13k). Although it is seen on a few tools in other typological groups (such as the burin illustrated in plate 3l), light abrupt modification approaching heavy nibbling use-retouch does not appear. A couple of specimens bear standard retouch that bites at least moderately into the cross section of the blank. But in only two pieces does retouch simultaneously combine the invasive scaling and biting encroachment typifying Aurignacian retouch (type 63): a whole blade (plate 13m) and a mesial blade fragment (plate 13h). In the latter, quasi-Aurignacian retouch affects only the left margin; that on the right does not bite sufficiently to be regarded as other than heavy and invasive standard retouch.

The most important observation to make about table 7.20 is that 42% of the sample consists of whole pieces and an additional 9% of distal quasi-wholes. This means that, at least in the 3-A industry, marginally retouched pieces do indeed constitute a legitimate typological group (regardless of how difficult it may be to draw its boundaries with precision). We are obviously not dealing simply with the retouched supports of other groups that happen to have lost their active parts to breakage. This conclusion is reinforced by the distinctive combination of features displayed by the sample's blank morphology. Otherwise, the group shows relatively little systematic patterning: substantial quantitative

analysis largely fails to reveal any significant associations among attributes referring to the nature, extent, and placement of retouch or between them and attributes of blank morphology. The sole exception is the finding that the margins of any given piece retouched on both sides more often than not agree in the extent and type of retouch they bear.

Of some considerable typological interest, however, are ten or more specimens (including plate 13a, b, c) that share a distinct family air, being particularly broad pieces that carry at least one continuously retouched convex margin. The retouched edge is not the heavy beveled front of a sidescraper but rather, for want of a better parallel, a flint equivalent of the arced Eskimo ulu form. Regardless of whether they deserve to be recognized as a distinct type, these arced pieces seem to be characteristic of couche 3-A. What may be a special form of this arced type, in which the curved bevel is opposed by a massively backed margin, is inventoried in § 7.13 as a diverse piece (plate 14g).

Fragments

Fragments, that is, pieces too short to reveal whether their retouch was originally continuous or only partial, are inventoried in table 7.22. That their average width is only 2.8 cm is not surprising, as two-thirds of the sample constitute proximal fragments representing the tapering, narrower end of blades. Here

Table 7.21. Blank morphology of 3-A marginally retouched pieces. Cross-tabulation of Blank Variety and Blank Width.

	Blade	Flake	Square Flake	
2 cm	8 —	0 —	0 —	8 10.3
3 cm	30 —	0 —	0 —	30 38.5
4 cm	24 —	3 —	0 —	27 34.6
≥ 5 cm	5 —	8 —	0 —	13 16.7
	67 85.9	11 14.1	0 0.0	78

G-supports: 48.7%

R-supports: 51.3%

Average width = 3.58 cm

Note: Solid line demarcates G- and R-supports;
dashed line demarcates R1- and R2-supports

the bias for retouch to affect the left, rather than the right, margin is only half as strong as among whole and quasi-whole pieces. Moreover, the proportion of brown flint is reduced to 68%, which more closely approaches its popularity in such tool categories as burins and endscrapers. All this suggests that a significant number of these 40 specimens constitute broken supports of tools from other typological groups rather than marginally retouched pieces as such. That proximal fragments dominate the sample is consistent with this conclusion, a point that is reinforced both by inspection of other tool groups and by the additional fact that a large majority of the pieces bearing too little retouch to be included in the sample are also proximal.

7.10 Points

The 33 pointed blades assigned to type 101a make up a distinctive, if numerically modest, series. All but one, a point-scraper composite, are single pieces. They are inventoried in table 7.23 in the form of a

Table 7.22. Inventory of marginally retouched pieces: fragments

FRAGMENT	MARGINS RETOUCED		
	One	Both	
Distal	3 —	2 —	5 12.5
Proximal	19 —	8 —	27 20.0
Mesial	4 —	4 —	8 67.5
	26 65.0	14 35.0	40

Table 7.23. Pointed blades: 3-A tool sample. Cross-tabulation of Point Profile and Point Position.

	Narrow	Ogival	Round	
Distal	8 —	3 —	9 —	20 60.6
Proximal	0 —	7 —	6 —	13 39.4
	8 24.2	10 30.3	15 45.5	33

cross-tabulation of the Point Profile and Point Position attribute sets defined below.

7.10.1 General

Apart from their specific shapes, these points are distinctive for several reasons. One is that 13 of them (39%) are actually proximal points, that is, they are fashioned on the proximal end of a blade from which the original butt has been removed. All that remains of the bulb of percussion, if anything, is a slight swelling. Such pieces appear nowhere else at Solvieux, and they are not to be confused with retouched proximal ends of blades that simply happen to converge upon the butt, which appear in all assemblages. With few exceptions, the points of these specimens result from the convergence and elaboration of marginal retouch that ascends or descends the sides of the piece. Only two lack marginal retouch (apart from the spalling that enters directly into shaping the point and invariably

encroaches at least to some extent upon the margins). Only three more of these pieces lack sufficient marginal modification to qualify at least as partially retouched pieces according to the criteria used for type 61 (§ 6.10). The remaining 28 specimens, which are substantially modified, are nearly three times more likely than regular retouched pieces to bear retouch; this retouch more often tends to be continuous rather than partial, and it is somewhat heavier in its expression. Four specimens bear scaled quasi-Aurignacian retouch.

Blank morphology in this point series occupies the extreme of the 3-A industry's range of variation and—like that of retouched pieces—is too straightforward to require depiction in the usual table. Pointed pieces are made overwhelmingly on blades (the only exceptions being two quasi-flakes) and, despite possessing seven members in the 4 cm width category, they average only 2.8 cm in width. Their incidence of G-supports (79%) is exceptionally high in comparison to the other 3-A typological groups. All but three are made of brown flint (see table 7.5), among which Ivy League seems to dominate rainbow by nearly five to one.

7.10.2 Analytic description

In table 7.23 the point sample is cross-tabulated in terms of two obvious attribute sets. One, Point Position, simply indicates whether the active part occupies the distal or proximal end of the support. The other, Point Profile, indicates whether this point describes a narrow, ogival, or rounded outline. Statistical testing not tabled shows that neither set interacts other than randomly with the features of blank morphology and retouch described in the previous section. And sample size is too small for the apparent interactions in table 7.23 to be regarded as any more than suggestive. What little can be said, therefore, is largely restricted to descriptive typology, taking care to distinguish the point profiles that characterize this type from those of other, non-point types with which they might be confused.

Narrow points are truly pointed. They differ from perforators in their narrow closing angle, in being truly shaped (rather than simply outlined) by retouch, and in continuing without interruption the incurving line of the piece's retouched margins (rather than being disengaged from the blank that

carries them). All eight specimens with narrow points are proximal. In two of them the retouch forming the point is not extensive enough to meet the one-quarter criterion required of marginally retouched pieces. But in the rest the point represents the convergence of heavy continuous retouch from both margins (plate 14f). Heavily encroaching Aurignacian retouch is involved in one of these (plate 14c). The point born by a distal fragment approaches the limits of the closing angle for this type (plate 14d). While the absence of proximal pointed forms may be due simply to sampling error, it could also be contingent upon the greater thickness of the butt end, which would require removing a proportionately greater amount of material to achieve the desired profile.

Ogival points differ from ogival endscrapers in the narrowness of their outline and in the kind of retouch that shapes them, which is quite different from that which bevels a scraper front. Three distal pieces fall in this category (plate 14a). Seven more are proximal, including one specimen carrying moderate standard retouch (plate 14i) and a second with considerably heavier retouch on both margins (plate 14h).

Their narrow profile and shaping retouch also distinguish rounded points from endscrapers (plate 14b). Nine in the 3-A sample are distal (plate 14e). A particularly handsome rounded point joins with an endscraper on a composite piece bearing light scaled (quasi-Aurignacian) retouch on both margins (plate 14j distal). Illustrating the six proximal rounded points are a specimen carrying moderate standard retouch (plate 14i) and another with considerably heavier retouch on both margins (plate 14h).

It would be difficult to argue that the variation in point form described above necessarily represents a single, perhaps functionally distinct, tool type. And some of the less typical specimens not illustrated could possibly constitute aberrant endscrapers or perforators. Yet the ensemble does have a family air, dictated not so much by the points' specific profiles as by the manner in which they are usually formed: by converging lines of substantial marginal retouch and what seem to have been fairly exacting standards for selecting blanks. While these blanks contrast with the very robust ones that typify the marginally retouched piece sample, it may not be coincidental that the two typological groups to

which they belong play a significant role in couche 3-A that neither plays in any other Solvieux assemblage. One could speculate that a substantial number of these points are secondary by-products of substantial marginal retouch that happened to converge upon the midline in approaching the extremity of the narrower blanks. In other words, rather than being points on marginally retouched blades, they are marginally retouched blades that happen to end in points. If so, it would be interesting to know whether they were manufactured piecemeal or resulted from a reduction sequence that entailed progressive periodic rejuvenation of the marginal retouch.

A word is in order with respect to their classification. In discussing a somewhat similar sample of tools from the Magdalenian VI site of Morin in the Gironde, de Sonneville-Bordes and Deffarge (1974) state that retouched, often pointed, blades seem to characterize many Final Magdalenian industries and suggest that they be regarded as diagnostic *fossiles* for that stage. It is presumably to accommodate such pieces that the new type-list includes type 103: 'Magdalenian blade, pointed at one or both ends.' Although its members seem to qualify on typological grounds, the 3-A point series has not been so classified. The reasons for this are that the series does not belong to a Final Magdalenian industry, that de Sonneville-Bordes and Deffarges' definition of the category is at once too broad and too vague to have much diagnostic value, and that not dissimilar pieces appear as isolated specimens in all the Solvieux assemblages.

7.11 Bladelets

3-A bladelets are of considerable interest both in themselves and with respect to the larger question of the evolution of bladelet typology within the Magdalenian tradition. The situation is more easily presented if the simple retouched forms are taken up before backed bladelets. The background to this discussion is provided in § 6.13.

7.11.1 Bladelet with fine direct retouch

Contrary to their numerically minor and heterogeneous aspect elsewhere at Solvieux, bladelets with

fine direct retouch are represented in the 3-A assemblage by a relatively large sample of 66 members that form a reasonably coherent typological ensemble. This group is typified by a well-made, parallel-sided bladelet averaging somewhat under 1.0 cm in width and bearing continuous abrupt or semiabrupt retouch along its right margin. Its dimensions are quite unlike those of a backed bladelet. The height of the retouched edge is ordinarily less than 1.5 mm and indeed usually under 1.0 mm; in any case, it rarely exceeds 10%, and is most often less than 5%, of piece width. The opposite margin may exhibit the stigmata of utilization but, like the ends of the piece, only very rarely shows systematic modification.

A selection of these bladelets is illustrated in plate 15 (a-s). Their basic attributes are inventoried in table 7.24, which is largely self-explanatory. Essentially 70% of the sample falls in the *b* blank width range (0.5 to 1.0 cm), in contrast to only 50% of most backed bladelet samples. As is so often the case among particularly small tools at Solvieux, this sample is dominated by black flint. Piece size and flint type combine randomly, however. Nearly three-fourths of the specimens bear a lightly retouched edge that gives the appearance of continuous nibbling produced by use rather than by a series of individually spalled removals. The latter appears only in the case of fairly heavily retouched edges, all of which exceed 1.5 mm in thickness (plate 15i, p). Interestingly enough, piece size and edge thickness do not associate statistically. The overwhelming majority of these bladelets are broken; and the few whole specimens available to us were for the most part reconstituted in the laboratory. Given that the distal portion tends to taper naturally, it is not surprising that the distal end is missing in 80% of the sample. More than half of those present are pointed, but this is due to the natural contours of the blade itself and not to intentional shaping (plate 15e, l, n). Only two specimens have been modified, which involves only minor regularization of the point or simply usage (plate 15m).

Two bladelets present special features. One is a mesial fragment whose retouched edge lies on the left rather than the right side; significantly, the right margin bears an abrupt natural flank that would have been impossible to retouch in the regular

Table 7.24. Inventory of 3-A bladelets with fine direct retouch

Portion	
Whole	8
Distal	6
Proximal	26
Mesial	26
	<u>66</u>
Size	
a (1.0 cm)	1
b (0.75 cm)	46
c (0.5 cm)	19
	<u>66</u>
Flint type	
Black	55
Brown	9
Other	2
	<u>66</u>
Retouch	
Light	48
Heavy	18
	<u>66</u>

manner (plate 15j). It is then the exception that proves the rule. The second piece has been rather carefully bitruncated (plate 15o).

7.11.2 Bladelet with fine inverse retouch

A single whole bladelet is assigned to the bladelet with fine inverse retouch category. Its retouch suggests use-wear rather than systematic modification (plate 15t).

7.11.3 Backed bladelet

Perhaps a dozen specimens in the 3-A bladelet sample would not look out of place in a collection of Middle Magdalenian *lamelles à dos* (plate 15u-aa). Only nine, however, actually meet the dimensional requirement of possessing a backed edge whose height exceeds 1.5 mm and constitutes between 35% and 65% of current piece width (§ 6.13.1). And, of these, only four are heavily backed in a manner that creates the cross section typical of most *lamelles à dos*. Though somewhat less finely made than those of the Middle Magdalenian I/II backed bladelet samples, they exhibit (so far as can be determined from so few specimens) no notable

differences in the way their principal elements are distributed. Thus, seven are of black flint and two of brown; two belong to the *b* width class and seven to the *c* class. Three are backed on the right side, four on the left, and two are indeterminate. One distal end is present, that of a whole piece whose end is slightly modified into a blunt point but whose overall profile is that conventionally described by ordinary bladelets with direct retouch. None of the proximal ends present carries retouch.

What is the significance of these pieces? They are quite distinct from the handful of narrow blades and bladelets in the couche 3-A assemblage whose flank bears heavy raclette retouch and which consequently have a superficial resemblance to backed bladelets (plate 16t). Also, it is highly unlikely that they can be referred to the Raysse Perigordian 4-B industry, which admittedly contaminates the 3-A assemblage (of which more below) but which seems to lack a backed Gravettian element altogether. Nor are they sufficiently numerous or sufficiently characteristic typologically to define a distinct backed blade element in the 3-A industry that presages the true *lamelles à dos* that appears in Middle Magdalenian times. Thus, while these specimens technically may qualify as backed bladelets, it is not unreasonable to regard them as part of the range of variation described by the 3-A industry's distinctive component of bladelets with direct retouch.

7.12 Raclettes

Its 727 specimens makes the raclette the single most popular tool class in couche 3-A, accounting for one-third of the entire assemblage. This tool is puzzling indeed, given that it occurred in such high frequencies during the comparatively short span of later Early Magdalenian industries and yet appeared only sporadically before and after. What special function could it have served that required its manufacture in such numbers for only a brief period? And, if the function was of a more generic nature met by another tool or tools at other times, why did the raclette appear at all? And, once on the scene, why did it disappear so quickly despite its obvious popularity?

Equally puzzling is the methodological problem faced by typologists who wrestle with this tool. To

begin with, raclettes are easy to recognize but difficult to define, combining narrow tolerances of execution with equally great freedom of shape. They are fashioned by a distinctive form of abrupt marginal retouch that is applied to blanks having sub-parallel faces along which an edge can be produced that is blunt and fairly constant in thickness. Raclettes have an unmistakable family air thanks to this distinctive retouch and to the consistency shown by the edges it produces in terms of their manner of execution, their regularity, and their narrow range of variation with regard to thickness. (An initial appreciation of raclette morphology can be gained by examining plates 16 and 17.) Yet, despite the tool's two-dimensional cookie-cutter simplicity, the retouch is applied in what appears (at least at first glance) to be a random fashion. As a result, they are too variable in size, outline shape, and amount of retouched edge they bear to lend themselves to easy classification into neat subtypes. Indeed, for all their simplicity, they seem to offer more resistance to systematic description and analysis than perhaps any other type in the Upper Paleolithic toolkit. It is with this problem that we begin.

7.12.1 Background

Detailed description of raclettes dates to the writings of André Cheynier in the 1930s, perhaps the first researcher to appreciate fully their typological distinctiveness and industrial significance (for example, Cheynier 1933). But classification has lagged behind description, and despite some worthy efforts, no adequate system for ordering raclettes has yet emerged. The tool's great range of form, which seems to defy systematic organization, often combined with sample sizes too small for the basic continuity underlying that range to be appreciated, has led typologists to make three fundamental errors in approaching it.

The first error is to oversimplify the problem of raclette classification by more or less arbitrarily restricting the range of variation recognized as legitimately belonging to the type. One can, for example, remove from that range those specimens that mimic the outlines of other tool types and codify them as atypical members of those types. This, as we have noted, is commonly done in the case of those raclettes whose contour suggests the front of an end-

scraper (§ 7.4). What remains after this process of elimination is described simply as being 'variable' (for example, Bordes 1984:280). A related practice is to recognize as raclettes only those specimens that meet fairly strict criteria and then simply dismiss the rest. Typical here is J. Allain's view that in a true raclette the retouched edge involves all, or at least most, of the periphery of the piece (1979:102). By arbitrarily restricting the range of variation attributed to raclettes, both procedures result, of course, in seriously under representing their numbers.

The second error is to deal comprehensively with the full range of raclette variation but, thwarted by its complexity, to produce a series of classes that are either too few and generalized to have much utility or that are more numerous but not really mutually exclusive. An example of the former is De Heinzelin's classification, which seemingly divides raclettes into two groups: those that bear retouch on the end of a blank (*en bout*) and those that do not—in other words, all the rest (1962:27). An example of the latter is Le Tensorer's (1981:344–350) type-list of ten raclette classes that distinguishes, among other things, between forms that are nosed or have a convex 'front,' that are elongated or small or large, that have spines, and so forth. Because such distinctions involve features that might occur together on one and the same specimen (say, an elongated piece bearing a convex front), the classes they define must overlap so as to obscure and/or skew a considerable amount of information. (It must be added that Le Tensorer also provides useful quantitative data regarding the direction of retouch, piece dimensions, and average width of retouched edges, although little of this can be related directly to the raclette classes themselves.)

The third error is to eschew comprehensive morphological classification altogether and simply report raclette samples in terms of discrete observations of those attributes that happen to lend themselves to straightforward measurement. This approach is exemplified in Hemingway's (1980: 169–175) ordering of raclette samples by features such as angle of retouch, thickness of retouched edge, and percentage of blank margin actually retouched. Assuming that the full range of raclette variation has been included in one's sample, this approach does yield precise piece counts and an

array of accurate observations. But the observations remain disconnected and piecemeal, and consequently the raclettes themselves are lost in statistical abstractions that resist translation into the tangible objects journeyman typologists want and need to see in their mind's eye.

Seemingly apart from all this is a very interesting and thorough comparative study of raclettes that was apparently conducted some years ago by Michel Lenoir, a particularly astute observer of Early Magdalenian industrial variation (1983: 306–310, 1988:406–409). Lenoir seems to have joined consideration of retouched contours with information on blank morphology and a variety of metric observations, and in the process perhaps avoided many of the problems built into the studies mentioned above. Unfortunately, he never published his findings in detail, in part because he believed his study was flawed in design and in part because the results revealed no systematic associations among the different aspects of raclette variation. He does, however, provide a typology of raclette outline contours, which, unlike those of Le Tensorer, seem to be mutually exclusive and which should have yielded valuable insights into raclette dynamics when regarded in the light of variations in blank form. Perhaps Lenoir simply did not pursue his study far enough.

Now, the approach used in our investigation has two basic features that set it somewhat apart from the studies mentioned above. First, it uses an attribute system designed expressly to avoid the kinds of ambiguities that plagued earlier investigations, such as incomplete or inconsistent coverage, overlapping categories, and a dependence upon metric observations whose interrelations are difficult to visualize intuitively. Second, it is grounded in the working assumption that the key to raclette typology lies in mechanical and geometric contingencies arising from blank morphology that are somewhat different in kind and degree from those operating elsewhere in the Magdalenian toolkit. We have profited from a masters thesis on the 3-A raclettes by Kenneth Freeland (1988), who focused on the complex statistical interactions of their metrical attributes and the difficulties encountered in distinguishing between those that represent meaningful typological associations and those that stem from geometric contingencies

inherent in the measurements themselves. Reflection upon Freeland's results has informed the somewhat different emphasis taken by the current investigation.

7.12.2 The raclette system

The raclette system consists of three attribute sets—Blank Form, Blank Width, and Contour Type—each of which is preceded by the term raclette where necessary to avoid confusion with the blank and contour attributes used in analyzing other typological groups. Together, these sets reduce raclette morphological variation to realistic and intuitively manageable terms, avoiding the unnecessary multiplication of all too often redundant measurements and observations that have confused previous ambitious quantitative studies.

Blank form

Four categories of blank form are recognized among raclettes—long, short, side, and fragment. The first three are based upon the length/width dimensions of pieces oriented with respect to their axis of percussion. The fourth accommodates broken pieces of which too little remains to assign them with confidence to any one of the first three. The attributes of Raclette Blank Form should not be confused with those of the Blank Variety set used for most tool groups (§ 6.2.1). Blank Variety is defined and used in a somewhat different fashion and does not meet the rather special demands of raclette classification. The basic difference is that Blank Variety is designed to codify blanks that are ordinarily elongated, if not always truly laminar, and that can be regarded as supports which to an important extent are typologically distinguishable from the tools they bear. Raclette Blank Form, on the other hand, concerns blanks that are more variable and less regular in outline and whose shape is an integral—indeed determining—aspect of the typological variation of the tool itself. Short blanks, in other words, are literally short raclettes, and they display a range of variation of retouched edges that differs notably from those shown by long and side raclettes.

A long blank is one whose long axis is parallel or subparallel to the axis of percussion and whose width does not exceed 80% of its length (plate 16a–w, plate 17a–g). It is the only member of the

Raclette Blank Form set that equates directly with the Blank Variety set, encompassing the latter's blade and standard flake categories. Blades and standard flakes will be recognized as subcategories of long racettes when conditions warrant, but here we avoid terminological confusion by referring to them as blades and flake-blades. Included in the long blank category are quasi-whole blanks that lack their proximal ends but still meet the dimensional criteria for membership, and whose breakage does not interfere with their being coded unambiguously with respect to the kind of contour they bear. Counted separately are broken long pieces that retain enough of their original form to ensure correct assignment to this blank category but not enough to be assigned with reasonable confidence to a specific contour type within it. These pieces must not be confused with fragments (see below).

A short blank is one whose width constitutes between 80 and 120% of its length when oriented on its axis of percussion (plate 17h-v). All short blanks would qualify then as square flakes in the Blank Variety set. But the reverse does not hold true, because many square flakes happen to be side flakes—which here constitute a separate blank category. As in the case of long blanks, the whole subsample of short blanks includes several that are quasi-whole. The broken subsample of this category is negligible, however. Broken specimens are rarely included in this and the side blank categories, not because they are rarely broken, but because short and side racettes are usually difficult to distinguish from each other when they are broken. Where the distinction cannot be made, the piece must be relegated to the fragment category.

Side blanks are often referred to as side-struck flakes because their long axis lies more or less perpendicular to the axis of percussion. Thus, when oriented in the same fashion as the long and short flakes, their width exceeds their length by more than 120% (plate 17w-gg). Like short flakes, they qualify as square flakes in the Blank Variety set, but at least in the 3-A industry, they seldom appear in typological groups apart from racettes. Only a handful are quasi-whole, and the broken subsample is restricted to a single specimen.

Portions of racettes too fragmentary to be unambiguously assigned as broken members of the

above classes are relegated to the fragments category. They subdivide into two groups, lesser parts and greater parts, according to how much of the original piece is presumably represented.

Blank width

The widths of racette blanks are taken in the same manner and in the same closer-to intervals as those of the Piece Width set (§ 6.2.2). But whereas the width of long and short blanks is measured in the usual fashion perpendicular to the axis of percussion, that of side blanks is taken parallel to it. The reason is that side flakes are dimensionally analogous to standard flakes of the Burin Variety set in their general outline form; consequently, and that what is desired in this case to make them comparable to standard flakes is a 'width' lying perpendicular to the long axis of the piece.

Contour type

The Contour Type set codifies the outline shape, position, and extent of the edge or edges of a piece formed by racette retouch. Given the nature of the tool, there is an extremely close relationship between contour types and blank forms, and indeed the variations assumed by the former are largely a matter of geometric and mechanical contingencies imposed by the latter. For example, although the distal margin of a side blank may constitute a retouched edge essentially like that often found on the margin of a long blank, a side racette never displays the equivalent of bimarginal retouch often seen on the long form. The reason is that the bulb of percussion and remnant of the striking platform that dominate its proximal margin cannot accommodate racette retouch. In a like manner, given their shape and dimensions, short blanks do not lend themselves to contours resembling those that the end and lateral margins of long blanks can assume.

Because the contours any given racette can assume are governed by the form of its blank, it is misleading to bring contour types into play by themselves, as other researchers have done. Consideration of contours cannot, in practice, be divorced from consideration of blanks; therefore, the principal classes used for ordering racettes must be composite categories in which the two are combined. The major permutations in which we find it convenient

to visualize contours and blanks combining are shown schematically in figure 7.1. They and their underlying typological dynamics are reviewed in detail in the analytic description (§ 7.12.4).

7.12.3 Generalities

The sample

The sheer size of the 3-A raclette sample, 727 pieces, is noteworthy. Judging from the inventories of Early Magdalenian assemblages provided by de Sonneville-Bordes (1960) and Hemingway (1980), raclette samples exceeding 100 pieces are not particularly common, and those above 200 are rare. The only one exceeding 3-A in size involves some 850 specimens recovered by André Cheynier in the 1930s from level VII at the classic rock shelter of Badegoule in northeastern Périgord. It appears, however, that only small portions of this collection have been studied since Cheynier's own important publication (1939). The 3-A raclette sample is in any case the richest and best documented one to become available for study for well over half a century.

Table 7.25 inventories the 3-A sample in terms of four major raclette types that equate with the

blank form classes. The table does not distinguish between pieces and tools because raclette typology itself defies this distinction: each piece must be regarded as an integral tool in itself regardless of whether it bears more than one discrete edge carrying raclette retouch. The relatively high number of broken pieces noted for long raclettes constitute obvious blade fragments. Very few broken pieces are indicated for short and side raclettes because of the difficulty involved in discerning the original blank form from which the detached part derived. But the quite unlaminar aspect of 75% of the members of the unassignable fragments category, including all those in its greater parts subdivision, indicates they derived from short and side specimens. Together, the inventory and our guesswork about the membership of the fragments component suggests that, in its original state, roughly 45% of the sample consisted of long raclettes and 55% of short and side raclettes.

Omitted from the sample is a handful of otherwise typical burins, endscrapers, and truncations whose margins happen to bear raclette retouch. Four perforators whose projection is defined by raclette retouch are also omitted (plate 12k) (§ 7.6.2). Otherwise included, however, are all pieces executed in raclette retouch whose edges happen to mimic the active parts of other typological groups, in particular endscrapers and truncations. Also included are five questionable pieces. These comprise two very narrow blades whose marginal raclette retouch gives them the appearance of highly atypical Gravettian pieces, and three crude short specimens that could qualify as ad hoc denticulated pieces. The sample also includes two long blanks bearing raclette marginal retouch whose ends suggest the remnants of broken burins; had the latter been identifiable, they would have been assigned somewhere in the burin group and their retouch simply noted. Given the great size of the sample, these omissions and inclusions have only a negligible effect on its typological and quantitative makeup.

Blanks

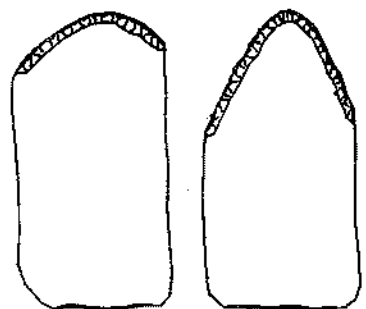
The typological plates illustrate the major variations of the three basic blank classes: long, which subdivides into blades (plate 16a, e, f, l, t) and flake-blades (plate 16c, g, i, u); short (plate 17h, l, n, q);

Table 7.25. Inventory of 3-A raclettes

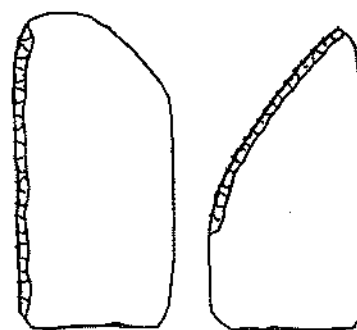
			N	%
Long				
	Whole (& quasi-whole)	232	306	42.09
	Broken			
	Distal	41		
	Mesial	11		
	Proximal	22		
		74		
Short				
	Whole	225	235	32.32
	Broken	10		
Side				
	Whole	85	87	11.97
	Broken	2		
Fragments				
	Lesser parts	63	99	13.62
	Greater parts	36		
			727	100.00

Read only/No Download

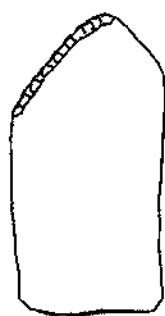
LONG RACLETTES



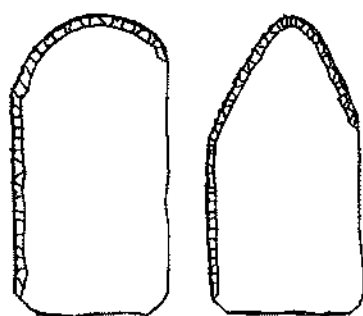
broad convergent
TRAVERSE



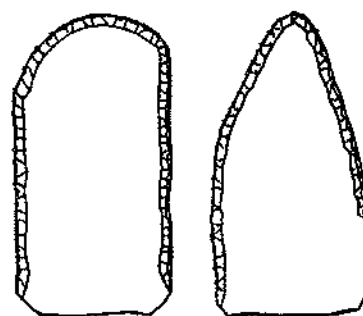
regular arced
AXIAL



OBLIQUE

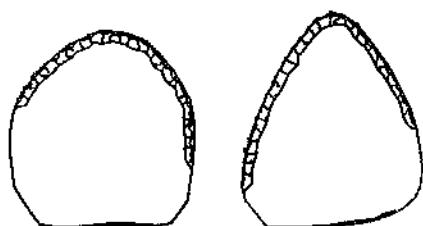


broad convergent
TRAVERSE / AXIAL

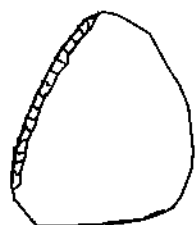


broad oblique
TRAVERSE / BIAxIAL

SHORT RACLETTES



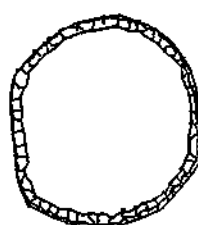
STANDARD CONVERGENT



LATERAL



DOUBLE



ROUND

SIDE RACLETTES



TRAVERSE



TRAVERSE/AXIAL

Figure 7.1. Raclette contour types

Table 7.26. 3-A whole raclettes.
Cross-tabulation of Blank Form and Blank Width.

	Long blade	Long Flake-blade	Short	Side	
≤ 2 cm	55 71.4	79 51.0	116 51.6	51 60.0	299 55.2
3 cm	21 27.3	59 38.1	83 36.9	28 32.9	191 35.2
≥ 4 cm	1 1.3	17 11.0	28 112.4	6 7.1	52 9.6
	77 14.2	155 28.6	225 41.5	85 15.7	542

$$\chi^2 = 15.43 (p < .10)$$

$$\phi = .169$$

and side (plate 17w, y, cc, ee). In table 7.26 the whole members of these three classes are cross-tabulated with attributes of blank width. Although the width classes in this table have been collapsed, less than a handful of specimens actually exceeds 4 cm in width and only 26 that fall into the ≤ 2 cm class are as narrow as 1.5 cm. Interestingly, interaction in the table is restricted to long blanks, among which flake-blades are significantly wider than blades. Together, however, the two average 2.5 cm in width, which is not significantly different from the averages for short (2.6 cm) and side (2.4 cm) blanks.

Although we will see that it makes very little difference to their typological contours, the distinction between blades and flake-blades is even more obvious upon inspection, as only blades tend to be truly laminar. The great bulk of flake-blades, along with essentially all the short and side forms, on the other hand, display heavy bulbs of percussion, wide butts that retain a good portion of the striking platform, and ventral faces whose ridges only seldom suggest a prismatic blade core.

Apart from the rarity of cortex, these blanks seem to share few specific features that tell us about the technology that produced them. Two points are apparent, however. One is that their great variability does not support the theory that a distinct *tranche de saucisson* technique was systematically used to produce them, by means of which they were supposedly knapped like so many slices of sausage from a specially prepared cylindrical nucleus (Cheynier

1939:382). As Lenoir points out (1988:406), the same range of flakes can be obtained from more prosaic kinds of cores. The other point is that blanks lacking butts, which are especially common among short raclettes (see table 7.31), look as if they were made from fragments of particularly broad blades of Ivy League and rainbow flint like those that often served as supports for endscrapers (plates 8 and 9). A single such blade would have provided several squarish blanks with subparallel faces and edges of a constant width suitable for receiving an optimum amount of raclette retouch.

Raclettes stand apart from other 3-A typological groups in their distribution of flint types (see table 7.5). Brown flint overwhelmingly prevails (although, because of the relatively small size of raclettes, it is often difficult to determine whether any given piece is Ivy League or rainbow). Less than 7% of raclettes are made of black flint. The reason is obscure, particularly because black specimens distribute over the blank width categories in the same fashion as other flint types. Also noteworthy is that several black raclettes are in a special variety of black flint with white zones that differs from the standard black ubiquitous to all Solvieux couches. An additional 7% of raclettes are made from a distinctive yellow flint that appears very sporadically in other 3-A typological groups. Its color is bright, or at least intense, and it is speckled with whitish inclusions and frequently carries numerous fine parallel bands of a somewhat darker hue. Perhaps the

colors and/or textures of flint may have been as important to a maker of raclettes as their distinctive knapping properties.

Retouch

The retouch that produces 3-A raclettes is invariably abrupt, with an edge angle exceeding 80°. Its removals are normally broader and more robust than those of backing retouch like that seen on Gravette points, and as a consequence the edge produced is noticeably more irregular. Raclette retouch is virtually always direct, that is, spalled from the ventral face of the blank. Only four instances of inverse retouch appear in the entire sample, and only one example of bidirectional retouch. The retouched edge normally bears a narrow undercut margin of crushing (*écrasement*) contiguous to the ventral face, which apparently results from the manufacture of an abrupt edge by percussion rather than use-wear. It is heaviest where the edge is thickest. The edge may show signs of wear or polish, but the stigmata of wear and breakage, like that which endscraper fronts commonly display, are absent. Unlike endscrapers, raclettes do not appear to have undergone major changes in form over the course of their use-life.

The most striking features of raclette retouch are its extraordinary constancy and the seemingly opportunistic manner in which it is applied to the blank. Constancy refers to its regularity of execution and width, which show narrow tolerances even though raclettes themselves vary greatly in size. Edge width on 3-A raclettes concentrates narrowly between 2.2 and 2.8 mm, with 1.5 and 4 mm representing the extremes. (Freeland reports a mean width value of 3.22 mm [1988: table 36], but this is based upon maximum piece widths rather than, as in our case, an attempt to characterize average widths of pieces.) While edge width may correlate to some degree with overall blank size, whatever association exists is largely obscured by the fact that variation in average edge width between pieces is exceeded by variation in edge width over the margins of individual pieces.

What we have referred to as the opportunistic nature of raclette retouch is of course one of the diagnostic features of the tool type and the cause of its baffling range of formal variation. The term opportunistic must not, however, be misunderstood. We disagree with Cheynier's characterization of

raclette retouch as being *au petit bonheur*, that is, haphazard or even happy-go-lucky (1939:382), because it is highly systematic in its way. The knapper apparently retouched those portions of a blank's margin lying proximate to subparallel faces that were of an appropriate vertical thickness and presented an edge that easily accommodated the distinctive spalling. Where an otherwise suitable margin is interrupted by cortex or an irregularity, the retouch simply skips over it; where the margin thins, the retouch may either simply stop or trail off into a form of light nibbling. Apparently, in any event, the manufacture of raclettes did not entail major modification of blanks to prepare their margins to receive the retouch, such as removing an edge formed by a hinge fracture or trimming the butt end of a flake to the necessary dimensions. All this explains why blank form and edge contours are so intimately related: an edge that accommodated raclette retouch was likely to receive it, while one that did not was simply ignored. The overall typology of a raclette was determined more by the properties of the blank that happened to be chosen than by the relatively minor modifications in shape it underwent during manufacture.

7.12.4 Analytic description

We now review the nature and distribution of morphological variation among 3-A raclettes. Because this variation is dictated by a distinctive form of retouch opportunistically executed in accordance with the mechanical and geometric contingencies inherent in the blanks to which it is applied, the discussion is organized in terms of the blank form categories. As we have seen, these can be regarded as general raclette types in their own right, at least for purposes of description.

Long raclettes

Although they display the greatest amount of variability, long raclettes are the easiest to describe and order into contour types because their elongated geometry creates reasonably well-defined lateral margins and more or less sharply demarcated proximal (butt) and distal ends. Thus, a long blank obviously lends itself to the basic distinction between what can be called traverse and axial contours, from which derive the contour types schematically

rendered in figure 7.1. Traverse refers to a retouched edge that lies more or less perpendicular to the long axis, ordinarily occupying the blank's distal end. Axial refers to an edge bearing raclette retouch that runs parallel to the long axis, normally encroaching upon all or part of one of its lateral margins. Each of these two basic contour types divides into subtypes—the traverse into broad and convergent, and the axial into regular and arced. The two types also frequently combine in the traverse/axial contour type, nearly half of whose members are in fact traverse/biaxial, that is, retouched on both margins. (Interestingly enough, although quite feasible geometrically, biaxial raclettes do not appear outside these combination forms.) Finally, it is necessary to recognize the oblique contour type, which essentially defies the distinction between traverse and axial contours.

The basic inventory of these contour types among whole (and quasi-whole) long blanks is presented in table 7.27, a contingency table in which the contours are cross-tabulated with the major width categories. The chi-square score for this particular cross-classification almost attains the 5% level of significance, but the weak phi value indicates that the result is significant only in the statistical sense. Contours and widths effectively combine almost randomly among long raclettes. Equally interesting, the contours of long raclettes also distribute more or less randomly among blades and flake-blades (table 7.28). It is their overall

similarity in contour variation that justifies merging blades and flake-blades into the more general long raclette category for typological purposes.

Simple traverse contours, wherein the edge bearing raclette retouch is restricted to the end of the blank, account for 30% of the long raclette sample. Three-fifths of them are broad, describing the outline form of a truncation or scraper front and intersecting fairly abruptly the lateral margins of the piece (plate 16a, b, c, d). The first two specimens illustrated in plate 16 are on blades; the second two are on flake-blades. The remaining two-fifths of traverse contours are convergent, describing an elongated round or pointed form created by two retouched edges that approach each other from the opposite margins with a closing angle of less than 90° (plate 16m, n). The acute angle of the first of these approaches that of a percoir or bec. If the 3-A sample were not so large, one might fail to appreciate that this form is an integral part of raclette variation and consequently assign it to the perforator group. Inspection of the few specimens illustrated thus far should make it obvious, by the way, that actual raclette contours depart widely from the idealized types illustrated in figure 7.1 and that a degree of arbitrariness can be involved in coding any given piece. Some contours occupy the zone of intergradation between broad and convergent (plate 16e).

As indicated in table 7.27, nearly two-thirds of the traverse contours actually appear in combination

Table 7.27. 3-A long raclettes (whole).
Cross-tabulation of Contour Type and Blank Width.

	Traverse	Traverse Axial	Traverse Biaxial	Axial	Oblique	
≤ 2 cm	37 53.6	31 52.5	35 67.3	20 50.0	11 91.7	134 57.8
3 cm	26 37.7	22 37.3	13 25.0	18 45.0	1 8.3	80 34.5
≥ 4 cm	6 8.7	6 110.2	4 7.7	2 5.0	0 —	18 7.8
	69 29.7	59 25.4	52 22.4	40 17.2	12 5.2	232

$$\chi^2 = 10.40 (p < .20)$$

$$\phi = .212$$

Table 7.28. 3-A long raclettes (whole).
Cross-tabulation of Contour Type and Blank Form.

	Traverse	Traverse Axial	Traverse Biaxial	Axial	Oblique	
Blade	24 34.8	17 25.4	15 34.1	15 37.5	6 50.0	77 33.2
Flake-blade	45 65.2	50 74.6	29 65.9	25 62.5	6 50.0	155 66.8
	69 29.7	67 28.9	44 19.0	40 17.2	12 5.2	232

$$\chi^2 = 3.8 (p < .05)$$

$$\phi = .128$$

axial contours. The retouch that forms simple traverse contours can continue a short distance down one or both margins. It must continue at least one-half the length of the margin for the piece to qualify as a traverse/axial. Broad traverse/axial forms appear on both blades (plate 16f, h) and flake-blades (plate 16g, i), as do convergent traverse/axial specimens (plate 16o, p, q). The irregular scalloped appearance of the pieces identified as p and q in the plate is no less typical of raclettes than the handsome clean lines of specimen o. Scalloping can be marked enough to entail what some observers refer to as 'spines.' Although they may suggest the thorn type of perforator, such spines never possess the feel or the use-wear of a thorn; they are simply the by-product (rather than the object) of an irregularly spalled raclette edge.

Traverse/biaxial contours are nearly as common as those retouched on only a single margin. Characteristic broad traverse/biaxial specimens appear as usual on both blades (plate 16l) and flake-blades (plate 16k). The first of these specimens, by the way, illustrates particularly well the accommodating nature of raclette retouch, which in this case simply avoids, rather than attempts to remove, the narrow cortex intrusion on its distal end. Convergent traverse/biaxial specimens are proportionately fewer (plate 16r, s).

Consideration of these combination contour types raises two interesting issues. The first is the extremely weak association between contour type and blank width revealed by table 7.27, even though the pieces illustrated in plate 16 clearly indicate that

raclette retouch encroaches sufficiently to appreciably narrow the original width of the blank. One might therefore expect to find that simple traverse specimens are somewhat broader than traverse/axial ones. The failure to find such a correlation is due possibly to the relative coarseness of our width classes. The second issue concerns the behavior of broad and convergent traverse contours. These contours appear in virtually identical frequencies among blades and flake-blades, with broad being somewhat less than twice as common as convergent. A significant association does emerge when they are cross-tabulated for the presence or absence of marginal retouch (that is, simple traverse pieces as opposed to those bearing traverse-axial combination contours) (table 7.29). In brief, a convergent transverse edge is more likely than a broad one to associate with margins bearing retouch and to associate more strongly with biaxial edges than with single retouched edges. The explanation obviously lies in the realm of mechanical contingency: broad traverse contours tend to intersect the lateral margins fairly abruptly, leaving clear-cut nickpoints, whereas convergent contours are the product of retouched edges that arise on, and only gradually depart from, the margins themselves.

The long raclette sample includes nine double traverse raclettes, that is, pieces bearing a retouched edge at either end. Despite their obvious analogy to a double endscraper in outline, these pieces are regarded as integral tools as such and are counted only once. Although a blade could easily carry a double contour, all of these specimens happen to be

Table 7.29. 3-A long raclettes (whole).
Cross-tabulation of simple and combination traverse contours with broad and convergent subtypes.

	Traverse [simple]	Traverse Axial	Traverse Biaxial	
Broad	56 81.2	40 59.7	17 38.6	113 62.8
Convergent	13 18.8	27 40.3	27 61.4	67 37.2
	69 38.3	67 37.2	44 24.4	180

$$\chi^2 = 23.19 (p < .001)$$

$$\phi = .358$$

flake-blades. On two of them the margins remain unmodified (plate 17a), while the remainder constitute traverse/axial forms (plate 17b) in which the bulk of the margin is retouched. The latter of these illustrated specimens bears one of the only two convergent ends represented in the group, which is somewhat unexpected in view of the relationship noted above between axial retouch and this contour.

Long raclettes bearing axial contours alone are rarer than traverse/axial specimens. In a regular axial specimen, the retouched edge simply more or less parallels the original line of the lateral margin into which its raclette retouch has encroached (plate 16t, u). The arced axial type, on the other hand, gives the piece an outline form reminiscent of a side-scraper; in most cases the edge actually carries away much of the end of the piece and meets the opposite margin (plate 16v, w). Because the arced profile lends itself to a broader blank, it is not surprising that 14 of the 19 pieces bearing it involve flake-blades, whereas blades account for 10 of the 21 regular axial pieces (even though blades as a whole account for only one-third of the long blank sample). The average blank width of a regular axial piece is 2.5 cm, whereas that of an arced axial is 2.9 cm. No pieces qualify as biaxial as such even though the form could easily be realized on the geometry of long blanks (and even though biaxial retouch frequently associates with the traverse contour).

An oblique contour entails a retouched oblique edge that lies at less than a 45° angle to the long axis

of the piece and occupies little, if any, more than half the length of its margin. Distally the edge forms either an amorphous minimal front or directly intersects the opposite lateral margin. The oblique group is numerically unimportant, consisting of only 12 specimens, but it is of considerable utility to the typologist because it provides a home for pieces that would otherwise create a troublesome area of intergradation between axial and traverse contours (plate 17c, d).

We turn now from whole (and quasi-whole) long raclettes to the significant subsample of broken ones. Typical of these is a proximal specimen (plate 17f). Pieces like this are undeniably long raclettes, but lacking their distal ends, they remain unassignable to a specific contour type. Distal broken pieces are somewhat special due to the problem posed by axial retouch. As noted previously, for a specimen to qualify as a traverse/axial, its retouched edge must continue at least halfway down the lateral margin—which means that a considerable portion of a broken traverse/axial piece must be present if it is to be assigned to the type. Because it has no significant axial retouch, identifying a simple traverse, on the other hand, just calls for enough of the original artifact to be present to qualify the piece as some sort of long blank. To add broken traverse specimens to the whole piece subsample on the basis of less rigorous length/width standards than those required of traverse/axial pieces would skew its distribution of contour types. As a result, the practice followed here is to retain pieces like that illustrated in plate 17e in the broken category, even though its correct assignment to a contour type is not in doubt.

Broken long raclettes are inventoried in table 7.30. These, as a rule, fully resemble their whole counterparts in morphology and do not require systematic illustration. Troublesome, however, are four of the distal and mesial members in the 1.5 cm width category, whose narrowness raises the question of whether they do not actually constitute abruptly retouched bladelets (plate 17f). To inspection, the retouch is of the raclette variety and qualitatively different from the kinds on either bladelets with fine retouch or backed bladelets in the 3-A assemblage. The issue involves too few specimens to have any quantitative impact on the inventories of the typological groups involved, but it concerns an

Table 7.30. Inventory of 3-A broken long raclettes

	≤ 1.5 cm	2 cm	3 cm	4 cm	
Distal portion	2	28	10	1	41
Mesial portion	3	2	3	3	11
Proximal portion	3	10	8	1	22
	8	40	21	5	74

interesting area of intergradation. Its resolution must presumably wait upon comparative studies of raclette variation among other Early Magdalenian assemblages. Six of the 22 proximal broken pieces are biaxially retouched, as are three of the mesial specimens—proportions that may not differ significantly from those of the whole group once the possible effects of sampling error are taken into account. In sum, broken long raclettes suggest an overall pattern of typological variation that is thoroughly comparable to whole ones.

Short raclettes

Short blanks lend themselves to a range of profiles that is at once more obvious and more limited than that of long blanks (see figure 7.1). A single contour is common enough to warrant the name “standard”; here the retouch lies opposite the butt and continues to a greater or lesser extent down the piece’s margins without describing any sharp angles. A convergent contour among short raclettes is essentially the same as its counterpart among long ones, but it is much less common and its overall effect is different because it is tailored to the distinct geometry of a short blank. The fairly rare lateral contour is unique to short raclettes; here the retouched edge simply involves a lateral margin of the piece. Finally, short raclettes may have double or rounded contours.

The basic information relevant to the distribution of these contour types among whole (and quasi-whole) short raclettes is provided in table 7.31, which distinguishes between blanks with and without butts. In tables 7.32 and 7.33 these two subsamples are cross-tabulated with blank widths. Most short raclettes lacking butts bear standard contours and exhibit no significant differences in general morphology or blank width from their butted counterparts. They are simply either stubby fragments

of larger flakes (of unknown morphology) or true square flakes whose bulbar edge broke off when they were struck from the core. Flakes without butts involve two contours in addition. One, the double, carries opposed retouched edges at either end of a piece whose margins remain unretouched. The second contour concerns pieces whose entire margin is retouched; this contour is termed rounded, as the distinction between the ends and margins of such pieces is lost in a more or less continually curving edge. (Because of the dimensions of the flakes involved, analogous pieces among long raclettes are simply coded as double traverse or traverse/axial forms and not given distinct contour status.)

In three-fifths of short raclettes bearing the standard, or garden-variety, contour, the retouch involves less than half the total periphery of the piece (plate 17h, i, j), distributing fairly evenly between 30% and 50% of it in the vast majority of specimens. Those whose retouch exceeding 50% cluster rather narrowly between 50% and 60% (plate 17k, l, m, r); because the butt end of the blank itself normally occupies one-fourth of the periphery, ones with proportionately longer edges are rare. It is noteworthy in this regard that, while otherwise similar, pieces without butts at least tend to offer somewhat more edge amenable to raclette retouch, and consequently somewhat more than half of them (19 as opposed to 16) possess retouched edges lying in the > 50% subtype. The reverse is true of butted blanks, of which slightly less than two-fifths (51 as opposed to 81) fall into this subtype.

Variation in outline form within the standard contour type is great, presumably reflecting the original shape of the blank, where and how its margin accommodated raclette retouch, and perhaps the successive rotations the piece underwent in the hand of the knapper during the manufacturing process. Comparative studies among additional samples are needed to learn whether there is any profit in subdividing this type into a range of specific shapes, for example, pointed (plate 17q). But it is obvious that the convergent contour type is as distinctive, if much less common, here as it is among long raclettes and deserves to be explicitly recognized. Among short blanks this contour is essentially the same as among long ones, except that it involves most of the margin of the piece apart from the butt

Table 7.31. 3-A short raclettes (whole).
Cross-tabulation of Contour Type and form of proximal end.

	Standard	Convergent	Lateral	Double	Rounded	
With butt	131 78.9	28 96.6	9 75.0	0 —	0 —	168 74.7
Without butt	35 21.1	1 3.5	3 25.0	6 100.0	12 100.0	57 25.3
	166 73.8	29 12.9	12 5.3	6 2.7	12 5.3	225

Note: Untabulated are 9 proximal ends carrying butt and enough of retouched margin to indicate a short raclette

Table 7.32. 3-A short raclettes with butt (whole)

	Standard	Convergent	Lateral	
≤ 2 cm	67 51.2	9 32.1	2 22.2	78 46.4
3 cm	48 36.6	14 50.0	5 55.6	67 39.9
≥ 4 cm	16 12.2	5 17.9	2 22.2	23 13.7
	131 78.0	28 16.7	9 5.4	168

(plate 17n, o). Like a few of their long counterparts, a handful of these pieces approximates the outline of perforators (plate 17p).

Few raclettes have lateral contours. Their edges invariably occupy less than half of the total periphery of the piece and affect only its distal end, if at all, in the manner of a medial oblique truncated piece group (plate 17s).

A special subgroup of short raclettes comprises pieces without butts that are retouched at either end in the form of doubles (plate 17t) and, in the case of rounded contours (plate 17u, v), the margins as well. It may be noteworthy that this is the only group outside the blade component of long raclettes that occasionally suggests the presence of laminar specimens, which, like the two double pieces illustrated, suggest true blade fragments rather than stubby flakes. Such pieces are difficult to identify given their present dimensions, but may comprise somewhere between one-fourth or one-fifth of the group.

This is one of the kinds of modalities in raclette production that may be seen to vary significantly among Early Magdalenian industries once comparative studies are undertaken.

The broken category comprises nine proximal fragments that happen to retain their butts and enough of their original retouched margins to indicate they were short raclettes. All would presumably have constituted standard contours extending over more than 50% of the periphery. The nine specimens distribute evenly over the three width categories.

Side raclettes

Side raclettes possess the most homogeneous of the blank forms, consisting of side-struck flakes whose average length is slightly less than 1.5 times their width and only rarely double it; the butt portion occupies more than 40% of the entire periphery. Consisting of a heavy bulb of percussion trailing off to an extremely thin edge, it never accommodates raclette retouch. This dictates the limited range of contours found among side raclettes, which consist essentially of only two types, axial and traverse/axial. These types may be regarded, within the limitations imposed by the nature of the blank, as being analogous to the contours that bear these same names among long raclettes.

Table 7.34 provides the basic information on side raclettes in a cross-tabulation of Contour Type and Blank Width. Here, as usual among raclettes, the two sets seemingly combine at random. None of the blanks exceed 4 cm in width, and only nine of them lack butts. With the one exception described below, the latter are simply specimens that have lost

Table 7.33. 3-A short raclettes without butt (whole).
Cross-tabulation of Contour Type and Blank Width.

	Standard	Convergent	Lateral	Double	Rounded	
≤ 2 cm	19 54.3	1 —	0 —	6 —	11 —	37 64.9
3 cm	12 34.3	0 —	1 —	0 —	1 —	14 24.6
> 4 cm	4 11.4	0 —	2 —	0 —	0 —	6 10.5
	35 61.4	1 1.8	3 5.3	6 10.5	12 21.1	57

Table 7.34. 3-A side raclettes (whole).
Cross-tabulation of Contour Type and Blank Width.

	Axial	Traverse Axial	Miscel- laneous	
≤ 2 cm	41 64.1	9 50.0	1 —	51 60.0
3 cm	20 31.3	7 38.9	1 —	28 32.9
≥ 4 cm	3 4.7	2 11.1	1 —	6 7.1
	64 75.3	18 21.2	3 3.5	85

their proximal edge to breakage. This is shown by the fact that their retouched edge is interrupted by the break (even though enough of the piece remains to leave no doubt that its original form was that of a side-struck flake). Only one specimen is formally coded as broken, consisting of the right half of a side raclette broken on its axis of percussion.

Axial contours account for 75% of all side raclettes. Here the retouched edge, even though it lies opposite the butt, occupies the blank's long edge and would be viewed as a lateral margin were the piece oriented on its long axis. Ordinarily, the edge bears raclette retouch to the fullest extent it can be accommodated, which means that axial contours tend to occupy roughly 50% of the piece's margin, with the butt end taking up most or all of the remainder (plate 17w, x, y, z). Where the edge accounts for less than 50% of the periphery (plate 17aa, bb), it nonetheless occupies all the margin capable of receiving raclette retouch without significant prepa-

ration. Such preparation, we have seen, was not an integral part of raclette manufacture. A raclette maker may have chosen his or her blanks with reasonable care but, once chosen, modified them little, if at all, to enhance the amount of edge amenable to receiving raclette retouch.

Side raclettes do bear retouched edges that would qualify as traverse and occupy the end of the blank were it oriented on its long axis. Typical specimens are virtually always part of traverse/axial combinations, however, representing the continuation of an axial edge contour that 'rounds the corner' of a piece that bellies out from a relatively narrow butt. The traverse portion of the edge is three times more likely to be broad (plate 17dd) than convergent (plate 17cc). Two of the three with miscellaneous contours are the only side raclettes that bear traverse retouch that is not part of a traverse/axial combination. The third lacks a butt and is the only specimen with biaxial retouch; the two edges involved meet to form a convergent traverse contour on the right side (plate 17ff).

Fragments

The fragment category houses specimens that are too incomplete to be assigned with confidence to a blank form, let alone a specific contour type. The group represents what remained following a refitting operation which, despite its intensity, successfully reconstituted only a dozen pieces of the entire raclette sample. Presumably the mates to these pieces still lie buried at Solvieux beyond the margins of our excavations in locality 3. As indicated in table 7.25, the fragment sample consists of 99

pieces, about two-thirds of which represent lesser parts and one-third more complete specimens that still defy confident assignment. It should be stressed that our approach to fragments has been quite conservative in order not to vitiate the integrity of the analyses to which the bulk of the raclette sample has been subjected. But we would not be too hesitant in assigning perhaps as many as half of these specimens to the broken subsamples of the regular blank categories. The overall proportionate distribution of blank forms, and even specific contour types, among the fragment sample is generally comparable to that which we detailed earlier, although apparent blade fragments do seem a bit overrepresented (approximately 25% of the total). Possibly some of these specimens are not broken long raclettes at all, but instead typical short raclettes that happen to be made on distal blade fragments (plate 17gg). One cannot be sure unless the break interrupts a retouched lateral edge.

7.12.5 Commentary

We must be clear about what the preceding section has and has not done. The classes into which raclettes have been ordered according to their blank form and edge contour constitute an heuristic array. They are not 'real' types either in the sense that they necessarily reflect design notions held by Magdalenian artisans or that they represent statistically distinguishable clusters of the tools (akin, say, to those we have defined among dihedral and truncation burins in § 6.3.4). They are, instead, arbitrary delineations superimposed upon what is in reality a multidimensional block of continuous formal variation that exhibits no obvious planes of cleavage. Nonetheless, the classes possess considerable analytic utility for three principal reasons. One is that they constitute mutually exclusive categories and hence provide a comprehensive picture in which none of the formal variation residing in raclettes has been obscured or lost. Another reason is that they are easily replicated by any competent typologist and should therefore provide a standardized basis for comparative studies. Finally, they are grounded upon an appreciation of the basic mechanical and geometric contingencies that underlie the typological dynamics of raclettes. Researchers who apply our approach to their own assemblages may find it

useful to collapse some of these categories into broader units and subdivide others into finer ones. But they should find that the system of attribute sets these categories represent at least focuses analysis upon those areas of formal variation among raclettes where meaningful industrial patterning is likely to be found.

That our study rests exclusively upon the 3-A raclette sample has both positive and negative aspects. On the plus side, the sample is so large that it very likely approximates the full range of morphological variation described by raclettes and the nature of the continuities and transitions in form that interrelate their various expressions and mark their distinctiveness from other typological groups. On the negative side, the sample is the only one of its kind at Solvieux, and no other significant ones are at our disposal. This means that we have had to proceed without the benefit of a comparative frame like those that underlie most analyses in this monograph. (Burins, scrapers, and other such typological groups recur of course in all Solvieux assemblages.) Possibly then, too much emphasis has been placed upon certain modalities and ways of doing things that are peculiar to the 3-A assemblage rather than to the Early Magdalenian industry of which it is but one specific manifestation. The necessary corrections will be made if and when our system has been tested, amended, and presumably expanded during the course of future comparative studies of other Early Magdalenian assemblages.

It is hoped that from these studies will gradually emerge an appreciation of the modalities of variation in raclette form and manufacture that define significant temporal and geographic groupings within them—information now sadly lacking. It is frustrating that the Early Magdalenian's dominant and most diagnostic tool type remains so refractory.

7.13 Ad hoc and diverse pieces

Some 140 pieces, about 6% of the global assemblage, meet the conventional criteria for denticulated and notched pieces, that is, forms that bear opportunistic retouch or heavy use-wear but do not fall into the standardized morphological types (§ 6.14). Five fairly crude specimens assume the geometry of side scrapers, although they do not

share a family air suggestive of an integral type. The only member of the ad hoc group that excites interest is a *pièce esquillée*, or splintered piece (plate 18g). Ventral splintering use-spalling of this kind is very occasionally found associated with end-scrapers fronts, but virtually never in the Neuvic sector on blanks whose end is not otherwise modified by shaping retouch. The sole exception is a splintered piece recovered at the Tas de Beaufort (§ 1.3.3) (Gaussen and Sackett 1990). The form can abound in Early Magdalenian industries elsewhere. A second splintered piece in 3-A occupies the distal end of a heavily retouched blade fragment.

Of particular interest in the diverse group are two pieces bearing parallel oblique spalling on their ventral faces (plate 18k, l), which in the second example illustrated interrupts a distal inverse truncation. These specimens approach the *pièces de Bertonne* described by Lenoir (1987a; 1987b: 398–400), differing from them in their relative elegance and in that the dorsal flank from which their spalls are struck is unretouched. Perhaps due in part to Lenoir's own keen eye, the *pièce de Bertonne* seems to be particularly typical of Lower Magdalenian assemblages from the Gironde. What may be a related type is the *pièce d'Orville* from the Centre of France—an even shorter and stockier form, also truncated, that usually bears a single removal and is regarded as a kind of bladelet nucleus (Perles 1982). For what it is worth, the spalls removed from the two Solvieux specimens must have been considerably thinner and more delicate than any of the retouched bladelets inventoried in 3-A.

Equally interesting are five pieces, presumably designed to be hafted, that bear a tang formed by a double basal notch (plate 18a–e). The first of these exhibits what might be considered a minimal end-scrapers front superimposed on a hinge fracture; the remainder are broken distally. All bear some amount of intentional or use-retouch. No other tools in 3-A or elsewhere at Solvieux carry similarly notched bases.

A large, handsome arced piece opposes a carefully beveled edge to a massively backed margin (plate 14g). It may be related to the ten substantial convex 'ulus' inventoried as special marginally retouched pieces (§ 7.9).

The remainder of the diverse group involves miscellaneous forms of a kind that appear more or less randomly in all Upper Paleolithic assemblages. They include the proximal end of a blade fashioned into a sort of crude tang (plate 18f); a crude, bifacially chipped form approximating a pick; and two rather crude and massive nosed becs formed on elevated blocks (plate 18h). The latter, despite their air of kinship with carinate muzzled scrapers, are retouched in a manner indicating that the projection was purposefully fashioned and is not simply a broken scraper front.

7.14 Miscellaneous and uncounted artifacts

The miscellaneous and uncounted artifacts dealt with here were recovered within the couche 3-A horizon but are presumably attributable to contamination from other archaeological horizons. Consequently they are not included in the 3-A assemblage inventory. They include two Solutrean points, a Noailles burin, and several Raysse burins. Only the points are illustrated (plate 18i, j).

Solutrean points

The specific original provenance of the points is unknown because the Solutrean couche S that presumably once occupied northern Solvieux Centre was probably mostly lost to erosion (§ 4.1.4). Its intact remnant lies several meters north of locality 3. The points may therefore be souvenirs gathered in piecemeal fashion by the Magdalenians at times when their own excavations or natural erosion brought elements of the couche to light. The smaller point is a well-made laurel leaf; the larger one was apparently broken during manufacture.

Noailles and Raysse burins

The Raysse Perigordian elements undoubtedly derive from the couche B complex lying immediately north of the principal Magdalenian horizon in locality 4. Quite possibly, remnants of couche B continue southward into locality 3 and are stratigraphically merged with couche A (§ 4.5.2).

A single Noailles burin was recovered from couche 3-A. There is a significant component of

Raysse burins, however, consisting of 12 single specimens and 5 additional ones involved in multiple mixed burins and composite pieces. Their numbers are sufficient to raise the worrisome question as to what extent the 3-A assemblage may be contaminated by additional tools deriving from couche 4-B whose origin is not suspected because they do not constitute diagnostic *fossile directeur* forms. For example, given the relative proportions of Raysse and standard burins in couche 4-B, one might suspect that around 20 members of the 3-A standard burin sample may not legitimately belong to it. (This assumption is based, of course, on the hypothesis of stratigraphic contamination rather than upon the presumably more selective process of souvenir collecting.) It bears stressing, however, that the absolute size of the 3-A sample is so great that such contamination would be very minor and could not appreciably influence either the descriptive or quantitative definition of its typological makeup.

7.15 Summary of the couche 3-A industry

The 3-A assemblage is not entirely free of contamination, and it probably represents a palimpsest of occupations. Yet it has few, if any, equals as a type-assemblage for the Early (stage I) Magdalenian (an industrial phase we subsequently refer to as the Late Badegoulian [§ 11.1.1]). This stratigraphically well-segregated assemblage of remarkable size (2184 pieces) samples an extremely broad surface (120 m²) over which tool types are seemingly distributed at random. The proportions in which these types appear are therefore trustworthy for characterizing the industry as an industrial frame of reference. Given the apparent fullness of its range of typological variation, one might even assume that the 3-A industry samples in representative fashion the full repertoire of design and manufacturing standards practiced by artisans living at the time in the region. It presents, then, a generic or 'normative' picture of the Early Magdalenian of the Perigord.

The banal assemblage is made on well-proportioned blades and laminar flakes that promote a high degree of standardization and typicality. Tools are ruggedly handsome and, where made on brown flint, tend to be robust. Similar robustness is not

seen in the other Solvieux assemblages, even though they use this same flint.

Standard burins dominate the common toolkit, being nearly four times as common as endscrapers; their proportion in the global piece count about equals that of raclettes (34%). Dihedral burins are in a clear majority in the series (57%), while truncation burins account for 36% and break burins 7%. Though less robust than endscrapers, almost three-quarters of burins are made on blades, and the same proportion of the rest of them occupy flake-blades. Their profile distributions are appropriate to a burin sample dominated by broad laminar supports, which means, among other things, that transverse burins are rare (less than 4% of the series). Burins other than the standard varieties are numerically insignificant, mostly comprising a varied assortment of Corbiac burins.

Even though their members appear in appreciable numbers, the remaining typological groups attain only modest proportions in the assemblage because their relative frequencies are suppressed by the inordinate popularity of raclettes and standard burins. Endscrapers account for 6% of the global count and 14% of the common toolkit; here robust blades are especially common, and one-quarter of the pieces bear substantial marginal retouch (in contrast to only one-tenth of the standard burins). Endscrapers are accompanied by a small and disparate group of flake scrapers and atypical carinate scrapers among which no consistent nor distinctive typological themes are apparent. Standard perforators account for somewhat more than 5% of the toolkit; although they occupy amorphous flakes, they are carefully made and as often as not constitute well disengaged percoirs. The special perforator group includes six delicate multiples that unambiguously qualify as star perforators; five additional diminutive percoirs are probably related. Truncations are only half as common as perforators and lack typological distinction apart from their marginal retouch (3.5%).

A distinctive typological feature of the industry is an ensemble of 33 pointed blades. Also distinctive is a sample of 66 retouched bladelets that share a family air and make up a rather special microlithic component. They are parallel-sided, come naturally to a point, and bear on their right margin fine abrupt

or semiabrupt retouch, which is three times more often produced by nibbling than by discrete serial spalling. A dozen of these might easily be classified as backed bladelets if viewed individually. But in context, these pieces appear to constitute one end of the range of variation of a typological group of abruptly retouched bladelets distinct from true *lamelles à dos*.

Raclettes account for a full third of the 3-A assemblage and constitute the largest and best documented sample of the tool class available to modern archaeological research. They make up a multidimensional block of formal variation that defies subdivision into clear-cut types. Their distinctive abrupt retouch is executed with narrow tolerances but is at the same time opportunistically applied wherever an appropriate edge presents itself. This means that raclette variation is dependent upon mechanical and geometric contingencies arising from the supports involved, and consequently that the operations of raclette type design and blank choice must have been one and the same.

Ad hoc tools such as notches and denticulations are not particularly common, which is consistent with the strong laminar aspect of the industry and its fairly high standard of workmanship. The diverse

group accounts for less than 1% of the assemblage. A motley assortment of unique forms that invariably appears in any numerically large assemblage is accompanied by five rather special tanged pieces and a splintered piece (*pièce esquillée*)—the last a rarity in the Neuvic sector. Fifteen uncounted tools are industrially alien: two Solutrean points, one Noailles burin, and 12 Raysse burins. They undoubtedly represent admixture from the distinct Solutrean and Upper Perigordian occupations that currently appear as stratigraphically intact horizons only to the north of locality 3. It is unclear whether their appearance in locality 3 is to be attributed to local remnants of these horizons or to other cultural or natural agencies which introduced them into the locality. Their presence makes it impossible to regard the 3-A assemblage as being free from contamination. Nonetheless, their number, along with that of the banal tools that may have accompanied them and whose alien origin has gone unrecognized, is much too small to distort our perception of the industrial makeup of the assemblage or to compromise its value as a type-assemblage.

How the 3-A assemblage fits into and illuminates our understanding of the evolution of Magdalenian industries is discussed at length in § 11.1.

8

Middle Magdalenian Industry Couches I and II

Couches I and II are stratigraphically proximate throughout their areal extent and can be distinguished only with difficulty even in locality 1. That we have succeeded in separating them is suggested by the clear-cut segregation in their two artifact assemblages of an individual artifact type (the Solvieux point) and of certain tool group frequencies and raw materials. But these two assemblages remain no more than variants of what is essentially one and the same Middle Magdalenian industry seen elsewhere in the Neuvic group. Here, therefore, we treat them in the ensemble as a composite assemblage, couche I/II, or, simply, I/II, noting the few salient contrasts between them in passing.

There are no ancillary lenses or horizons to be summarized, because outside locality 1 the two couches are known only from trench M and scattered sondages, where they have provided only small tool samples that cannot be segregated from the underlying couche III, let alone from each other. Our discussion follows the format established in the previous chapter for couche 3-A, although, due to the much smaller sample sizes involved, the text is considerably less encumbered by statistical tables. A general summary of the couche I/II industry appears in § 8.10. The significance of this industry to Magdalenian systematics is discussed at length in § 11.2.

8.1 Preliminaries

The inventories for the I/II composite assemblage accompany those of 3-A for comparative purposes in tables 7.1 through 7.4. Individual piece counts for couches I and II are provided in table 8.1. These counts show that, apart from the special Solvieux point type restricted to couche II, the only obvious differences between the two are that couche I has almost twice as many standard burins as couche II and only half as many bladelets. Otherwise, the differences seen in the proportions of their typological groups lie within the range of sampling error. Given that the standard burin types are essentially identical in both typology and relative frequencies in the two assemblages, the contrast in their overall popularity between the two perhaps suggests somewhat different patterns of horizontal concentration. The bladelet group may raise somewhat more complex issues, however. On the one hand, the two bladelet samples differ somewhat typologically, making it more difficult to rule out the possibility that their disproportionate representation between couches I and II may not have some industrial significance. On the other hand, the recovery rate of these diminutive tools is highly dependent upon excavation conditions. They are difficult to recover from the quite clayey soil of locality 1 when it is rain-soaked, as it often is;

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Table 8.1. Piece Count: Middle Magdalenian assemblages

		1-I		1-II		I/II	
		N	%	N	%	N	%
Scrapers							
1a	Endscraper on blade	17	5.78	19	7.36	36	6.52
1b	Endscraper on flake	1	0.34	4	1.55	5	0.91
2	Double endscraper	1	0.34	2	0.78	3	0.54
3	Flake scraper	4	1.36	2	0.78	6	1.09
9	Endscraper on retouched blade	7	2.38	4	1.55	11	1.99
11	Block/Aurignacian scraper	—	—	1	0.39	1	0.18
Composites							
17	Scraper + burin	10	3.40	4	1.55	14	2.54
19	Burin + truncation	—	—	2	0.78	2	0.36
22b	Point + burin	—	—	2	0.78	2	0.36
22c	Point + scraper	1	0.34	—	—	1	0.18
Perforators							
23	Percoir	2	0.68	3	1.16	5	0.91
24	Micropercoir	2	0.68	1	0.39	3	0.54
27	Bec	4	1.36	3	1.16	7	1.27
28	Thorn	1	0.34	1	0.39	2	0.36
29	Bec burinante alterne	—	—	1	0.39	1	0.18
Burins							
30	Axial dihedral burin	92	31.29	37	14.34	129	23.37
31	Lateral dihedral burin	46	15.65	21	8.14	67	12.14
32	Lateral break burin	3	1.02	5	1.94	8	1.45
34a	Corbiac burin	—	—	1	0.39	1	0.18
36	Double dihedral burin	8	2.72	2	0.78	10	1.81
37	Axial truncation burin	10	3.40	3	1.16	13	2.36
38	Lateral truncation burin	8	2.72	2	0.78	10	1.81
41	Transverse burin	4	1.36	1	0.39	5	0.91
46	Multiple mixed burin	8	2.72	1	0.39	9	1.63
Truncations							
57	Traverse truncation	1	0.34	7	2.71	8	1.45
58	Oblique truncation	3	1.02	5	1.94	8	1.45
59	Medial oblique truncation	—	—	1	0.39	1	0.18
Marginally retouched pieces							
61	Whole	4	1.36	—	—	4	0.72
62	Fragment	—	—	3	1.16	3	0.54
Ad hoc tools							
72	Notched piece	9	3.06	12	4.65	21	3.80
73	Denticulate piece	2	0.68	29	11.24	31	5.62
Bladelets							
85a	Backed bladelet	17	5.78	39	15.12	56	10.14
85b	Special backed bladelet	12	4.08	9	3.49	21	3.80
86	Fragment of backed bladelet	1	0.34	4	1.55	5	0.91
94	Bladelet with direct retouch	14	4.76	20	7.75	34	6.16
Points							
101a	Pointed blade	2	0.68	—	—	2	0.36
101b	Solvieux point	—	—	6	2.33	6	1.09
Diverse pieces							
105	Diverse	—	—	1	0.39	1	0.18
Totals		294	99.98	258	100.04	552	99.99

furthermore, excavations there took place largely before deblois screening was introduced.

The technology of couche I/II contrasts with that of 3-A. It is equally laminar but lacks almost entirely the latter's robustness, consisting of relatively narrow and well-proportioned blades that average under 3 cm in width in the typological groups making up the common toolkit. Dimensionally, I/II blank morphology in fact closely approaches that of the Raysse Perigordian 6-M sample, except that the latter's blades are decidedly thicker in vertical section. While respecting the same general patterns, such as its endscrapers exhibiting a greater average width than its standard burins, I/II's blanks vary less from one tool group to the next than do those of 3-A (with bladelets constituting an obvious exception). Marginal retouch is much scarcer than in 3-A, but when present it is executed with a deliberation and emphasis that lends it a typological impact out of proportion to its actual incidence.

Black and brown flint prevail in both couches, with the first decidedly more popular except among bladelets. Brown consists almost exclusively of Ivy League, although in both couches rare examples appear of rainbow—a variant otherwise restricted to couche A. Again contrary to 3-A, black and brown flint are knapped into blanks that do not differ in size or morphology. A special feature of couche II is a significant proportion (essentially 10%) of side-walk flint, from which couche I/II artisans produced blanks that are appreciably more robust and less laminar than those in brown and black. But its role in the I/II assemblage is not great enough to affect seriously the overall aspect of a laminar and gracile technology. Flint from both couches is invariably heavily patinated.

The I/II sample is the only one at Solvieux that approaches refinement in workmanship. Consistent with this is its comparatively low incidence of atypical forms, which are notably fewer than in 3-A and only half as common as in the Raysse Perigordian assemblages. Partly this may reflect a narrower degree of tolerance in executing type design notions, and partly it may entail a lower incidence of rejuvenating worn and broken tools. In any event, the somewhat opportunistic, even casual, approach

to tool production often seen elsewhere at Solvieux is absent. Presumably, the fairly homogeneous and elegant blade technology may be viewed as both a cause and effect of the I/II stone knappers' craft standards.

The overall distribution of single, multiple, and composite pieces in the I/II assemblage is virtually identical to that of 3-A. Their similarly proportional differences from one typological group to the next obviously reflect the generic patterns on combination pieces discussed previously (§ 6.1).

8.2 Burins

These two Middle Magdalenian assemblages have yielded only a single special burin form, a typical Corbiac burin from couche II. Our concern then focuses exclusively upon standard burins. The burin samples from couches I and II are basically similar in makeup. Their ratios of dihedral, break, and truncation burins are virtually identical, as are the ratios of their single, multiple, and composite piece sub-samples. In every instance where tool and piece counts are adequate for formal quantitative testing, the two samples behave statistically as if they had been drawn at random from the same parent population. Hence, it is altogether reasonable to regard them as expressions of one and the same industry, and to review them together as a single composite sample. This composite burin sample makes up 65% of the I/II common toolkit and 45.5% of its global piece count.

8.2.1 General

Dihedral burins outnumber truncation burins seven to one, which contrasts markedly with their less than two-to-one ratio in couche 3-A. This ratio undoubtedly has industrial significance. Break burins remain constant at 6%.

Although somewhat less strongly expressed than in 3-A, the generic pattern for combination pieces is maintained by I/II burins (table 8.2), which are more likely than endscrapers to join into multiple tools but much less likely to join composites. Here again, the bulk of the composites involve burin + endscraper combinations whose members, insofar as can be safely inferred from such a small sample,

Table 8.2. Association pattern of I/II burin composite pieces

	Dihedral Burin	Break Burin	Truncation Burin	
Endscraper	9	3	2	14
Truncation	2	0	0	2
Point	2	0	0	2
	13	3	2	18

combine in proportions consistent with their relative frequencies in the sample as a whole. That table 8.3 shows no obvious nonrandom patterning among the burin multiple pieces is not surprising in view of the small size of the subsample and its domination by a single type (dihedral burins). Break burins, however, are clearly more likely to appear on combination pieces than are dihedral and truncation burins.

Table 8.4 makes obvious the gracility of I/II burin morphology. Combination pieces are just as narrow as single ones but, with the exception of a single nonlaminar flake, always involve blades. Brown supports are somewhat more common (4 to 3 ratio) than black ones, but the two exhibit essentially identical ranges of blank morphology. A few burins from both couches I and II included in the brown group are actually of rainbow flint. In addition, the couche II sample contains an appreciable amount of sidewalk flint, whose blanks tend to be less laminar and slightly wider than average. These account for only 6% of the combined sample, however. An additional 7% is made up of other miscellaneous flints like those seen among 3-A burins.

Couche I/II burins tend to be handsome. Less than a fifth are atypical, which is notably less than that of couche 3-A and only half that of the Raysse Perigordian burin samples.

8.2.2 Dihedral burins

The I/II dihedral burin sample repeats the generic pattern of dynamic interaction of trigon profiles and blank types seen among 3-A dihedrals (table 8.5). The frequency distribution of profile types is also comparable to that of 3-A; indeed, a chi-square test would show that the differences between the two

Table 8.3. Association pattern of I/II multiple burins

	10 [10.5]		
Dihedral			
Break	5 [5.1]	1 [0.6]	
Truncation	4 [2.9]	0 [0.7]	0 [0.2]
	Dihedral	Break	Truncation

Note: Expected frequencies are shown in brackets

distributions are statistically negligible. It is noteworthy, however, that I/II's distribution exhibits no further shift toward axially and narrowness of closing angle despite its significantly higher incidence of G-supports. We will see that the explanation lies in the overall gracility of dihedral burin supports, which offers a proportionately greater opportunity for the scale effect to come into play.

In keeping with the sample's strong component of gracile supports, D1 narrow burins are numerous. They tend to be made on slender, even elegant blades (plate 19a, b, h) that are frequently broken (plate 19c). D1 trigons often appear on multiple (plate 19f distal) and composite (plate 20n) pieces, in the latter sharing the support with a handsome ogival point. Due to the narrowness of the closing angle, a laterally positioned biseau does not negate the effective axially of the profile (plate 19g).

About 60% of D2 medium axial burins are symmetric and continue the clean lines of the narrows (plate 19d, e; plate 20o); in the last composite a point again associates with a dihedral burin. A rather massive asymmetric D2 trigon associated with an endscraper illustrates the robustness often encountered in blades made from sidewalk flint (plate 20p). Wide, polyhedral biseaux like these are otherwise uncommon.

D3 wide axial profiles are, predictably, the smallest group numerically. Many are altogether typical and far from robust (plate 19i), serving as a reminder that, while they may lend themselves to the spalling of narrow-angled trigons, gracile blanks can just as easily be spalled into wider ones. Of

Table 8.4. Blank morphology of I/II standard burins.
Cross-tabulation of Blank Variety and Blank Width.

	Blade	Flake	Square Flake	
2 cm	113 58.5	16 27.1	0 —	129 49.6
3 cm	68 35.2	25 42.4	0 —	93 35.8
4 cm	10 5.2	12 20.3	3 37.5	25 9.6
≥ 5 cm	2 1.0	6 10.2	5 62.5	13 5.0
	193 74.2	59 22.7	8 3.1	260

G-supports: 75.8%

R-supports: 24.2%

Average width = 2.70 cm

Note: Solid line demarcates G- and R-supports;
dashed line demarcates R1- and R2-supports.**Table 8.5.** Dihedral burin dynamics: I/II tool sample.
Cross-tabulation of Burin Profile and Support Type.

	D1	D2	D3	D4	D5	
G-support	62 96.9	28 65.1	17 50.0	40 93.0	29 64.4	176 76.9
R-support	2 3.1	15 34.9	17 50.0	3 7.0	16 35.6	53 23.1
	64 27.9	43 18.8	34 14.9	43 18.8	45 19.7	229

$$\chi^2 = 41.75 (p < .001)$$

$$\phi = .427$$

course, the opposite does not hold true: robust blanks tend to carry wider trigons precisely because they do not lend themselves to narrower ones. This is why the proportion of stocky pieces is higher here than in any other profile (plate 19k, l); the latter piece is another example of sidewalk flint. Nearly half of D3 burins are atypical. Half of them are also asymmetric, including an interesting piece whose cortex bears deeply engraved lines that were seem-

ingly made prior to the manufacture of its blank (plate 19j); at least no depictive artistic intent is apparent. A burin with a similarly grooved cortex was found at Plateau Parrain (Gaussens et al. 1993: figure 10.3).

D4 medium lateral burins are characteristic in form (plate 19n distal) and often illustrate the intergradation frequently observed between the D4 and D2 profiles (plate 19o). A somewhat atypical

Table 8.6. Truncation burin dynamics: I/II tool sample.
Cross-tabulation of Burin Profile and Support Type.

	T1	T2	T3	T4	T5	T6	T7	
G-support	4	4	3	3	6	1	0	21
R-support	0	1	3	0	2	1	5	12
	4	5	6	3	8	2	5	33

specimen bears a minimal facet (plate 19m); in contrast, a quasi-lateral trigon constitutes one of the rare polyhedral burins in the sample whose biseau is actually wide enough to qualify as chunky (plate 19p). In contrast to its analog in the 3-A sample, the D4 profile here associates particularly strongly with G-supports and is equally as popular as D2. This pattern represents the scale effect at work. The relative frequencies of these medium-angled profiles are equal because only a spall sufficiently heavy to create an asymmetric (D2) biseau on the relatively broad blanks characteristic of the 3-A sample is capable of cutting across the narrower I/II blanks to create a lateral (D4) biseau (plate 19n proximal). The consequent increase in the proportion of D4 trigons at the expense of D2 trigons of course counteracts the trend toward enhanced frequencies of axial profiles that one might otherwise expect to see the principle of economy promote in a gracile burin sample.

The D5 wide lateral group associates preferentially with R-supports, as might be expected, and includes many characteristic pieces fashioned upon broad flakes and blades (plate 19q; plate 20a, b); the second of these pieces is a chunky polyhedral, and the third is only minimally spalled. Yet here again the scale effect can be seen at work, for nearly a third of the group's members are atypical burins on narrow blades. These obviously represent reworked specimens that originally possessed an altogether different profile (plate 20e). It is not unreasonable to conclude that their narrowness facilitated their breakage, as well as their hasty rejuvenation. They are responsible for the D5 category's incorporating approximately 5% of the sample's burin population that would otherwise presumably have fallen into narrower profile categories. Here again we see the anticipated shifts toward axial biseaux and narrow trigons offset, as these specimens probably enhance

the I/II sample's proportion of burins with lateral profiles, and they definitely serve to increase its average closing angle.

8.2.3 Truncation burins

Table 8.6 is the contingency table for I/II truncation burins. Percentages are indicated here only for the marginal frequencies, because sample size is much too small to yield trustworthy percentages within the cells of table itself. Still, the obvious patterns of interaction between profile type and blank type are apparent, such as those between T1 and G-supports and between T7 and R-supports. Moreover, the table's horizontal marginal distribution is consistent with our expectations regarding the differences between truncation and dihedral burins, that is, higher proportions of lateral biseaux and R-supports and an especially marked increase in wide closing angles. Repeating what we saw in I/II dihedral burins, this profile distribution of truncation burins does not significantly differ statistically from its counterpart in the 3-A sample (see table 7.11).

A handful of illustrations suffices to characterize this very small series. Examples of T1 (plate 20g), T2 (plate 20h), T4 (plate 20i), and T5 (plate 20j) burins attest to the fairly elegant quality I/II burins often exhibit. Transverse (T7) burins appear characteristically upon square flakes lacking clear-cut orientation along a typological axis (plate 20f, k).

8.2.4 Break burins

Break burins (plate 20c, d) are heterogeneous and combine at random with the support types. Exaggerating a trend seen generally in the Solvieux assemblages, they appear proportionately more often as members of multiple burins (plate 19f proximal) and composite pieces (plate 20l) rather than as single pieces.

8.2.5 The question of giant burins

In his major work on the Neuvic sites (1980: 69ff), Gaussen raises the issue of *outils géants* in couche I/II, which concerns the large flakes of sidewalk flint found virtually paving the surface of couche II in parts of locality 1. We have seen that this flint is responsible for a component of large blanks in the burin sample and have illustrated representative specimens whose legitimacy as burins is unquestionable (plate 19l, q; plate 20p). While acknowledging that much larger flakes of this flint were frequently transformed into denticulated pieces and racloirs (Gaussen 1980: figure 17:1, figure 18, figure 21:3 and 4), the writer remains unconvinced that the equally large pieces Gaussen identifies in these and other figures really deserve the appellation of burins. It is our impression that sidewalk flint was probably reduced to large tabular pieces before being brought into the site, pieces that in turn were occasionally spalled to obtain rather smallish blades and bladelets. Where it was not intensive, this work occasionally left faceted edges on the tabular forms that simulate kinds of massive burins. But these facets were the by-product, not the purpose, of the spalling.

It is rare indeed that Gaussen and the writer differ on typological issues, and the question remains open. Unless new work is undertaken at locality 1, the problem must be attacked on the basis of his collections alone. For nearly all such pieces from our own excavations were stored with the debitage in the site laboratory, and lost in the fire that destroyed that installation.

8.3 Scrapers

Scrapers are numerous in both couches I and II, accounting for 11% of the global piece count and 17% of the common tool kit of the I/II composite assemblage. The two samples are generally similar and can be treated in the ensemble.

Endscrapers

Couche I/II endscrapers conform to the generic pattern summarized in § 6.5 with respect to their relative proportion to burins and (with allowance for sampling error) their behavior among multiple and composite pieces. That 22% of their blanks carry

significant marginal retouch reinforces the special association we have seen between retouch and endscrapers. This proportion approximates that of the 3-A sample, even though the relative frequencies of retouched burins and marginally retouched pieces in couches I and II are significantly less. As well as can be gauged from the small sample sizes entailed, such retouch is more than twice as common among couche I scrapers than it is among couche II scrapers. It is more or less equally light (plate 20l) and fairly heavy (plate 21g).

The sample displays what is simply a more gracile version of the same blank patterns seen in the 3-A industry. In short, blades are more common among I/II's endscrapers than among its standard burins (83% versus 74%), but their greater average piece width (2.9 cm versus 2.7 cm) somewhat reduces the proportions of G-supports (70% versus 75%). Brown flint outnumbers black in both couche samples by nearly two to one, with no appreciable difference in the range of blank forms and dimensions produced from the two. Due almost entirely to an important element of sidewalk blanks in the couche II sample, the miscellaneous flint category is relatively large (11%). Most I/II endscrapers occupy well-made, quasi-parallel-sided blades, considerably less robust than those of the 3-A sample but nonetheless lacking altogether the thinness of the front section so often seen there. Although they seldom rival the largest 3-A blanks, sidewalk pieces are, as a rule, more robust (plate 20p, plate 21j). Quality is high. Even when including diverse front contours that have been broken and irregularly rejuvenated, atypical specimens comprise little more than one-tenth of the sample.

The distribution of front contours is essentially similar in couches I and II, and that of their combined sample is quite distinct from the distributions of the other Solvieux industries (table 7.13). Round contours are more than twice as common as shallow ones, and only three specimens fall into the irregular category. This distribution partly reflects the particularly gracile blank morphology of the sample, where flakes account for only 16% of the ensemble. Even more important, however, is the low incidence of use-wear, which means that a high proportion of the fronts that began their careers as round remained so up to the time they were discarded.

Most round fronts are altogether typical (plate 20l proximal; plate 21a distal, b, j). More than a tenth of them depart from the arc of a circle in being ogival (plate 21i) or elongated (plate 20n, plate 21f), in the latter specimen owing to shaping by marginal retouch. Consistent with the sparsity of heavy use-wear, only five asymmetric fronts appear in the entire series. The more interesting examples are round specimens whose fronts are wide enough to have sustained appreciable wear-damage without sufficient flattening to qualify as shallows (plate 21g). An asymmetric round contour appearing on a burin-scraper composite illustrates the robustness attained by pieces made of sidewalk flint (plate 20p).

Although many of its members are perfectly typical, the shallow category includes most of the sample's relatively few specimens with use-modified fronts (plate 21d, h). We have seen that a shallow front can also be an accommodation to a wide support (plate 21c). A single irregular contour is illustrated, a flake whose irregular broken front has been rejuvenated by continued usage (plate 21e).

Miscellaneous scrapers

Six specimens at least marginally qualify as flake scrapers, but they are too heterogeneous a lot to suggest the presence of a standardized type. At least half of them may simply be atypical endscrapers on irregular flakes and might as easily have been assigned to type 1b (plate 21c). One specimen in couche II marginally qualifies as an atypical carinate scraper by virtue of occupying a fairly thick block, but its irregular and heavy spalling falls far short of approaching systematic lamellar retouch.

8.4 Perforators

Couches I and II each have about the same number of perforators, enough to constitute a noteworthy component of their inventories even if it is insufficient for formal statistical analysis. They comprise 3% of the common toolkit.

Standard perforators

Couches I and II each possess seven standard perforators: respectively, two and three percoirs, four and three becs, and one thorn apiece. The two series are essentially alike and can be combined into the com-

Table 8.7. Standard perforators: I/II tool sample. Cross-tabulation of Perforator Type and Perforator Profile.

	Percoir	Bec	Thorn	
End	3	1	0	4
Pointed	2	5	0	7
Corner	0	0	2	2
Side	0	1	0	1
	5	7	2	14

posite sample inventoried in table 8.7. All of its members are single. There are not enough specimens to allow for solid statistical comparisons with the couche 3-A perforator sample, but the profile distribution does offer a suggestive contrast in that pointed perforators account for precisely 50% of the I/II sample but only 12% of the 3-A sample. The explanation presumably lies in blank morphology. Narrow blades dominate here as in the rest of the I/II assemblage, and average piece width is 2.4 cm; there is but one true flake, in striking contrast to the significant element of small flakes that are so prominent in the 3-A sample. All this presumably accounts for the emphasis upon pointed profiles and the low frequencies of corner and, especially, side profiles seen in table 8.7.

A few illustrations suffice to characterize the ensemble. Typical end perforators include a percoir (plate 21m) and an analogous piece that qualifies as a bec (plate 21n), the only member of the sample that bears marginal retouch. Pointed specimens include a percoir (plate 21o) that approaches the zone of intergradation with pointed blades (type 101a) and a somewhat robust bec (plate 21p) that does not, despite being rather carefully shaped by retouch. Both corner thorns are perfunctory, but the side bec is well made and occupies the margin of a robust but broken endscraper (plate 21k).

Special perforators

There are three micropercoirs, two from couche I and one from couche II, none of which bear edge modification reminiscent of a retouched bladelet. The perforator in plate 21l appears to be a burin spall.

Table 8.8. Standard truncations: I/II tool sample. Cross-tabulation of Truncation Type and Support Type.

	Traverse	Oblique	Medial Oblique	
G-support	7	9	0	16
R-support	2	0	1	3
	9	9	1	19

A single *bec burinante alterne* appears in couche II (plate 22a). It takes the form of a rounded bec with an end profile, whose careful shaping leaves no doubt that alternative retouch was intentionally used to effect the piece's design.

8.5 Truncations

Truncations are fairly negligible in couche I but somewhat more important in couche II. Joined together in the compound sample inventoried in table 8.8, they make up somewhat more than 4% of the common toolkit. Only two derive from combination pieces, both of which are burin + truncation composites. The nineteen blanks involved can be characterized without resorting to a table. Like those of the other I/II typological groups, they are gracile: the average piece width is 2.6 cm, 79% of the blanks qualify as G-supports, and only one is a true flake. None bear marginal retouch.

Although sample size is too small for it to have more than suggestive value, a cross-tabulation of truncation types with support types is fully consistent with the generic pattern (table 8.8). Oblique truncations associate exclusively with G-supports, and they equal traverse truncations in numbers because gracile blades are so common; the sole medial oblique occupies an R-support. All truncations bear straight contours with the exception of four concave specimens, which distribute equally by the traverse and oblique profiles.

A few illustrations should suffice. A traverse truncation of sidewalk flint (plate 22c) illustrates the robust blanks that this particular flint type produces in an otherwise gracile assemblage, as well as the fact that carefully made truncations do exist. This is also shown by a delicate oblique truncation

(plate 22e). Yet truncations here, as elsewhere, are heterogeneous and atypical. Characteristically atypical are an oblique truncation that is only partially retouched (plate 22d) and a concave traverse specimen that might possibly be an exhausted perforator (plate 22f).

8.6 Marginally retouched pieces

Marginally retouched pieces are few and undistinguished in both assemblages, in keeping with the minor role marginal retouch plays in the industry as a whole. Couche I furnishes four quasi-whole pieces (two proximal, two mesial), and couche II provides three fragments (one mesial, two proximal). In three of the specimens, retouch is light and perfunctory; in two others, it is of the standard variety. A margin of one of the two quasi-whole (proximal) blades bears fairly heavy semiabrupt retouch, however, while the other (plate 22g) bears heavy scaled retouch on both of its margins reminiscent of that seen on the two pointed composite pieces (plate 20n, o). All the blanks in this small sample are blades of narrow and medium width, and all but two are of brown flint.

8.7 Points

Couche I/II is the only Solvieux industry having tools in both classes of pointed pieces.

Pointed blades

Four specimens qualify for type 101a. One is a non-descript rounded point fragment, while the other three are excellent examples whose form is consistent with the range of point variation described for the 3-A sample. From couche I comes an ogival point on the distal half of a blade bearing heavy retouch on one side (plate 22h) and a narrow point sharing a composite piece with a burin (plate 20o). The composite carries heavy retouch on both margins, one of which qualifies as quasi-Aurignacian. Couche II yields a similar point-burin composite (plate 20n), the point in this case in ogival form.

Solvieux points

The distinctive Solvieux point (type 101b) is created by the intersection on or near the midline of the

Table 8.9. Inventory of backed bladelets in couches I and II

Type	I-I	I-II	II
Standard (85a)	17	39	56
Pointed (85b)	3	3	6
Truncated (85b)	9	5	14
Denticulated (85b)	0	1	1
Fragment (85b)	1	4	5
	<u>30</u>	<u>52</u>	<u>82</u>
Portion			
Whole	3	2	5
Distal	9	5	14
Proximal	8	7	15
Indeterminate end	1	6	7
Mesial	9	32	41
	<u>30</u>	<u>52</u>	<u>82</u>
Size			
a (1.0 cm)	0	1	1
b (0.75 cm)	11	30	41
c (0.5 cm)	19	21	40
	<u>30</u>	<u>52</u>	<u>82</u>
Flint type			
Black	23	31	54
Brown	6	9	15
Other	1	12	13
	<u>30</u>	<u>52</u>	<u>82</u>
Sidedness of backing			
Right	4	4	8
Left	21	13	34
Other	5	35	40
	<u>30</u>	<u>52</u>	<u>82</u>
Direction of backing			
Direct	30	45	75
Bidirect	0	7	7
	<u>30</u>	<u>52</u>	<u>82</u>

piece of two essentially straight edges bearing truncation retouch and closing at a very broad angle ranging from 75° to 110° and averaging around 90°. The point is sharp and its edges, at least to the eye, are unmodified by use. It is carried by a stubby, but not necessarily broad, flake or short blade segment lacking marginal retouch. Although one's initial impression in viewing a Solvieux point may be that of a broad bec (Bordes and Gaussen 1970:317), the form is distinctive and intergrades with no other perforator or pointed form. Dubbed *pointes de Solvieux* by Gaussen (1980:87), they are restricted to the Middle Magdalenian ensemble of locality 1 (more specifically, according to our own excavations, couche II alone) and a couple of neighboring sites

in the Neuvic sector that have similar industries (§ 11.2.1). There are six individual specimens (plate 22i, j, k, l, m, n) and one Solvieux point + end-scraper composite (plate 22o). All but one of the single points are made of brown flint.

8.8 Bladelets

8.8.1 Backed bladelets

Backed bladelets are diagnostic of both couches I and II and are numerically important, comprising over 10% and 20%, respectively, of the global sample of couches I and II. Apart from standard burins, this constitutes the only significant proportional difference in an important typological class between the two samples. We have seen that more than one explanation is possible for this difference (§ 8.1).

Analysis

Table 8.9 summarizes the more important attributal information recorded for backed bladelets. The sample sizes are small, 30 and 52 pieces in couches I and II, respectively. Because of certain peculiarities of the data, particularly the extremely high proportion (62%) of relatively uninformative mesial fragments in the latter sample, little meaningful analysis of attribute interaction can be pursued.

A general picture does emerge, however, and it suggests certain noteworthy differences between the two samples. For one thing, the couche I series incorporates more than half again as many small c width bladelets as couche II. In part this gracility may be contingent upon flint type. While black flint is nearly four times as common as brown in both samples, more than one-fifth of the couche II blanks are of other varieties, including sidewalk flint—which here as elsewhere in the assemblage involves more robust pieces.

To what extent the two samples differ in backing is unclear. In both, regardless of piece size, a left-handed back is considerably more common than one on the right. Exact comparison is impossible, however, because sidedness remains indeterminate in two-thirds of the couche II pieces due to their high proportion of mesial fragments. These fragments can only be oriented in terms of their conchoidal rippling, which is not strongly expressed on

bladelets. (It is also obscured by the lacquer applied to protect the catalogue numbers penned on their ventral faces.) Some difference is seen in the nature of the backing retouch, however. It is direct in all couche I specimens, being spalled from the ventral to the dorsal surface, whereas seven couche II pieces are bidirectionally spalled. Because only one of the latter is a *c* width piece, it seems likely that bidirectional spalling may, in part, be contingent upon a thicker blank.

Comparing the specific distribution of the type-list categories within the two samples is not very informative. The inordinately high proportion of regular (type 85a) backed blades in couche II is again due presumably to the preponderance of mesial fragments, which automatically reduces the proportional representation of pointed and truncated pieces. Yet that truncated backed bladelets are absolutely more numerous in couche I despite its smaller sample size is noteworthy. We will see that their specific form may also be somewhat distinctive.

Description

Backed bladelets are illustrated in plate 23 (a–r, couche I; s–cc, couche II). Those of couche I are, on the average, somewhat narrower, in part because some of them are truly diminutive (plate 23q, r) and in part because the couche II sample includes robust specimens fashioned of sidewalk flint (plate 23t, u). The latter may rival Gravette points in size; but the few specimens that retain their ends (plate 23s, y), unlike Gravettes, bear little or no shaping apart from the ordinary backing retouch. As noted, presumably because of their thickness, some of the larger couche II specimens are bidirectionally spalled. The large ones can also bear a gibbosity (plate 23u, v), suggesting a mode of manufacture whereby the spalling of backing retouch begins at the extremities of the piece and converges toward the center.

Purposeful retouch on the margin opposite the back is virtually nonexistent, although use-wear may be apparent (plate 23r, gg) and is often ventral (plate 23k, l). Although it never resembles that of a Gravette point, shaping retouch is more common on couche I backed bladelets than on those of couche II. It is seen on two of the rounded points (plate 23e, f) and an excellent complete specimen bearing a highly oblique truncation and heavy mar-

ginal use-wear (plate 23a). The three pointed specimens from couche II are simply produced by the convergence of backing retouch with the opposite margin (plate 23s). Of the nine truncated backed bladelets from couche I, five are distal (plate 23b, c, d) and four proximal (plate 23n, r). Those from couche II tend to be retouched in a more perfunctory fashion, although one is bitruncated (plate 23cc). The single denticulated piece (plate 23x) exhibits a notable degree of controlled flaking for such a small artifact.

8.8.2 Bladelets with fine direct retouch

Both samples of retouched bladelets are fairly heterogeneous (plate 23dd–ii, couche I; jj–mm, couche II). An appreciable number in both can reasonably be viewed as atypical forms of backed bladelets. They occupy *c* width blanks and possess the characteristic outline, but they simply lack a retouched edge sufficiently thick to qualify as true backing by our criteria (plate 23dd, ee, kk) (§ 6.13.1). Yet many specimens in both samples are simply wide bladelets that are abruptly retouched (often seemingly by use-wear) and bear no close resemblance to *lamelles à dos* (plate 23gg, ii, ll). They can be sufficiently wide to straddle the line between a bladelet and a true blade (plate 23mm). A number of these wider specimens, like their counterparts in couche 3-A, bear the retouched margin on the right side of the piece. Truncated ends are very rare (plate 23ff).

8.9 Ad hoc, diverse, and uncounted pieces

Splintered pieces and reasonably typical sidescrapers are absent altogether. The number of notched and denticulated pieces that warrant inventorying as ad hoc tools is small in couche I (4% of the global piece count) but sizable in couche II (16%) because of the latter's abundance of large and often utilized flakes of sidewalk flint (see § 8.2.5). It would be easy to justify increasing even further the proportion of ad hoc tools in the latter.

The diverse category is restricted to a double nosed bec found in couche II (plate 22b). One of its ends approximates a robust and crude point, the other an atypical nosed scraper.

Uncounted artifacts comprise six small, amorphous flakes and bladelets knapped from a form of

transparent quartz that seems never to have been reported in the Perigord. One of the bladelets is of a size and shape like the flint ones that often bear fine retouch, but it, like the rest of the quartz pieces, exhibits no stigmata of use. These objects were scattered over several square meters of the couche; given the prevalence of intrusions in the area, we cannot rule out that they actually date to post-Paleolithic times. Nonetheless, a microgravette also made of quartz appeared in couche 6-M (§ 9.3.8).

8.10 Summary of the couche I/II industry

The industry is most succinctly defined as a well-made banal toolkit supplemented by a strong microlithic component of backed and otherwise retouched bladelets. The quantitative structure of the common toolkit of the composite I/II assemblage is the same one seen in all of Solvieux's Magdalenian and Raysse Perigordian industries, wherein burins are more than three times more common as scrapers and the latter, in turn, are usually three times as common as any of the remaining typological groups. Yet couches I and II differ significantly from each other in their proportions of two typological groups: couche I has almost twice as many standard burins as couche II but only half as many bladelets. These differences may entirely be a question of site function or the manner in which burins and backed blades happen to have been sampled horizontally in the two couches. In any event, the major typological groups of the two assemblages remain essentially identical with respect to their formal variation and quantitative makeup, and both fall well within the polymorphic range of Middle Magdalenian industrial variability.

The industry is highly laminar, being dominated by relatively narrow, thin blades that are considerably less robust than those of couche 3-A. These supports, being the subject of fairly rigorous standards of manufacture and a low incidence of rejuvenation of worn and broken tools, carry an assemblage that is typologically standardized and reasonably adroit if at the same time banal. This banality is alleviated by an occasional piece bearing substantial and often scaled marginal retouch. This retouch is somewhat more common in couche I than in couche II.

Burins are virtually restricted to the standard varieties. Dihedral burins outnumber truncation burins in both series by a ratio of seven to one, in contrast to the two-to-one ratio found in the older 3-A sample. Most burins are typical, and the majority exhibit relatively narrow-angled trigon profiles appropriate to gracile blades. Endscrapers, which account for approximately 10% of each global sample, also tend to be gracile even though they are the principle bearers of what little marginal retouch is found in the industry. Perforators usually occupy smallish blades, and even truncations are well made as often as not, but both appear in only modest numbers. Marginally retouched pieces are of negligible importance.

Backed bladelets account for 10% and 20% of the global piece samples of couche I and couche II, respectively. Those of couche II are slightly more robust, which may account for their backs being sometimes retouched bidirectionally. A few in both samples are pointed and several are truncated, but none of the latter obliquely in the fashion of a scalene triangle. Both assemblages also yield substantial numbers of pieces inventoried as retouched bladelets. Many or most of these are probably backed bladelets whose abruptly retouched edge is too thin to meet our fairly stringent dimensional requirements for backed bladelets. But others are *lamelles à dos grignotés*, many of which resemble the retouched bladelets of couche 3-A.

Retouched points are also a distinctive element. A very few pointed blades reminiscent of those of Solvieux couche 3-A appear in both couches. The distinctive Solvieux point (§ 8.7) is somewhat more common but restricted to couche II.

Following the general rule in the Neuvic sector, splintered pieces are absent. Consistent with the strongly laminar aspect of the industry and its highly standardized typology, ad hoc tools such as notches and denticulations appear only in small quantities as far as the usual black and brown flints are concerned. In couche II, however, there are several denticulated large tablet flakes of sidewalk flint, a flint type that appears rarely, if at all, in the other couches at Solvieux.

Gausse's earlier exposure immediately to the east of our own in locality 1 produced the assemblage presented in table 8.10. It is an amalgam of

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Table 8.10. Piece Group Count comparison of Middle Magdalenian industries recovered from locality 1 by Solvieux project and by Gaussen

	Couches I/II		Gaussen excavation	
	N	%	N	%
Scraper group				
Endscrapers (1, 2, 9)	55		38	
Other scrapers (3, 11)	7		16	
	<u>62</u>	11.23	<u>54</u>	9.42
Composite group				
Scraper + standard burin (17)	14		14	
Scraper + special burin (17)	0		0	
Other composites (18-22c)	5		7	
	<u>19</u>	3.44	<u>21</u>	3.66
Perforator group				
Standard (23, 27, 28)	14		22	
Special (24, 25, 29)	4		1	
	<u>18</u>	3.26	<u>23</u>	4.01
Standard burin group				
Dihedral (30, 31, 36)	206		214	
Break (32)	8		23	
Truncation (37, 38, 41, 42)	28		30	
Multiple mixed (standard) (46a)	9		11	
	<u>251</u>	45.47	<u>278</u>	48.52
Raysse burin group (44)	0	0.00	0	0.00
Miscellaneous burin group				
Other special burins (34a)	1		0	
Multiple mixed (standard + special) (46b)	0		0	
	<u>1</u>	0.18	<u>0</u>	0.00
Gravette group (48b, 51, 52)	0	0.00	1	0.17
Truncation group (57-60)	17	3.08	11	1.92
Marginally retouched group (61-62)	7	1.27	4	0.74
Raclette group (76)	0	0.00	0	0.00
Bladelet group				
Backed bladelet (85-86)	82		114	
Retouched bladelet (94-95)	34		0	
	<u>116</u>	21.01	<u>114</u>	19.90
Point group				
Pointed blade (101a)	2		0	
Solvieux point (101b)	6		11	
	<u>8</u>	1.45	<u>11</u>	1.92
Ad hoc/diverse group (72-75, 105)	53	9.6	56	9.79
Totals	<u>552</u>	99.99	<u>573</u>	100.05

couches I and II, which he distinguished stratigraphically but was unable to segregate during excavation because of their proximity and artifact density. Its similarity to our composite assemblage is obvious. The minor details in which it differs stem largely from his including in his inventory certain giant forms of break, flat-faced, and nucleiform quasi-burins that we omit from our own (§ 8.2.5). The two microlithic series are seen to be the same in both proportions and makeup when it is noted that

Gaussen's backed bladelet group includes the forms we inventory separately as bladelets with fine retouch. He recovered 11 perfectly typical Solvieux points, two of which associate with endscrapers in composite pieces; presumably all derive from couche II. The couche has therefore yielded 18 such points altogether. It is noteworthy that neither assemblage has produced a raclette, a typical triangle, or any of the supposedly late Magdalenian lithic *fossiles directeurs*.

9

Raysse Perigordian Industries Couches 2-III, 6-M, and 4-B

The vast expanse of Raysse Perigordian occupation stretching over the middle latitudes of Solvieux is sampled by three principal assemblages deriving in turn from locality 2 (couche III), locality 4 (couche B), and locality 6 (couche M). All three are complemented by small artifact samples obtained from ancillary horizons. The 4-B assemblage is modest (190 pieces), but those of 2-III and 6-M are of substantial size (784 and 473 pieces, respectively). The three industries are summarized in § 9.6. A detailed examination of the thorny taxonomic issues they raise appears in § 11.3.

9.1 Preliminaries

The three Rayssian assemblages inventoried in tables 9.1 through 9.4 are very similar in most respects. Their common toolkits are essentially identical statistically, to which they add equally strong components of Raysse burins whose numerical impact upon their global samples is comparable to that of raclettes in couche 3-A and backed bladelets in couches I/II. They share virtually the same relative frequencies of the three standard burin varieties, and together they differ fundamentally from the Magdalenian industries in showing that truncation burins are more than twice as common as dihedral burins; break burins are relatively somewhat more numerous. Piece types conform to the generic pattern in

their overall distribution and proportional differences from one typological group to the next (§ 6.1). The only exception is that burin multiples are relatively twice as common as in the Magdalenian, because Raysse burins frequently combine not only with one another but also seemingly with all types of burins. Marginal retouch has little importance in any of the three assemblages. All are made up of black and brown flint in fairly balanced proportions; brown is dominated by Ivy League, which is accompanied by a small assortment of other zoned and banded varieties of Bergerac flint.

Eluding precise definition, but of major importance to their typological character, is the style of workmanship that characterizes these assemblages. The artisans were not unskilled, as is witnessed by the Raysse burin itself. Yet more often than not they accepted wide ranges of tolerance in realizing their type notions and they subjected their tools to heavy usage and often crude rejuvenation before discarding them. As a result, the Rayssian assemblages exhibit a makeshift and maladroit aspect that is lacking in Solvieux's Magdalenian industries.

Despite their fundamental similarity, there are significant differences among the assemblages. In blank morphology, for example, the robust and often flaky supports of 2-III contrast sharply with the gracile laminar supports of 6-M, giving the two assemblages quite different characters that tend to

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Table 9.1. Piece Count: Raysse Perigordian assemblages

		2-III		6-M		4-B	
		N	%	N	%	N	%
Scrapers							
1a	Endscraper on blade	40	5.10	33	6.98	9	4.74
1b	Endscraper on flake	9	1.15	1	0.21	—	—
2	Double endscraper	3	0.38	4	0.85	2	1.05
3	Flake scraper	12	1.53	—	—	—	—
9	Endscraper on retouched blade	6	0.77	3	0.63	—	—
11	Block/Aurignacian scraper	6	0.77	—	—	—	—
Composites							
17	Scraper + burin	26	3.32	14	2.96	3	1.58
18	Scraper + truncation	—	—	1	0.21	—	—
19	Burin + truncation	1	0.13	2	0.42	—	—
22a	Perforator + burin	2	0.26	3	0.63	1	0.53
22b	Point + burin	—	—	1	0.21	—	—
Perforators							
23	Percoir	7	0.89	8	1.69	—	—
24	Micropercoir	1	0.13	—	—	—	—
27	Bec	9	1.15	4	0.85	1	0.58
28	Thorn	2	0.26	1	0.21	—	—
Burins							
30	Axial dihedral burin	42	5.36	24	5.07	11	5.79
31	Lateral dihedral burin	33	4.21	14	2.96	3	1.58
32	Lateral break burin/pan naturel	18	2.30	10	2.11	5	2.63
34a	Corbiac burin	3	0.38	1	0.21	1	0.53
34b	Burin-point	3	0.38	4	0.85	4	2.11
36	Double dihedral burin	5	0.64	7	1.48	2	1.05
37	Axial truncation burin	40	5.10	37	7.82	19	10.00
38	Lateral truncation burin	98	12.52	50	10.57	22	11.58
41	Transverse burin	20	2.55	3	0.63	3	1.58
42	Double truncation burin	12	1.53	10	2.11	4	2.11
43	Noailles burin	7	0.89	1	0.21	4	2.11
44a	Raysse (Bassaler) burin	173	22.07	81	17.12	58	30.53
44b	Double Raysse burin	32	4.08	19	4.02	7	3.68
46a	Multiple mixed burin (std/std)	10	1.28	8	1.69	3	1.58
46b	Multiple mixed burin (std/special)	27	3.44	14	2.96	3	1.58
Gravettes							
48b	Gravette technopiece	4	0.51	11	2.33	1	0.53
51	Gravette point	13	1.66	32	6.77	—	—
52	Microgravette point	3	0.33	15	3.17	—	—
Truncations							
57	Traverse truncation	13	1.66	5	1.06	1	0.53
58	Oblique truncation	15	1.91	4	0.85	2	1.05
59	Medial oblique truncation	14	1.79	—	—	1	0.53
Marginally retouched pieces							
61	Whole	8	1.02	7	1.48	1	0.53
62	Fragment	6	0.77	6	1.27	5	2.63
Ad hoc tools							
72	Notched piece	21	2.68	16	3.38	8	4.21
73	Denticulate piece	29	3.70	4	0.85	4	2.11
75	Sidescraper	4	0.51	1	0.21	—	—
Bladelets							
94	Bladelet with direct retouch	4	0.51	9	1.90	1	0.53
Points							
101a	Pointed blade	2	0.26	4	0.85	1	0.53
Diverse pieces							
105	Diverse	1	0.13	1	0.21	—	—
Totals		784	100.01	473	99.99	190	100.05

Table 9.2. Piece Group Count: Raysse Perigordian assemblages

	2-III		6-M		4-B	
	N	%	N	%	N	%
Scraper group						
Endscrapers (1, 2, 9)	58		41		11	
Other scrapers (3, 11)	18		0		0	
	<u>76</u>	9.69	<u>41</u>	8.67	<u>11</u>	5.79
Composite group						
Scraper + standard burin (17)	13		9		2	
Scraper + special burin (17)	13		5		1	
Other composites (18-22c)	3		7		1	
	<u>29</u>	3.70	<u>21</u>	4.44	<u>4</u>	2.11
Perforator group						
Standard (23, 27, 28)	18		13		1	
Special (24, 25, 29)	1		0		0	
	<u>19</u>	2.42	<u>13</u>	2.75	<u>1</u>	0.53
Standard burin group						
Dihedral (30, 31, 36)	80		45		16	
Break (32)	18		10		5	
Truncation (37, 38, 41, 42)	170		100		48	
Multiple mixed (standard) (46a)	10		8		3	
	<u>278</u>	35.46	<u>163</u>	34.46	<u>72</u>	37.89
Raysse burin group (44)	205	26.15	100	21.14	65	34.21
Miscellaneous burin group						
Other special burins (34a, 34b, 35, 43)	13		6		9	
Multiple mixed (standard + special) (46b)	27		14		3	
	<u>40</u>	5.10	<u>20</u>	4.23	<u>12</u>	6.32
Gravette group (48b, 51, 52)	20	2.55	58	12.26	1	0.53
Truncation group (57-60)	42	5.36	9	1.90	4	2.11
Marginally retouched group (61-62)	14	1.79	13	2.75	6	3.16
Raclette group (76)	0	0.00	0	0.00	0	0.00
Bladelet group						
Backed bladelet (85-86)	0		0		0	
Retouched bladelet (94-95)	4		9		1	
	<u>4</u>	0.51	<u>9</u>	1.90	<u>1</u>	0.53
Point Group						
Pointed blade (101a)	2		4		1	
Solvieux point (101b)	0		0		0	
	<u>2</u>	0.26	<u>4</u>	0.85	<u>1</u>	0.53
Ad hoc/diverse group (72-75, 105)	55	7.02	22	4.65	12	6.32
Totals	<u>784</u>	<u>100.01</u>	<u>473</u>	<u>100.00</u>	<u>190</u>	<u>100.01</u>

mask their fundamental similarities in artisanship and design. (In this area, as in many others, the 4-B sample falls somewhere in between, partly because it is too small numerically to yield a consistent picture in its own right.) In addition, there are two basic typological differences of particular interest to the current debate over the systematics of Upper Peri-

gordian industries. One concerns the dissimilar roles played by Noailles burins both in these couches and in their ancillary horizons. The second, perhaps even more significant difference, concerns the relative importance of their Gravettian component of backed pieces, which is moderately strong in 6-M, weak in 2-III, and negligible in 4-B.

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Table 9.3. Tool Count: Raysses Perigordian assemblages

	2-III		6-M		4-B	
	N	%	N	%	N	%
Standard burins						
Dihedral burin (30, 31)	102	11.38	53	9.40	21	9.42
Lateral break burin (32)	26	2.90	24	4.26	9	4.04
Truncation burin (37, 38, 41)	219	24.44	135	23.94	57	25.56
Special burins						
Raysses burin (44)	276	30.80	139	24.65	77	34.53
Noailles burin (43)	7	0.78	1	0.18	4	1.79
Busked burin (35)	—	—	—	—	—	—
Corbiac burin (34a)	5	0.56	2	0.35	1	0.45
Burin-point (34b)	3	0.33	4	0.71	4	1.79
Scrapers						
Endscraper (1, 9)	81	9.04	60	10.64	16	7.17
Flake scraper (3)	12	1.34	1	0.18	—	—
Carinate/nosed scraper (11)	6	0.67	—	—	—	—
Standard perforators						
Percoir (23)	7	0.78	9	1.60	1	0.45
Bec (27a)	10	1.12	6	1.06	2	0.90
Thorn (28)	2	0.22	1	0.18	1	0.45
Special perforators						
Micropercoir (24)	1	0.11	—	—	—	—
Star perforator (25)	—	—	—	—	—	—
Bec burinante alterne (29)	—	—	—	—	—	—
Truncations						
Traverse truncation (57)	15	1.67	13	2.30	6	2.69
Oblique truncation (58)	15	1.67	8	1.42	2	0.90
Medial oblique truncation (59)	14	1.56	1	0.18	1	0.45
Marginally retouched pieces						
Piece with continuous retouch (61)	14	1.56	13	2.30	6	2.69
Points						
Pointed blade (101a)	2	0.22	5	0.89	1	0.45
Solvieux point (101b)	—	—	—	—	—	—
Gravette points						
Gravette technopiece (48)	4	0.45	11	1.95	1	0.45
Gravette/microgravette point (51, 52)	16	1.79	47	8.33	—	—
Bladelets						
Backed bladelet (85)	—	—	—	—	—	—
Bladelet with direct retouch (94)	4	0.45	9	1.60	1	0.45
Bladelet with inverse retouch (95)	—	—	—	—	—	—
Raclettes						
Raclette (76)	—	—	—	—	—	—
Ad hoc (72-75)	54	6.03	21	3.72	12	5.38
Diverse						
Diverse (105)	1	0.11	1	0.18	—	—
Totals	<u>896</u>	<u>99.98</u>	<u>564</u>	<u>100.02</u>	<u>223</u>	<u>100.01</u>

Table 9.4. Common Toolkit: Raysse Perigordian assemblages

	2-III		6-M		4-B	
	N	%	N	%	N	%
Standard burins						
Dihedral burins (30, 31)	102		53		21	
Lateral break burins (32)	26		24		9	
Truncation burins (37, 38, 41)	219		135		57	
	347	65.60	212	64.24	87	73.11
Scrapers						
Endscrapers (1, 9)	81		60		16	
Other scrapers (3, 11)	18		1		0	
	99	18.71	61	18.48	16	13.45
Standard perforators						
Percoirs (23)	7		9		1	
Becs (27a)	10		6		2	
Thorns (28)	2		1		1	
	19	3.59	16	4.85	4	3.36
Truncations						
Traverse (57)	15		5		1	
Oblique (58)	15		8		2	
Medial oblique (59)	14		1		1	
	44	8.32	14	4.24	4	3.36
Marginally retouched pieces (61)	14	2.65	13	3.94	6	5.04
Retouched bladelets						
Direct fine retouch (94)	4		9		1	
Inverse fine retouch (95)	0		0		0	
	4	0.76	9	2.73	1	0.84
Pointed blades (101a)	2	0.38	5	1.52	1	0.84
Totals	529	100.01	330	100.00	119	100.00

9.2 Couche 2-III

The assemblage of 784 pieces furnished by couche III in locality 2 is second only to that of couche 3-A in size. In the case of some typological groups it is the only Raysse Perigordian series large enough to provide a solid statistical grounding for the industry's description and definition. We have seen that the couche is a stratigraphic amalgam in which more than one occupational episode is undoubtedly represented (§ 4.5.1). Those ancillary lenses that can be distinguished from the principal couche in locality 2 are discussed separately (§ 9.2.12).

9.2.1 Standard burins

Standard burins make up 66% of the common toolkit but only 35% of the global piece count, the latter figure being suppressed by the assemblage's large component of Raysse burins. The considerable

size of this sample (347 tools) provides a clear view of Solvieux's most distinctive expression of the typological dynamics we have seen at work among standard burins (§ 6.3.2 through 6.3.4). It illustrates particularly well how burin typology varies in conformity with blank morphology but at the same time respects certain industrial norms that are independent of it.

General

As in the other two Rayssian assemblages, truncation burins outnumber dihedrals by more than two to one in the 2-III sample. The behavior of standard burins among composite pieces is indicated in table 9.5, and among multiples in table 9.6. The latter table evidences the trend seen in 3-A whereby truncation burins enter into doubles more often than chance would dictate.

Table 9.5. Association pattern of 2-III burin composite pieces

	Dihedral Burin	Break Burin	Truncation Burin	Raysse Burin	
Scraper	6	0	7	13	26
Truncation	1	0	1	0	2
Perforator	0	0	1	0	1
	7	0	9	13	29

The blank morphology of 2-III's standard burins is singular (table 9.7). Relatively narrow blades 3 cm wide or less are by no means uncommon, yet they account for only 45% of the total; half of the sample actually consists of flakes. All this translates into a distinctive pattern of summary statistics: a high average blank width, a particularly low incidence of G-supports, and an especially strong component of particularly stocky R2-blanks. This special morphology is a product of the ordinary flint types being used in a manner quite different from that seen elsewhere at Solvieux. Slightly over 67% of all standard burins are made of black flint, 27% of Ivy League, and 5% of additional varieties of banded brown flint. The brown, as a rule, has been knapped into fairly wide blades, though not as robust as those seen in 3-A. Black flint, contrary to

its use elsewhere at Solvieux, contributes a notably high proportion of robust flakes that are frequently amorphous in shape and retain a great deal of cortex—products of a somewhat perfunctory reduction of the flint nodules that dominate the site's gravel lines. Interestingly enough, multiple and composite blanks are as diverse in morphology as those of single pieces, and they include rather special typological forms peculiarly suited to stocky flakes. A handful of burins and one scraper are made of a smooth, white, very homogeneous, fine-grained flint resembling porcelaine that was also used occasionally for backed pieces.

The 2-III standard burin series is the opposite of elegant, as is also true of the other Raysse Perigordian samples. But here the impression is enhanced by the opportunistic and artless style of manufacture fostered (as well as reflected) by its strong element of nonlaminar chunky blanks; even blades narrow enough to qualify as G-supports tend to be thick and somewhat irregular. Perhaps one-third of all 2-III burins would be considered atypical if judged by the standards used in describing the Magdalenian series. (Atypicality involves about one-quarter of the 3-A sample, whereas it accounts for only one-fifth in I/II.) Burin margins often carry much nibbling and signs of heavy use, but they are rarely systematically retouched.

Table 9.6. Association pattern of 2-III multiple burins

Dihedral	2 [1.2]				
Break	2 [0.9]	1 [0.4]			
Truncation	7 [6.0]	3 [2.4]	12 [7.9]		
Raysse	7 [10.5]	1 [4.2]	17 [27.2]	32 [23.6]	
Corbiac	0 [0.2]	0 [0.1]	1 [0.6]	1 [1.0]	0 [.02]
	Dihedral	Break	Truncation	Raysse	Corbiac

Note: Expected frequencies are shown in brackets

Table 9.7. Blank morphology of 2-III standard burins.
Cross-tabulation of Blank Variety and Blank Width.

	Blade	Flake	Square Flake	
2 cm	71 44.1	6 5.6	2 3.7	79 24.7
3 cm	76 47.2	49 45.4	6 11.8	131 40.9
4 cm	13 8.1	35 32.4	14 27.5	62 19.4
≥ 5 cm	1 0.6	18 16.7	29 56.9	48 15.0
	161 50.3	108 33.8	51 15.9	320

G-supports: 48.4%

R-supports: 51.6%

Average width = 3.25 cm

$\chi^2 = 165.93$ ($p < .001$)

$\phi = .720$

Note: Solid line demarcates G- and R-supports;
dashed line demarcates R1- and R2-supports

Despite its typological peculiarities, the 2-III sample illustrates, as well as confirms, in particularly clear-cut fashion the generic model of burin dynamics derived from our analysis of 3-A standard burins. It also displays systematic shifts in profile type frequencies away from the 3-A distributions that are fully consistent with expectations (§ 6.3.4). This clarity of patterning is due, of course, to the special robustness seen among 2-III burin supports. This robustness makes them much less subject to the factors that in more gracile samples can mitigate the basic patterns of dynamic interaction between blank morphology and trigon profile. Here, in other words, we see the principle of economy operating largely unfettered by the scale effect. This clarity of patterning is reflected statistically by phi values for strength of nonrandom association in tables 9.8 and 9.9, which that surpass those for comparable tables in all other burin samples.

Dihedral burins

A sample of 102 dihedral tools is small enough to be distorted by chance fluctuations when distributed over the ten cells of the standard dihedral burin contingency table (table 9.8). Yet the results here are consistent with our expectations. First, comparison of the column percentages with one another and with the vertical marginal percentage distribution reveals a pattern of interaction between the burin profiles and blank types that conforms altogether with the generic model. Second, for reasons already discussed, the shift in profile type frequencies toward more lateral biseaux and more wide-angled trigons is to be expected in a sample possessing a blank morphology stockier than that of 3-A. Particularly telling in this respect is that the profile type which combines both of these features, D5, is proportionately more than twice as common here as among 3-A dihedral burins.

Table 9.8. Dihedral burin dynamics: 2-III tool sample.
Cross-tabulation of Burin Profile and Support Type.

	D1	D2	D3	D4	D5	
G-support	18 90.0	8 53.3	3 16.7	9 64.3	13 37.1	51 50.0
R-support	2 10.0	7 46.7	15 83.3	5 35.7	22 62.9	51 50.0
	20 19.6	15 14.7	18 17.7	14 13.7	35 34.3	102

$$\chi^2 = 24.32 \text{ (} p < .001 \text{)}$$

$$\phi = .488$$

A rough-and-ready style of manufacture characterizes burins made on the sample's strong component of nonlaminar blanks and is often imposed even upon those carried by reasonably narrow and regular blades. Biseaux are frequently wide, formed either by single massive removals or by polyhedral spalling; the two are often found on either side of one and the same trigon. Burin facets are often flat-faced or, conversely, directed dorsally. One side of a trigon may consist of only a perfunctorily spalled minimal facet or an unmodified edge or flank of the support. Many burins also exhibit the stigmata of successive spalling. This can indicate rejuvenation of broken trigons (which was certainly more often practiced here than in the Magdalenian samples) but equally often it simply suggests artless standards of manufacture that entailed repeated, choppy spalling.

Perfectly typical D1 narrow specimens on blades are not rare (plate 24a, b). Yet even gracile blanks can bear trigons that are minimal (plate 24c) or maladroit (plate 24d), and some specimens are particularly robust (plate 24e, f distal). D2 medium axial burins comprise a similar mixture of reasonably typical (plate 24h, j) and atypical (plate 24g, i) forms, the trigon of the last involving an adapted facet. The D3 wide axial group is dominated by pieces on R-supports (plate 24l, plate 25a) that often display a makeshift quality, the facets of their trigons being chopped (plate 25c, d) or involving adopted edges (plate 24k). Only one-third of them are symmetric.

D4 medium lateral trigons are as common as their axial (D2) counterparts (plate 25e, f); one-third are quasi-laterals, which accounts for the group's modest preference for G-supports (plate 30b). Those

on flakes have a rough-and-ready quality, for example by adopting the unmodified steep flank of the support as one edge of their trigon (plate 25g).

D5 wide lateral burins account for a full one-third of the series. Specimens on reasonably narrow blades are not rare (plate 25h). But the group is characterized by R-supports. A few of these are blades (plate 25l), but most are chunky and amorphously shaped cortical flakes derived from nodules of black flint (plate 25i, j). These flakes can be difficult to orient for purposes of coding their profiles; some counted here as D5 (plate 25k) might easily change places with some counted as D3 (plate 24i). A particularly impressive D5 trigon (plate 24f proximal) incorporates the unmodified edge of an elongated cortical flake whose opposite end carries a robust D1 burin.

Truncation burins

The 2-III's sizable truncation burin sample meets our expectations equally well with respect both to the interaction pattern and the distribution of profile types seen in table 9.9. The latter contrasts in the expected manner to the profile distribution of 2-III's dihedral burins by exhibiting higher frequencies of lateral biseaux and wide closing angles, even though it involves only a negligibly greater proportion of R-supports. This is of course additional proof of our conclusion that the dynamics of truncation burins differ in certain basic respects from those of dihedral burins and that, in consequence, their contrasts in profile distribution cannot be attributed simply to blank morphology in and of itself (§ 6.3.3). Yet blanks do indeed influence the distribution. For the

Table 9.9. Truncation burin dynamics: 2-III tool sample.
Cross-tabulation of Trigon Profile and Support Type.

	T1	T2	T3	T4	T5	T6	T7	
G-support	12 100.0	17 94.4	14 48.3	20 76.9	32 31.1	8 100.0	0 —	103 47.0
R-support	0 —	1 5.6	15 51.7	6 23.1	71 68.9	0 —	23 100.0	116 53.0
	12 5.5	18 8.2	29 13.2	26 11.9	103 47.0	8 3.7	23 10.5	219

$$\chi^2 = 77.04 (p < .001)$$

$$\phi = .593$$

expected shifts toward wider closing angles and lateral biseaux between the 2-III and 3-A truncation burin samples, while definitely in evidence, are not as great as those seen between the dihedral burin samples of the two assemblages, where the proportional difference between G-blanks and R-blanks is greater than that between the truncation burin samples.

T1 narrow burins are, as usual, relatively rare and always occupy G-supports. Here, however, due to their vertical thickness, many of these supports provide sufficient bite to receive altogether typical truncations (plate 26a, b, c). Polyhedral flat-faced spalling can create a wide biseau where the blank is thin (plate 26d distal). T2 medium axial trigons occupy blades almost exclusively and carry in varying degrees the heavy and rather maladroit burin spalls of their dihedral counterparts (plate 26e, f). The same makeshift quality typifies their truncations, which, if heavy, can be crude (plate 26g) and, if light, minimal (plate 26h). Symmetric and asymmetric trigons are equally common.

T3 wide axial burins are mediocre in quality. While nearly half occupy G-supports, reasonably well-made ones (plate 26i) are rarer than less typical ones with irregular truncations (plate 26j). These can involve simply a one-blow truncation consisting of a single massive removal whose edge is lightly regularized (plate 26k). A few of the R-supports are fairly massive blades (plate 26m, plate 27a), but most T3 trigons are found on flakes (plate 26l, plate 27b).

T4 medium lateral burins are numerous in comparison with medium axial (T2) burins (plate 27d, e,

f, h). Some trigons approach the T2 profile (plate 27g), but the problem of intergradation between the two profiles is much reduced because quasi-lateral specimens are comparatively rare (10%) in the 2-III sample. We have seen that quasi-laterals normally involve fairly long, gracile pieces on which even moderate burination is sufficient to create an axial biseau. But even the G-supports here are mostly too stocky to be easily modified in this way.

It is with the T5 wide lateral profile that 2-III truncation burins attain their most common and most characteristic form. Those on G-supports can be fairly gracile (plate 27i, j), but two-thirds occupy true flakes (plate 27l, m; plate 28a-d, f, g). One of the latter bears a ventrally flaked truncation that has been burinated dorsally (plate 28e). These are the same chunky, amorphous flakes rather haphazardly struck from black gravel flint that carry the assemblage's D5 burins. The crudity of their spalling and (often one-blow) truncations cannot help but give them a general air of atypicality even though such features could be fairly regarded as reasonable, if somewhat opportunistic, accommodations to the blanks involved. Not surprisingly, T5 trigons join some of the special composite tools on flakes peculiar to the 2-III assemblage, including associations with a massive side bec (plate 30d) and a heavy front that almost qualifies as a carinate scraper (plate 30e). Because of the overall stockiness of T5 blank morphology, quasi-lateral trigons are rare (only 7 out of 96).

As usual, T6 semi-transverse burins are uncommon and atypical. In the plate 28h specimen crude marginal retouch plays the role of a truncation. The

T7 transverse burins, on the other hand, constitute a substantial, well-defined group. They are invariably made on flakes, most of which are similar to those that dominate T5 burins, and possess shapes and dimensions suggesting they represent the same wide lateral trigon adapted to a blank whose axial orientation was of no concern to their knappers (plate 28i, l; plate 29a, c, d). One multiple burin unites the T7 and T5 profiles in a particularly interesting fashion (plate 28j); another joins T7 with D3 (plate 28k).

Break burins

Break burins are more common in 2-III than they are in the Magdalenian assemblages but still considerably less than in the other two Rayssé samples. As is also true of 2-III dihedral and truncation burins, they show little preference for either support type. Here as elsewhere they are somewhat more likely to join in multiples (plate 27m). In the ensemble, they exhibit the usual heterogeneous and essentially ad hoc aspect (plate 29b, e, f, j).

9.2.2 Special burins

Because of their significance to the Rayssé Périgordian assemblages, Rayssé burins themselves are taken up subsequently in a separate section where the three couche's samples are compared side by side (§ 9.5). The 2-III assemblage also possesses a small component of other special burins.

Corbiac burins

There are five Corbiac burins: three single specimens and two appearing in multiples with a Rayssé and truncation burin. Like their counterparts in couche 3-A, they are both right- and left-handed (plate 29k, l distal). The characteristic trihedral biseau does not necessarily preclude the presence of an appreciable amount of retouch on the edge from which the burin spall is struck (plate 29i). As usual, such pieces suggest that at least some Corbiac burins may represent rejuvenated forms of the more familiar standard varieties.

Noailles burins

Couche 2-III yields seven typical Noailles burins and one additional specimen that has, with some hesitation, been codified as an atypical Noailles. All of the typical forms were collected south of the lat-

itude in locality 2 where considerable stratigraphic merging seems to have taken place; they may actually derive from a lens that to the north constitutes a distinct lower horizon (couche 2-IIIc) (§ 9.2.12). One of the seven bears a single truncation (plate 35y). Another three are truncated at both ends (plate 35m, n, o), and in two of these one of the truncations bears facets struck from both of its sides. Two more oppose a truncation at one end to a break at the other (plate 35p, q); in the second of these, the lateral notches are inversely retouched. The sixth member of the typical group is particularly small and carries only a single burinated truncation opposed to a clean break (plate 35s). It is moot whether it was manufactured on a broken fragment or whether it represents half of a Noailles burin that, in its original form, was worked at both ends like the others. The atypical specimen (plate 35r) approaches a Noailles burin in size and general outline; but its truncation is minimal, it bears a single burin facet, and it has no lateral stop-notch.

Burin-points

There are three burin-points, all typical. The tertiary modification can occasionally take the form of a line of fine dihedral removals rather than more extensive lamellar spalling (plate 29h).

9.2.3 Endscrapers

Scrapers make up 10% of the piece count and 19% of the common toolkit. Only three-fourths of them are endscrapers, in contrast to well over nine-tenths in all other Solvieux assemblages. This proportion has no obvious industrial significance as such, because it is not seen in the other Rayssé assemblages and because 2-III's component of other scrapers is contingent upon its unique blank morphology. Furthermore, endscrapers still account for 7.5% of the piece count and 15% of the common toolkit—proportions that are essentially equivalent to those of Solvieux's other endscraper samples.

General

2-III endscrapers conform to the generic pattern summarized in § 6.5.2 with respect to their relative frequencies vis-a-vis standard burins and to their general behavior in combination pieces. Their propensity to join in composites, invariably with burins

in this case, is particularly marked thanks to the agglutinative bent of Raysse burins (table 9.5). (Five of the scraper + burin composites appearing on the Piece Count are not included in table 9.5, as they involve flake scrapers.) Marginally retouched end-scrapers (12%) are only half as common as in the 3-A sample. But here again this is much more than among 2-III standard burins, where retouch is rare indeed. The retouch is more often than not crude (plate 30h) and only rarely heavy and regular (plate 30i, plate 31d)

Table 9.10 summarizes endscraper blank morphology. The contrast with burins is fairly striking: blades are considerably more important (69% versus 50%), G-supports are much more common (62% versus 48%), and blank width is narrower if still substantial (3.0 cm versus 3.3 cm). The flint types are employed here as elsewhere at Solvieux, which means, among other things, that black (which accounts for only 44% of endscrapers as opposed to 76% of burins) is more often being converted into fairly narrow blades than into the amorphous, cortex-bearing flakes seen among burins. This no doubt

Table 9.10. Blank morphology of 2-III endscrapers. Cross-tabulation of Blank Variety and Blank Width.

	Blade	Flake	Square Flake	
2 cm	15 —	2 —	1 —	18 23.1
3 cm	30 —	8 —	2 —	40 51.3
4 cm	9 —	9 —	0 —	18 23.1
≥ 5 cm	0 —	2 —	0 —	2 2.6
	54 69.2	21 26.9	3 3.9	78

G-supports: 61.5%

R-supports: 38.5%

Average width = 3.05 cm

Note: Solid line demarcates G- and R-supports; dashed line demarcates R1- and R2-supports

accounts for the reduced piece width seen among scrapers. Yet, consistent with the assemblage's overall tendency in blank morphology, flakes are quite numerous in comparison with Solvieux's other endscraper samples (30%); and more than four-fifths of these are true flakes.

Analytic description

The distribution of front contours is the most distinctive at Solvieux, with the shallow contour fairly closely approaching round in popularity (see table 7.13). This shift entails a decrease in the number of round fronts and a proportionate increase in the irregular category, with the percentage of shallow itself remaining very close to that of the 3-A sample. In part this reflects the degree of overall atypicality native to 2-III and in part heavy usage, which flattens the arc of fronts that originally may have been round and creates a relatively high number of irregular and broken fronts. It also reflects the sample's strong component of stocky and less regular flakes (table 9.11), which we have seen promote the manufacture of diverse contours (§ 7.4.2).

Round fronts can be typical, if diverse (plate 30b; i, plate 31b, i), and include ogival (plate 31a) and elongated (plate 31d) forms. But a more relaxed standard of workmanship is apparent. Some fronts are fairly crude (plate 30c, plate 31c proximal), and several are minimally spalled (plate 30g). Shallow contours are common (plate 31l) and even likelier to show use-wear that more often than not produces asymmetry (plate 30f proximal; plate 31g, h, k). They also result from accommodating front retouch to the geometry of wide blades (plate 31e), in this

Table 9.11. Endscrapers: 2-III tool sample. Cross-tabulation of Front Contour and Blank Variety.

	Round	Shallow	Irregular	
Blade	32 86.5	20 66.7	5 35.7	57 70.4
Flake	5 13.5	10 33.3	9 64.3	24 29.6
	37 45.7	30 37.0	14 17.3	81

$$\chi^2 = 11.80 (p < .01)$$

$$\phi = .382$$

Table 9.12. Standard perforators: 2-III tool sample. Cross-tabulation of Perforator Type and Perforator Profile.

	Percoir	Bec	Thorn	
End	4	4	1	9
Pointed	0	2	0	2
Corner	1	1	1	3
Side	2	3	0	5
	7	10	2	19

case minimally retouched, and to the geometry of stubby flakes that usually show fairly heavy usage (plate 31n). Irregular fronts occasionally result from spalling a front on an irregular support (plate 31f), but most are heavily used pieces rejuvenated by additional use-wear (plate 31j, m).

9.2.4 Miscellaneous scrapers

The high proportion of other types of scrapers in couche 2-III has greater technological than industrial significance, representing opportunistic use of the nonlaminar blank forms peculiar to the assemblage. (Tellingly, the highly laminar 6-M Rayssian assemblage has no miscellaneous scrapers at all [§ 9.3.3].) The 17 tools that qualify as flake scrapers are a heterogeneous lot fashioned mostly upon chunky flakes; five of these belong to scraper + burin composites. A couple are reasonably well made (plate 32a, b), but most are maladroit and irregular, and their fronts do not proceed very far around the margin of the blank (plate 32c). These scrapers obviously intergrade with the industry's substantial component of denticulated pieces. Six pieces on elevated blocks qualify as broad or muzzled carinate scrapers. Five take the form of rather haphazardly spalled atypical broad carinates (type 11) and might easily be dismissed as particularly regular nuclei or perhaps rabots (plate 32d). Only one is a typical nosed carinate scraper and bears reasonably well-executed lamellar spalling (plate 32e).

9.2.5 Perforators

Standard perforators account for less than 4% of the common toolkit but are typologically distinctive. Table 9.12 inventories them in terms of a cross-

Table 9.13. Standard perforators: 2-III sample. Cross-tabulation of Perforator Profile and Blank Variety.

	End	Pointed	Corner	Side	
Blade	4	1	2	0	7
Flake	3	1	1	6	11
	7	2	3	6	18

tabulation between perforator types and profiles; only one specimen, a bec, derives from a composite tool. What distinguishes the sample is a preponderance of robust supports. Eleven of the 19 pieces involve true flakes, and the average width of the sample as a whole is 3.5 cm. This robustness contrasts with the markedly laminar aspect of the perforator samples from I/II and 6-M on the one hand and the small dimensions of the flakier couche 3-A sample on the other. Slightly less than half of the blanks are in black flint, and—in contrast to what is found among burins, the larger flakes tend to be brown.

Just as among the Magdalenian assemblages, the relative frequencies of the perforator profile types seem to be dictated largely by a typological dynamics grounded in blank morphology. In this case, a strong flake component appears to be responsible for both relatively low frequencies of pointed perforators and high frequencies of side perforators. While sample size again precludes this pattern being formally demonstrated statistically, the tendency is obvious to inspection of the cross-classification of perforator profiles and blank varieties in table 9.13. The difference between this distribution and those of the highly laminar I/II and 6-M standard perforator samples is striking (see tables 8.7 and 9.21).

The robust end (plate 32f, i) and corner (plate 32g, h) perforators are usually handsome and massive enough to blur the distinction between percoirs and becs. Smaller end percoirs can also be well made even if atypical in opposing a retouched edge to a natural facet or break (plate 33c, g, i). The second of two pointed becs (plate 33f, j) approaches the zone of intergradation with real pointed blades (type 101a). One particularly impressive side bec belongs to a burin-perforator composite piece (plate 30d), while

Table 9.14. Standard truncations: 2-III tool sample. Cross-tabulation of Truncation Type and Support Type.

	Traverse	Oblique	Medial Oblique	
G-support	11 73.3	12 80.0	6 49.9	29 65.9
R-support	4 26.7	3 20.0	8 57.1	15 34.1
	15 34.1	15 34.1	14 31.8	44

$$\chi^2 = 4.38 \text{ (} p > .20 \text{)}$$

$$\phi = .316$$

others are shaped by inverse retouch on smallish flakes (plate 33a, b). Thorns are rare and nondescript.

The special perforator group is represented by a single microporcoir formed by the intersection of a natural edge with a high oblique truncation (plate 33d).

9.2.6 Truncations

The relatively large size of the 2-III truncation sample (8% of the common tool kit) is noteworthy. Their numbers are presumably to be accounted for in terms of the diversity of blank forms, maladroitness, workmanship, and general rough-and-ready character of the assemblage.

Only two of couche 2-III's 44 truncations derive from composite pieces, both involving burins (see table 9.5). On the basis of chance one could expect to find them involved in composites with at least one more burin, as well as with one or more scrapers and perhaps a perforator. In contrast to 2-III standard burins, truncation blanks are relatively laminar (86% blades), narrow (2.9 cm average width), and gracile (66% G-supports). In all of these respects they resemble 2-III endscraper blanks. Furthermore, brown and black flint appear in approximately equal proportions and, again in contrast to the burins, exhibit no significant differences in blank morphology. Only one specimen bears marginal retouch.

Cross-tabulation of the truncation and support types reveals the generic pattern (table 9.14). That medial oblique forms are nearly as common as traverse and oblique forms here may be due not so much to stocky nonlaminar blanks as to perfunctory

workmanship. Reasonably typical medial oblique specimens do exist (plate 34c, d). But more often than not they comprise partially retouched blanks that naturally come to a point (plate 33l, plate 34b), bear irregular ends (plate 34a, e), or have partial truncations that fail even to reach the midline of the piece (plate 33q). Because their truncations by definition must span the width of the piece, regular oblique forms tend to look more typical (plate 33p, t). Where auxiliary retouch is involved, however, they can be difficult to distinguish from endscrapers (plate 33k, s). Conceivably even some axial oblique truncations may constitute atypical skewed endscrapers (plate 34c), but the angle of the retouch and their general configuration argue against it. Traverse truncations are particularly diverse in form and quality (plate 33m, n, r), although those on cortical flakes (plate 33o) are rare in contrast to the popularity of this support among burins.

9.2.7 Marginally retouched pieces

Consistent with the unimportance of marginal retouch in the assemblage as a whole, this typological group is small and unprepossessing. The eight tools listed under type 61 on the piece count comprise five whole and three quasi-whole pieces. Four carry a crude abrupt retouch along all or a significant portion of their margin (plate 34f); the rest have standard retouch (plate 34h). It tends to be light and often suggests use-wear as much as intentional retouch. The six fragments listed under type 62 divide equally between mesial and proximal segments; all bear standard retouch, some of which is heavy and invariably crude (plate 34g). Insofar as can be determined from such a small sample, the pieces are typical of the assemblage in terms of blank morphology and flint type.

9.2.8 Points

Two quite dissimilar specimens qualify for inclusion in type 101a. One is a point shaped by quasi-Aurignacian retouch on a distal blade fragment; it falls well within the range of variation described by narrow points in couche 3-A (§ 7.10; plate 34j). The second is the distal half of a delicately fashioned shouldered point (plate 34i), seemingly reminiscent of those that appear occasionally in late Magdalenian contexts (see Lenoir 1975). That industry has not

Table 9.15. Inventory of 2-III Gravette points

	Gravette	Microgravette	Total
Portion			
Whole	1	0	1
Distal	2	1	3
Proximal	4	1	5
Mesial	6	1	7
	13	3	16
Size			
a (1.0 cm)	3	0	3
b (0.75 cm)	8	0	8
c (0.5 cm)	2	3	5
	13	3	16
Flint type			
Black	4	1	5
Brown	8	2	10
Other	1	0	1
	13	3	16
Sidedness of backing			
Right	5	1	6
Left	1	2	3
Indeterminate	7	0	7
	13	3	16
Direction of backing			
Direct	11	2	13
Bidirect	2	1	3
	13	3	16

been identified in the Neuvic sector, nor has any other piece remotely similar to it been found at Solvieux. It remains an anomaly.

9.2.9 Gravettian pieces

The Gravettian element is weak in the 2-III assemblage, constituting less than 3% of the piece count and being proportionately only one-third as common as in the 6-M sample (§ 9.3.8). Table 9.15 provides the basic inventory of Gravettes and microgravettes, along with significant information regarding blanks and backing. The only potentially important quantitative differences from 6-M (see table 9.23) are the greater importance of brown flint and the lesser importance of bidirectional backing in the 2-III series. These apparent differences could, however, result from sampling error.

Nearly half of the specimens are mesial fragments, which of course inform much less about Gravettian typology than proximal or distal portions. Their size distribution, as well as their general morphology, suggest fairly narrow and straight

Gravette points. Yet the only whole piece has a broad outline reminiscent of a Les Cottés point (plate 35a), which also recurs on a substantial proximal fragment (plate 35b). Only two distal ends lie in the size range of Gravette points. One is the whole specimen just noted, which is shaped by retouch running the entire length of the margin opposite the backed edge. The other specimen, which is fairly nondescript, has both inverse and direct retouch (plate 35d). Butts are represented by the whole point mentioned above, whose marginal retouch only partially shapes it, and by four proximal fragments of which two exhibit ventral retouch (plate 35c, e) and two no spalling at all (plate 35g). Although too small to serve as a trustworthy basis of generalization, the sample suggests that shaping retouch is less important here in both degree and effect than in the 6-M series. As has been noted, bidirectional backing retouch is also less common. It is seen on a mesial fragment (plate 35h), whose opposite margin carries light abrupt retouch or perhaps simply use-nibbling (which also appears on several other specimens).

Microgravettes are restricted to three incomplete specimens. Two are distal fragments that are naturally pointed and carry no shaping retouch whatever (plate 35i). The third is a proximal fragment that bears some light direct retouch (plate 35f).

There are four technopieces. One bears a gibbosity, which presumably results from backing retouch that began near the extremities and proceeded toward the middle portion of the piece (plate 35l). The remaining three suggest, on the contrary, a backing procedure that began near the center of the blank and was carried outward toward the extremities (plate 35k).

9.2.10 Bladelets

The bladelet sample is restricted to four diverse specimens, all of which are classified as bladelets with fine direct retouch. In two of the four retouch is fairly abrupt, however, and consequently suggestive. One of them could be regarded as an atypical mesial fragment of a smallish Gravette point, while the other bears a truncation and in fact qualifies as a truncated element (*élément tronqué*) (plate 35j). It is the only example of one at Solvieux, however, and

the term may be meaningful only where a number of such specimens exist and they make up a typologically coherent group.

9.2.11 Ad hoc, diverse, and uncounted pieces

A numerically strong ad hoc element of crudely retouched and denticulated flakes is present that tends to intergrade with the rest of the comparatively flaky 2-III assemblage. The distinction between these ad hoc pieces and miscellaneous flake scrapers is arbitrary (plate 32c). The heavily rolled diverse piece (plate 34k) that appeared immediately beneath the couche in the southern half of the locality probably derives from the underlying fluvial deposits of the Lower zone. An uncounted raclette from the locality joins six others from trench M in suggesting that higher deposits in northern Solvieux Ouest which are now lost may have incorporated an Early Magdalenian horizon at least analogous to couche A of Solvieux Centre (§ 3.2.2).

9.2.12 Ancillary lenses

The main horizon of couche III in northern locality 2 is sandwiched between two secondary lenses, which seem to have been incorporated in the stratigraphic merging and consolidation of deposits that take place at the midpoint of the locality (§ 3.2.4). The overlying lens, couche 2-IIIa, repeats the distinctive technological and typological features seen in the main couche III horizon. The underlying lens, 2-IIIb, raises an interesting question with respect to the role of a specific tool type, the Noailles burin, in the couche 2-III industry—a question that we will see has ramifications well beyond Solvieux.

Couche 2-IIIa

Although it represents a distinct depositional episode, the 2-IIIa lens yields absolutely no differences of potential industrial significance from the main horizon. It was successfully segregated from the latter only in the northeastern quadrant of the locality. Its small sample of 64 pieces is, to all purposes, identical to 2-III in its technology and is, if anything, even more maladroit in execution. Burins account for 73% of the assemblage, one-fourth of which are indisputably Raysse burins (additional broken and atypical specimens of this type may be included among the truncation burins). There are no

Noailles burins. Truncation burins outnumber dihedral burins in essentially the same proportion as seen in the three principal Raysse Perigordian assemblages. Scrapers are rare, and the incidence of marginal retouch is extremely low. An atypical broad Gravettian piece whose pointed end is unshaped by retouch but whose proximal end is truncated is illustrated (plate 35b).

Couche 2-IIIb

The couche 2-IIIb sample does not represent a distinct stratigraphic unit but consists instead of a scattering of flint in the brown silt and salamander gravels underlying the main couche III horizon in the northern half of locality 2 (§ 4.5.1). Some of its pieces may have migrated downward from the main horizon. Most probably have not, and derive instead from a distinct lens (or lenses) that only became incorporated into the main horizon as part of the stratigraphic merging that took place just to the north of the point where trench A traverses the locality.

The collection amounts to but 20 pieces. It resembles couche 2-III in physical aspect and consists entirely of burins, except for one specimen that is either an oblique truncated piece or a broken corner perforator. Four of the burins are dihedrals, one a double truncation burin, and ten constitute a miscellaneous assortment of truncation burins. Two of the last may possibly be broken Raysse burins and one a failed attempt at a Noailles burin. Finally, and most importantly, the collection also includes five more or less typical Noailles burins (plate 35t, u, v, w, x). These are of particular interest because, as was noted above, the main horizon contains only a single questionable Noailles burin north of the point of juncture with lens 2-IIIb and seven quite acceptable ones to the south of it. It is tempting therefore to attribute the latter to admixture with this underlying Noailles-rich lens—a view reinforced by what appears to be a parallel industrial stratigraphy in locality 4 (§ 9.4.4).

9.3 Couche 6-M

Couche 6-M constitutes a sizable assemblage of 473 pieces and presents certain distinctive typological contrasts to couche 2-III (see tables 9.1 through 9.4). It is convenient to take it up at this point,

Table 9.16. Association pattern of 6-M burin composite pieces

	Dihedral Burin	Break Burin	Truncation Burin	Raysse Burin	
Endscraper	2	1	6	5	14
Truncation	0	1	1	0	2
Perforator	0	0	3	0	3
Point	0	0	0	1	1
	2	2	10	6	19

even though it comes from the eastern extremity of the site, leaving the geographically intermediate, but small and typologically somewhat ambiguous, couche 4-B assemblage until last. As we have seen (§ 4.5.3), couche M constitutes the stratigraphically best integrated and most clearly segregated archaeological unit at Solvieux. It is overlain by the very weak couche H, which has yielded a couple of Raysse burins and eight standard burins (all but one on truncations); their heavy patination and robust flakes are reminiscent of couche 2-III rather than of 6-M itself. The H and M horizons ultimately join to the south of locality 6.

The 6-M assemblage is dominated by black and brown flints that appear in roughly equal proportions throughout the assemblage. Here, unlike in

2-III, pieces have a fresh and unpatinated aspect that recurs at Solvieux only in the equally deep lying couche IV of locality 2. The blanks of 6-M contrast strikingly with those of 2-III in comprising a highly laminar industry that often lacks true flakes altogether, which is fairly consistent from one typological group to the next, and whose average width is essentially no greater than that of the couche I/II assemblage. Its supports have appreciably greater vertical thickness, however, which lends the 6-M industry a somewhat less elegant aspect and which, as we will see, has certain typological contingencies.

9.3.1 Standard burins

Standard burins make up 64% of the common toolkit and 34.5% of the global piece count—proportions essentially the same as in 2-III. The relative frequencies of the three varieties are virtually identical to those of the other Raysse Perigordian samples. But the manner in which dynamic typological patterns are expressed within them contrasts strikingly with 2-III.

General

6-M standard burins in composite and multiple pieces behave like those of 2-III (tables 9.16 and 9.17), again with truncation burins (along with Raysse burins) exhibiting a clear tendency to associate with their own kind. Blank morphology is quite

Table 9.17. Association pattern of 6-M multiple burins

Dihedral	2 [0.8]				
Break	3 [1.5]	2 [0.6]			
Truncation	6 [4.5]	2 [3.8]	10 [5.9]		
Raysse	1 [6.3]	3 [5.4]	9 [16.6]	19 [11.7]	
Corbiac	0 [0.1]	0 [0.1]	0 [0.3]	1 [0.5]	0 [0.01]
	Dihedral	Break	Truncation	Raysse	Corbiac

Note: Expected frequencies are shown in brackets

distinctive (table 9.18). The series is dominated by narrow if thick blades, and few true flakes are present at all. Multiple and composite blanks do not vary significantly from those of single pieces. Brown and black flint, along with 5% of miscellaneous varieties, are knapped into virtually identical blank forms. Hence, unlike those responsible for couche 3-A, 6-M knappers did not take advantage of the larger nodules of Ivy League, which have the potential for producing quite robust blades. Unlike in couche 2-III, they did not exploit black flint to make cortical flakes but instead, as in couche I/II, used it to produce blades no different from those made of brown flint.

Because of its highly laminar aspect, the general appearance of the 6-M sample is not unlike that of I/II (see table 8.4). But the greater vertical thickness of its supports promotes a much higher incidence of wide biseaux and polyhedralism. Moreover, close examination reveals quite mediocre workmanship and a kind of opportunistic maladroitness that betrays a fundamental stylistic similarity to the practices of couche 2-III stone knappers. Here, again, marginal retouch is rare and seemingly randomly distributed.

Dihedral burins

Given the relatively small tool sample involved, the contingency table for 6-M dihedral burins may not be free of distortion from sampling error (table 9.19). But its overall pattern of interaction between burin profiles and blank types is consistent with the expectations of our generic model of burin dynamics, especially as this model operates among samples manufactured upon particularly gracile blanks. Significantly, the distribution of profiles closely resembles that of I/II dihedral burins, which possess G- and R-supports in virtually the same pro-

Table 9.18. Blank morphology of 6-M standard burins. Cross-tabulation of Blank Variety and Blank Width.

	Blade	Flake	Square Flake	
2 cm	74 —	5 —	0 —	79 42.3
3 cm	56 —	24 —	1 —	81 43.3
4 cm	6 —	14 —	1 —	21 11.2
≥ 5 cm	1 —	4 —	1 —	6 3.2
	137 73.3	47 25.1	3 1.6	187

G-supports: 72.2%

R-supports: 27.8%

Average width = 2.75 cm

Note: Solid line demarcates G- and R-supports; dashed line demarcates R1- and R2-supports

portions (see table 8.5). A chi-square test would reveal that the two distributions could have been drawn from one and the same population.

Let us turn to characteristic pieces that illustrate the above pattern. Consistent with its high frequencies of gracile blades, D1 narrow specimens are numerous and most often smallish (plate 36b, c, d distal). A particularly handsome specimen bears abrupt marginal retouch on one side (plate 36a). D2 medium axial burins are evenly divided between symmetric (plate 36e, h) and asymmetric (plate 36f) forms. Many illustrate the signs of atypicality

Table 9.19. Dihedral burin dynamics: 6-M tool sample. Cross-tabulation of Burin Profile and Support Type.

	D1	D2	D3	D4	D5	
G-support	13 —	8 —	4 —	10 —	6 —	41 77.4
R-support	0 —	4 —	3 —	2 —	3 —	12 22.6
	13 24.5	12 22.6	7 13.2	12 22.6	9 17.0	53

Table 9.20. Truncation burin dynamics: 6-M tool sample.
Cross-tabulation of Burin Profile and Support Type.

	T1	T2	T3	T4	T5	T6	T7	
G-support	16 100.0	16 84.2	10 55.6	22 84.6	28 65.1	5 71.4	1 16.7	98 72.6
R-support	0 —	3 15.8	8 44.4	4 15.4	15 34.9	2 28.6	5 88.3	37 27.4
	16 11.9	19 14.1	18 13.3	26 19.3	43 31.9	7 5.2	6 4.4	135

$$\chi^2 = 19.13 \text{ (} p < .001 \text{)}$$

$$\phi = .376$$

common to the 6-M sample in spite of its gracility, such as adopted facets (plate 36i) and clumsy dorsal spalling (plate 36g). None of the D3 wide axial burins recalls the fairly elegant forms this profile can attain in the couche I/II series. One on a particularly grainy flint bears a wide biseau achieved on its thick blank by polyhedral spalling, suggesting rejuvenation of a broken trigon that once possessed a narrower profile (plate 36k).

D4 medium lateral burins exhibit the usual mixture common to the 6-M sample of altogether typical forms (plate 36p) and less handsome specimens with traits like a minimal facet (plate 36n) or a heavily rejuvenated trigon (plate 36o). The last shows that quasi-lateral forms are not necessarily restricted to gracile blanks (plate 36l). Five additional quasi-lateral specimens do, however, occupy narrow blades (plate 36m). They account for the fact that, just as in the case of the I/II dihedral burin sample, the D2 and D4 profile types are represented in equal proportions. They also contribute to the sample's incidence of axially, which is virtually the same as that of I/II truncation burins. Half of the burins with D5 wide lateral profiles are also quasi-lateral forms on relatively narrow blades (plate 37c). Three specimens do however occupy the kinds of stocky flakes that more typically characterize burins with this profile (plate 37a, b).

Truncation burins

Attribute interaction in table 9.20 conforms to the generic pattern. The contingency table's profile distribution is characteristic of a sample possessing a

gracile blank morphology and contrasts markedly to the distribution of couche 2-III's truncation burins, which are dominated by robust and often nonlaminar supports (see table 9.9). The 6-M sample is proportionately stronger in those profiles that call for gracile blanks, such as T1, T2, and T4, whereas 2-III is proportionately stronger in the profiles dominated by stocky blanks, such as T5 and T7. These same differences also appear, if in predictably less dramatic fashion, when we compare the 6-M profile distribution to that of the 3-A series (see table 7.11).

The proportion of G-supports among 6-M's truncation burins remains nearly as high as among its dihedral burins, in contrast to the Magdalenian samples, but not to 2-III (or, as we will see, 4-B). Nonetheless, consistent with their different design requirements, 6-M truncation burins, like those of 2-III, present appreciably higher frequencies of lateral profiles in comparison to dihedral burins. In contrast to 2-III, however, their average closing angle is only slightly greater than that of the dihedral sample. The same pattern occurs among I/II standard burins and, as we have seen, is presumably attributable to a gracile blank morphology involved.

In keeping with the sample's strong component of slender blades, the T1 narrow profile is relatively well represented. Truncation burins at this closing angle are rarely typical. A crested blade offers sufficient thickness for a quite substantial one (plate 37d), however, as does an elongated cortical flake (plate 37f double). The profile is achieved on thinner blanks by opposing a minimal burinated facet to a minimal truncation (plate 37e).

T2 medium axial burins divide about equally between symmetric (plate 37h) and asymmetric (plate 37i, j, l) trigons. The latter again remind us that the distinction between asymmetric T2 and quasi-lateral T4 burins can be fairly arbitrary where gracile blanks prevail. T3 wide axial burins include several of the better made members of the 6-M series (plate 37g, plate 39k, plate 40a). The specimen in plate 38a illustrates a problem that can occasionally arise when coding truncation burins in Raysse Perigordian assemblages, especially in this profile category. Although it satisfies the criteria for an asymmetric D3 trigon the piece nonetheless suggests a Raysse burin whose last spall was sufficiently heavy and encroaching to have removed all traces of previous burination and of any tertiary modification the truncation once bore. Specimens like this occasionally appear in all three Raysse Perigordian assemblages and must be coded piecemeal.

T4 medium lateral burins are fairly numerous. Not too surprisingly in a burin sample dominated by slim blades, quasi-lateral trigons (plate 38c) are almost as common in this profile type as regular ones (plate 38b, e). Two that occupy composite pieces (plate 40c, d) illustrate particularly well how these forms intergrade with asymmetric D2 profiles. Even D5 wide lateral trigons are more often than not made on blades, many of which are relatively narrow (plate 38f, h). An interesting refitted specimen bears two biseaux, one of whose facets transected the piece to create a new support on which a break burin was subsequently fashioned (plate 38i). Apart from more robust blades (plate 38g, j), the R-supports of this profile type account for most of the few true flakes that occur in the 6-M sample (plate 38k).

T6 semi-transverse burins are, predictably, few and heterogeneous. Most in fact constitute overstruck burins, their biseau being spalled against what appears to be the remnant of a truncation that once belonged to an altogether different profile. This can be indicated both by the disposition of the truncation itself and by the different angles at which the burinated facet was successively spalled during the course of rejuvenation (plate 38l). The proportionately low number of T7 transverse burins, in comparison to regular wide lateral (T5) ones, attests once again to the laminar nature of the sample's

blank morphology. Those manufactured on actual square flakes are very rare (plate 38m).

Break burins

Break burins display the usual heterogeneity common to the form (plate 39a, b, e) but, in contrast with our other samples, actually show some partiality in blank type, in this case toward R-supports (plate 39d). They follow the rule in appearing frequently on multiple and composite pieces (plate 39c, l, m).

9.3.2 Special Burins

Discussion of couche 6-M's Raysse burins is deferred to a later section (§ 9.5.2). The other types of special burins are summarized here.

Two Corbiac burins are present; one is a single piece and the other joined with a Raysse on a multiple mixed burin. The first bears considerable marginal retouch, and a refitted spall suggests it once may have been a semi-transverse burin (plate 39g). This supports the view that some pieces that now qualify as Corbiac burins began their careers as standard burins.

Significantly, couche 6-M possesses only one Noailles burin, and even it is atypical (plate 39i). It is a distal portion of an Ivy League blade bearing a truncation from which a single relatively delicate burin facet has been struck; an inverse stop notch occupies the opposite, unburinated margin. Given the size of the 6-M assemblage, more than this single specimen would surely be present if Noailles burins constituted a significant part of the couche 6-M industry.

Four single specimens of burin-points are present, all typical examples of fairly substantial dihedral spalling superimposed over what was originally a truncation burin (plate 39h, j). One of them (plate 39g) illustrates how the tertiary modification may take the form of a single substantial spall rather than a line of finer removals.

9.3.3 Endscrapers

Endscrapers make up 9% of the piece count and 8.5% of the common toolkit. No miscellaneous scrapers accompany them, which reinforces our conclusion that the sizable number of flake and block scrapers seen in couche 2-III reflects the opportunistic use of the blank forms peculiar to that

assemblage (§ 9.2.4). Couche 6-M endscrapers conform to the generic pattern seen at Solvieux with respect to both their relative proportion to burins and their concomitantly greater propensity to join in composite pieces—the latter enhanced, as in the case of 2-III, by combinations with Raysse burins. The incidence of marginal retouch is low (11%), essentially the same as that of the 2-III sample, but consistent with the generic pattern in being much more common here than among standard burins.

6-M endscrapper supports involve the highest proportions of blades (95%) and G-supports (88%) and the narrowest piece width (3.1 cm) of any of the Solvieux samples; true flakes are absent altogether. Contrary to burins, black flint is somewhat more common than brown, but again the two flint types exhibit no essential differences in blank form. Although it is difficult to generalize from such a modest sample size, the picture that emerges is consistent with what we have seen of endscrapper variation elsewhere. Because the bulk of the pieces are made on fairly gracile blades, the series bears an overall resemblance to couche I/II. As is also true of 6-M burins, however, endscrapper blanks are often thicker in cross-section and occasionally display a chunkiness not seen in I/II.

The distribution of front contours makes a particularly informative comparison with that of the I/II sample (see table 7.13). The irregular category contains only two members, one of which is a reasonably typical flat nosed scraper (plate 41d). As in the case of I/II, the rarity of irregular specimens is due to the lack of flakes, coupled with the fact that gracile blades are more likely to lose their fronts altogether (and hence be lost to the sample) when subjected to particularly heavy usage. In contrast to I/II, however, it is the shallow category that, so to speak, takes up the surplus pieces; round contours appear in virtually the same proportion as in 2-III. Due to the rarity of flakes, the front contour types statistically associate at random with blank types (table not shown). Yet the morphology of 6-M blanks does dynamically influence the contour distribution. Their narrowness brings the scale effect into play, as only a moderate amount of use-wear is required to modify round fronts on gracile supports into shallow ones. And, of course, such usage is

common in the 6-M sample, whereas it is comparatively rare in I/II.

Round fronts can be symmetric (plate 39k, plate 40n), but more often they assume asymmetric (plate 41b), elongated (plate 39m), and ogival (plate 40l, q) shapes, often apparently due to usage and reworking. Shallow fronts are particularly well represented (plate 40a, j, k, m [double], p, r; plate 41a, e; plate 40g), the last skewed. Due to their gracile laminar supports, 6-M endscrapers at least superficially present a less maladroit air than those of 2-III. Yet inspection reveals the same rough-and-ready standards of manufacture and usage. Signs of breakage and reuse are common (plate 39l proximal, plate 40o; plate 41f, h distal). Several fronts bear minimal retouch (plate 41g, h proximal), and several others only partially exploit the area available for beveling (plate 39n, plate 40b, i).

9.3.4 Perforators

The standard perforator sample is too small to allow for rigorous statistical comparison, but its incidence of 5% in the common toolkit and the picture presented by a cross-tabulation of its perforator types and profiles conforms to the general pattern at Solvieux (table 9.21). Two of its members derive from composite pieces, one of which is a massive end bec (plate 40d proximal). Like the rest of the assemblage, couche 6-M perforators are essentially laminar and relatively narrow (the average width is 2.7 cm), in both respects differing from their couche 2-III counterparts. They show the usual interaction pattern between blank morphology and perforator profile, wherein an emphasis upon blades

Table 9.21. Standard perforators: 6-M tool sample. Cross-tabulation of Perforator Type and Perforator Profile.

	Percoir	Bec	Thorn	
End	6	4	1	11
Pointed	2	2	0	4
Corner	0	0	0	0
Side	1	0	0	1
	9	6	1	16

results in a preponderance of pointed and especially end perforators. Not surprisingly, the sole side perforator appears on the only square flake in the sample.

Quality of manufacture is predictably mediocre. Many projections possess only one retouched edge, and their shaping retouch is frequently crude and perfunctory. Characteristic are an end percoir and two pointed percoirs that oppose minimal retouch to a broken edge (plate 41k, l). Indeed, the only handsome piece in the series is a bec that bears continuous marginal retouch on one side (plate 41n). While classified as a point, it approaches being a corner bec (as does plate 41j). Also illustrated are a particularly stubby end bec, a corner bec, and a side bec (plate 41o, j, m).

9.3.5 Truncations

Truncations are proportionately only half as common here as in the 2-III assemblage. Three of the 14 specimens in the sample derive from composite pieces (two associate with burins, one with a scraper) which, contrary to 2-III, is reasonably consistent with what might be expected on the assumption that the typological groups concerned combine in composite tools according to their proportions in the assemblage as a whole.

Truncations are dominated by fairly narrow, laminar supports. Their average piece width is 2.8 cm, and none of them is a true flake. For what it is worth, given the small sample involved, the cross-tabulation of truncation and support types mimics the generic pattern of truncation dynamics (table 9.22). Obliques associate moderately with G-supports, the single medial oblique truncation occupies an R-support, and traverses show no particular preference for either support type. The distri-

Table 9.22. Standard truncations: 6-M tool sample. Cross-tabulation of Truncation Type and Support Type.

	Traverse	Oblique	Medial Oblique	
G-support	2	5	0	7
R-support	3	2	1	6
	5	7	1	13

bution of truncation types closely parallels that of the even more gracile couche I/II sample (see table 8.8). The 6-M specimens tend to be of poor quality, often atypical, and quite heterogeneous (plate 40c proximal; plate 42a-h).

9.3.6 Marginally retouched pieces

There are few marginally retouched pieces. Seven belong to type 61, comprising three whole specimens and five quasi-wholes (two distal, one mesial, and two proximal). Their retouch is of the banal standard variety (plate 42j, k, m); the retouched margins of one converge proximally to form a point (plate 42l), but the piece does not qualify as a point because no effort has been made to remove its fairly prominent bulb of percussion. An interesting exception to the norm is a refitted whole blade (plate 42i) whose two segments respectively bear heavy standard and heavy abrupt retouch, respectively, on what was once the same margin. Quite similar heavy abrupt retouch appears along the entire length of a dihedral burin (plate 36a). Six fragments (four mesial and two proximal) are all that qualify for inclusion in type 62. Just like the wholes and quasi-wholes, they are quite consistent with the rest of the assemblage with respect to their generally narrow laminar quality and distribution of flint types.

This sample confirms what we have seen in couche 2-III: no distinctive component of marginally retouched pieces exists in Solvieux's Raysse Perigordian industry.

9.3.7 Points

A few of the pointed becs dealt with above at least begin to enter the area of intergradation with type 101a (plate 41n). But only five pieces actually qualify as points, and they are a varied lot that does not suggest the presence of a uniform type. Two are somewhat atypical points, rounded and ogival, respectively, bearing continuous heavy retouch on one margin; a third, which forms a composite with a Raysse burin, might as easily be coded as a medial oblique truncation. More interesting is a point fashioned on the distal fragment of a blade formed by heavily encroaching quasi-Aurignacian scaled retouch (plate 43c), which resembles one from couche 3-A (plate 14c). The fifth specimen is a

fairly massive point made on a thick blade of fine-grained quartz with a soapy aspect and bearing no marginal retouch whatever (plate 43b). Its form is unique, and it might as easily have been placed in the perforator group as here. Massive points or perforators such as this are occasionally referred to as *tarauts* (see Brézillon 1968:366).

9.3.8 Gravettian pieces

The Gravettian element is important in the couche 6-M assemblage, comprising 12% of the piece count. Table 9.23 provides the basic inventory. Contingency table analysis of these data reveals no significant patterns apart from obvious geometric contingencies arising from the fact that microgravettes are smaller by definition. All microgravettes fall into the *c* width class, as opposed to only four Gravettes (the latter being distal fragments of points whose main body might easily have been wider); and there are proportionally fewer medial segments owing to the obvious reason that smaller pieces are less likely than larger ones to undergo the twofold breakage required to produce a medial seg-

ment. Otherwise, there are no noteworthy differences between the two forms.

There are also few contrasts when these pieces are compared to their counterparts in the small 2-III sample (see table 9.15). The only difference that might not be attributable to sampling error is the relatively far greater proportion of whole specimens in the 6-M series; and this simply reflects the fact that the series was subjected to a major reconstitution effort in Linda Grimm's laboratory. Only two whole points were actually recovered intact during excavation.

Gravette points from 6-M are somewhat distinct, however. They are slender, well made, and straight backed; none assume the broader Les Cottés outline suggested by two of the 2-III points. The seven whole points range in length from 9 cm (plate 44j) to a somewhat crude specimen of 5.5 cm (plate 44d). Fifteen distal ends are present (eight fragments in addition to the seven whole pieces), all of which bear at least some amount of shaping retouch—which seems to be rarer in the 2-III sample. In ten specimens this retouch originates from the margin opposite the back, as in the two illustrated pieces just referred to. In an additional two it extends all the way or at least a good distance down the margin, qualifying as continuous marginal retouch (plate 44g). This last piece is of some interest because it is the only member of the group with a marked gibbosity; in addition, it exhibits bidirectional backing retouch (also present on plate 44j). The point is shaped by inverse retouch in four specimens, in two of which it assumes the form of Vachons retouch extending across the entire width of the ventral face. It is illustrated by an excellent whole specimen (plate 44a), which shows bidirectional backing.

There are 15 proximal ends, all but two of which bear shaping retouch. The butts of Gravettes are, not surprisingly, more variable in form than their distal points, and also in the mode and degree of their retouching. Direct retouch involves eight specimens, in four of which it essentially truncates rather than rounds off the butt (plate 44j). The remaining five bear inverse retouch; this tends to be somewhat more perfunctorily accomplished than the direct, but it includes the exceptional inverse truncation seen on the piece whose point bears

Table 9.23. Inventory of 6-M Gravette points

	Gravette	Microgravette	Total
Portion			
Whole	7	7	14
Distal	8	3	11
Proximal	8	3	11
Medial	9	2	11
	32	15	47
Size			
a (1.0 cm)	5	0	5
b (0.75 cm)	23	0	23
c (0.5 cm)	4	15	19
	32	15	47
Flint type			
Black	18	7	25
Brown	14	7	21
Other	0	1	1
	32	15	47
Sidedness of backing			
Right	16	8	24
Left	12	4	16
Indeterminate	4	3	7
	32	15	47
Direction of backing			
Direct	20	10	30
Bidirect	12	5	17
	32	15	47

Vachons retouch (plate 44a). One proximal fragment combines direct and inverse shaping (plate 44o). The inverse use-wear displayed by this last piece is not uncommon, and on some specimens can be quite heavy (plate 44d). Ordinary use-wear appears on at least half of the group, while intentional continuous retouch like that exhibited by the mesial fragment (plate 44i) and the gibbosed piece (plate 44g) appears on five specimens.

The seven whole microgravettes range in length from 3.1 cm (plate 44k) to 2.2 cm. Presumably because of their diminutive size, the degree of shaping exhibited by their ends is somewhat more perfunctory than that seen on Gravettes (though nonetheless more extensive than is seen among their couche 2-III counterparts). All but one of the ten distal ends bear direct retouch, often quite light (plate 44l). One of these (plate 44m) appears to be made on a quartz spall, a mineral otherwise known at Solvieux only from couche II (§ 8.9). Direct and ventral retouch are equally represented among the sample's ten proximal ends, but in the case of microgravettes such retouch largely serves to regularize the natural outline of the end rather than truly shape it. Microgravettes commonly bear use-wear, but intentional marginal retouch is absent.

The Gravettian sample includes 11 technopieces. Three seem to have been points broken in a late stage of manufacture just before the distal tip was to be shaped. The two whole specimens show that butt shaping was already completed at this stage (plate 44h). Four of the technopieces are *pièces à cran*, representing backing retouch that began in the central portion and proceeded outward toward the ends of the piece. One of them (plate 44q) closely recalls a similar piece from the 2-III sample (plate 35l). In two other specimens backing retouch began at the two extremities and converged upon the central portion (plate 44r). If successfully completed, pieces retouched in this manner can bear a gibbosity (plate 44g). It is interesting to note that these two alternative backing procedures also co-exist in the 2-III gravette sample and among I/II backed bladelets. Finally, included in this group, largely by default, are two nondescript fragments that are partially backed and were likely broken during manufacture.

9.3.9 Bladelets

All nine specimens inventoried here are classified as bladelets with fine direct retouch. Five constitute a miscellany of bladelet odds and ends. The remaining four are abruptly retouched and regular in shape, and may be atypical Gravettian forms. The situation here is consistent with what we have seen in the 2-III assemblage, and it indicates that a distinctive bladelet component is not part of Solvieux Raysse Perigordian industry.

9.3.10 Ad hoc and diverse pieces

Consistent with the industry's strongly laminar blank morphology, ad hoc tools are only half as common in couche 6-M as in couche 2-III. One diverse piece is a large flake bearing ventral polyhedral spalling (plate 43e) that one feels uncomfortable calling either a burin or a *pièce de Bertonne* (see § 7.13). The other is one of the four splintered pieces recovered at Solvieux (plate 43d). Consistent with its clean and clear stratigraphic position, the 6-M assemblage includes no uncounted pieces attributable to other industries.

9.4 Couche 4-B

The sample of 190 pieces recovered from couche B in locality 4 is too small to be of more than secondary interest in and of itself, yet it is important for two reasons. One is that it provides a third manifestation of the Raysse Perigordian industry, thus providing an independent basis for evaluating the contrasts which the 2-III and 6-M assemblages exhibit with respect to each other (as well as contributing a couple more on its own) (see tables 9.1 through 9.4). The other reason stems from the nature of its stratigraphic and typological relationship to an underlying horizon, couche 4-Bb, which concerns one of the key issues involved in the current debate over Raysse Perigordian systematics. Therefore, couche 4-B deserves thoughtful examination even though its small size severely limits the kind and amount of detailed analysis to which it can be subjected.

Being quite laminar, 4-B is reminiscent of 6-M in general blank morphology; at the same time, however, like 2-III, it tends to exhibit greater variation in blank morphology from one typological

Table 9.24. Association pattern of 4-B multiple burins

Dihedral	1 [0.9]			
Break	0 [0.5]	1 [0.2]		
Truncation	3 [1.9]	0 [0.9]	4 [1.9]	
Rayssé	1 [2.7]	1 [1.3]	1 [5.4]	7 [3.8]
	Dihedral	Break	Truncation	Rayssé

Note: Expected frequencies are shown in brackets

group to the next. The mediocre standard of workmanship seen in the other Rayssian assemblages recurs here. As has been noted, 4-B also closely resembles them in its distribution of single, multiple, and composite pieces, following the generic pattern except with respect to a heightened proportion of multiple pieces generated by its strong Rayssé burin component.

9.4.1 Standard burins

The standard burin sample comprises 72 pieces, which is too small for anything other than dramatic departures from the norm to be established on a trustworthy statistical basis. There seems to be none. Standard burins account for 73% of the common toolkit and 38% of the global piece count. In this and in its proportional distribution of the three burin varieties, it is statistically indistinguishable from the other Rayssé Perigordian samples. The behavior of the types in multiple pieces is also the same insofar as can be determined from the small numbers involved (table 9.24).

Burin blanks are narrow and involve the highest percentages of blades and G-supports of any Solvieux sample (table 9.25). The obvious resemblance to couche 6-M's blank population is reinforced by a particularly small proportion of real flakes (less than 10%). Blanks involving burins in multiple and composite tools tend to be slightly broader and less laminar than single pieces (which, in so gracile a sample may simply be a function of patterns of breakage);

Table 9.25. Blank morphology of 4-B standard burins. Cross-tabulation of Blank Variety and Blank Width.

	Blade	Flake	Square Flake	
2 cm	34 —	1 —	0 —	35 45.5
3 cm	28 —	5 —	2 —	35 45.5
4 cm	0 —	1 —	2 —	3 3.9
≥ 5 cm	0 —	2 —	2 —	4 5.2
	62 80.5	9 11.7	6 7.8	77

G-supports: 81.8%

R-supports: 18.2%

Average width = 2.69 cm

Note: Solid line demarcates G- and R-supports; dashed line demarcates R1- and R2-supports

in any event, they yield virtually the same support type frequencies. The burins are made exclusively of black (54%) and Ivy League brown (46%) flints, which—as in the case of the I/II and 6-M samples (and contrary to 2-III)—are knapped into precisely the same blank shapes and sizes.

The overall impression of this sample is reminiscent of 6-M typologically as well as in terms of blank morphology. If it possesses a distinctive character of its own, there are simply too few burins to make it apparent. As in the other Rayssé Perigordian samples, marginal retouch is rare and unsystematic even though burin margins often bear the stigmata of fairly heavy use modification.

Dihedral burins

Although there are too few 4-B dihedral burins to allow meaningful quantitative comparison, the overall picture provided by table 9.26 is what one might expect of a sample dominated by gracile blanks. D1 narrow profiles alone, which appear exclusively on G-supports, account for nearly half of the entire

sample (plate 45a, h). One of its members couples in a robust multiple with a Raysse burin (plate 52d proximal). The remaining dihedral burins are fairly nondescript if nonetheless consistent with what we have seen in the other Raysse Perigordian assemblages. One burin with a D4 trigon is delicate (plate 45d). A fairly crude D2 (plate 45k) and a robust polyhedral D3 (plate 45f) are more characteristic.

Truncation burins

Truncation burins are numerous enough to show the major trends of a pattern (table 9.27), which is again strongly reminiscent of 6-M truncation burins (see table 9.20). The profile distributions of the two samples are in fact indistinguishable statistically. Here, as in the other two Rayssian assemblages, the proportion of G-supports decreases only slightly in passing from dihedral to truncation burins.

T1 narrow burins are, as usual, atypical (plate 45g). T2 medium axial burins are more typical, if not especially elegant (plate 45i). Unlike dihedral burins, truncation burins often achieve perfectly typical T3 medium axial trigons (plate 45b, j). T5 wide lateral burins are the only members of the sample in which real flakes play a significant role (plate 45l, m). Semi-transverse (T6) and transverse (T7) burins are few and nondescript, and some suggest overstruck burins that once had a different profile (plate 45o).

Break burins

Break burins as usual associate at random with the support types and present no novelties (plate 45e).

9.4.2 Special burins

Here are summarized types of special burins other than Raysse burins (§ 9.5).

Table 9.26. Dihedral burin dynamics: 4-B tool sample. Cross-tabulation of Burin Profile and Support Type.

	D1	D2	D3	D4	D5	
G-support	9	1	2	1	3	16
R-support	0	1	2	1	1	170
	9	2	4	2	4	21

A single Corbiac burin is present, its facet spalled from a lateral margin that seems to be modified more by use than by purposeful retouch.

There are four single piece burin-points, a considerable number given the small size of the total tool assemblage. Three are typical examples where dihedral modification is superimposed upon the truncation against which the burin facet was struck. The fourth is made in the same manner but bears its facet on the left side (plate 46g). It constitutes the only left-handed member of the total sample of 14 specimens known from Solvieux.

Of more compelling interest, of course, are the assemblage's Noailles burins. As noted in § 4.5.2, couche 4-B possesses Noailles burins only south of the point where it intersects, and presumably incorporates, a lower horizon (couche Bb) that seems to have considerable numbers of them. Here our attention is restricted to the four Noailles burins that belong to couche 4-B proper. Three of them are reasonably typical. Only one of these is double, and it carries a stop-notch (plate 46h). The other two (plate 46k, l) bear a single truncation that is so highly oblique as to permit the spalling of only a single burin facet; but they nonetheless display the family air of Noailles burins. The fourth burin (plate 46p) is similar to the last two in manufacture,

Table 9.27. Truncation burin dynamics: 4-B tool sample. Cross-tabulation of Burin Profile and Support Type.

	T1	T2	T3	T4	T5	T6	T7	
G-support	5	8	6	8	13	1	1	42
	—	—	—	—	—	—	—	73.7
R-support	0	1	5	0	6	0	3	15
	—	—	—	—	—	—	—	26.3
	5	9	11	8	19	1	4	57
	8.8	15.8	19.3	14.0	33.3	1.8	7.0	

but its somewhat uncharacteristic blank warrants its being considered atypical. All four burins, as is the rule for Noailles at Solvieux, are made of black flint.

9.4.3 Other typological groups

Endscrapers

The entire scraper complement from this assemblage consists of 12 endscrapers on fairly gracile supports. Few generalizations can be drawn, apart from the fact that their typology departs in no notable manner from that seen elsewhere. In its laminar supports, the sample more closely approaches 6-M than 2-III. As in the other Raysse Perigordian samples, front contours are essentially evenly divided between round and shallow pieces. Fairly heavy use retouch appears on several pieces, but systematic marginal retouch is restricted to two specimens. The double endscraper illustrated in place 46a opposes shallow and round fronts.

Perforators

Perforators are restricted to an end bec made on a flake-blade and a pointed bec joined with a Raysse burin on a composite piece.

Truncations

The couche 4-B truncation sample comprises only four specimens: one concave traverse truncation, two straight obliques, and one medial oblique suggesting a truncation burin that was never successfully spalled. One of the straight oblique specimens is particularly delicate (plate 46d). The piece is carefully made and provides further demonstration that, regardless of the dubious history of many specimens assigned to it, this typological group does include well-made tools that seem to conform to its definition and to no other.

Marginally retouched pieces

Like the other Raysse couches, the 4-B sample of marginally retouched pieces is extremely modest. Only one specimen qualifies for type 61, a quasi-whole (distal) blade bearing continuous standard retouch on its left margin (plate 46b). Five fragments are placed in type 62 (one mesial, four proximal), all but one of which bear fairly heavy retouch (plate 46c).

Points

Type 101a is represented by a single quite nondescript piece. It is a rounded point on a distal blade fragment that bears light retouch on both margins but is too short to provide a clear picture of the piece in its original state.

Gravettian pieces

Despite its close industrial kinship with couches 2-III and 6-M, this assemblage's Gravettian element consists of a single atypical specimen classified as a technopiece (plate 46f). It is a distal fragment unidirectionally backed on the right side and bearing a marked gibbosity. Given the small size of the 4-B assemblage, only a couple of specimens are to be expected if Gravette pieces are proportionally no more common here than in couche 2-III. That only a single technopiece was found, therefore, lies well within the realm of sampling error. But a significant handful of pieces (say, seven or eight) would be expected if couche 4-B possessed a Gravettian element proportionately comparable to that of couche 6-M.

Bladelets

Only one piece qualifies as a bladelet with fine direct retouch (plate 46e). Its width is great enough, however, to carry it to the zone of intergradation between bladelets and marginally retouched blades.

Ad hoc and uncounted pieces

This small assemblage yields a handful of ad hoc tools and an uncounted raclette fragment no doubt derived from the overlying couche A. No item qualifies as a diverse piece.

9.4.4 Ancillary lens: couche 4-Bb

Couche 4-Bb is a distinct archaeological horizon lying below the main couche B horizon, which the latter intercepts and seemingly incorporates in its downward slope in the southern portion of locality 4 (§ 4.5.2). The artifact sample consists of 15 pieces made of relatively fresh-looking brown and black flint in equal proportions. Its banal members include a traverse truncation, an atypical axial truncation, a well-made endscraper, a fragment of a blade bearing fairly abrupt marginal (use?) retouch, a lateral truncation burin, and three fairly crudely rejuvenated lateral dihedral burins. One end of a multiple burin

is broken and cannot be identified, while its other end assumes the form of a heavily rejuvenated dihedral burin. That there is not a single Raysse burin could be the result of sampling error, given the very small size of the couche 4-Bb assemblage. Yet we would not be surprised to find at least 4 or 5 of them if they were, in fact, as common in the 4-Bb industry as they are in the three major Raysse Perigordian assemblages reviewed in this chapter.

The major items of interest are seven pieces that are either typical Noailles or lie well within the Noailles' typological suburbs. All carry only a single biseau, unlike some found elsewhere at Solvieux (including couche 4-B). Two particularly diminutive specimens are nonetheless quite typical and bear stop-notches (plate 46i, j); the biseau is broken off the latter specimen. Three are somewhat larger and fall within the range of smallish truncation burins, but they still carry the characteristically narrow burin facet terminating in a notch (plate 46n, o). The final two members of this series are neither really small nor notched, but they nevertheless have the family air of Noailles burins (plate 46g, m). The judgments made in grouping these seven specimens together involve a certain amount of subjectivity, and at least a couple of them would probably be coded simply as delicate lateral truncation burins were they viewed in isolation. But it is difficult to escape the conclusion that a substantial Noailles burin element seems to be present. Reinforcing this conclusion are three additional typical specimens (one on a truncation, two on breaks) found by the writer in the same horizon in early test excavations immediately adjacent to what was to become locality 4 (trench J, north 2). Unfortunately, these were left in the sondage wall the day of their discovery and were lost when the wall slumped in a rainstorm that same evening. Excavation notes do not indicate whether any of the specimens bore multiple biseaux, but there is no doubt they were reasonably diminutive as well as delicately shaped and notched.

The importance of the 4-Bb lens is that it possesses up to ten Noailles burins and, seemingly, no Raysse burins. Furthermore, the principal 4-B horizon, which is rich in Raysse burins, yields Noailles burins only south of the point where it merges with the underlying lens. These locality 4 horizons, there-

fore, express unambiguously the stratigraphic and typological pattern suggested in locality 2 by the relationship between couche 2-III and the 2-IIIb lens underlying it.

9.5 Raysse burins

Raysse burins are numerically the most important artifact in the assemblages dealt with in this chapter and also their typologically most distinctive and industrially most diagnostic feature. Their quite special design is now well understood, thanks primarily to the typological insight of the Abri Pataud researchers (Movius and David 1970). But there is much to be learned about how this design is variously expressed from one assemblage to the next and whether this variation is a matter of patterned typological dynamics or seemingly arbitrary 'stylistic' features. The three Rayssian samples from Solvieux provide an opportunity for such an investigation. The discussion occasionally draws upon the doctoral dissertation of William Breece (1992 *in passim*), which complements our own analysis of Raysse burins with certain quantitative findings of great interest.

9.5.1 General

Raysse burins account for at least 40% of the entire burin inventories of the three assemblages and invariably outnumber their truncation burin component, the most populous of the standard varieties and the one with which they are most closely allied typologically. The three Raysse samples are very similar in their proportions of single, multiple, and composite pieces. Their piece distribution differs from that of standard burins in that Raysse burins show a marked propensity to form multiples, as is seen in both the piece count sheets (see table 9.1) and in the burin association pattern matrices provided for each assemblage (see tables 9.6, 9.17, and 9.24). As is the case with most other typological groups in Solvieux's Rayssian industries, Raysse burins are of mediocre quality, and their marginal retouch is rare and sketchy.

Blank morphology is of considerable interest. For one thing, each sample reflects the overall morphological trends that characterize the standard

burins that accompany it. At the same time, however, the samples tend to approach one another both in certain dimensional parameters and in displaying a narrower range of blank variation than is seen among their standard burin cousins. Despite the seeming flexibility and opportunism seen in Raysse burin manufacture, production clearly entailed a more rigorous selection of blank forms, apparently dictated, albeit loosely, by the requirements of polyhedral burin spalling.

Raysse burins constitute a manifold field of formal variation that shows little systematic internal partitioning. For one thing, they are literally three-dimensional objects that cannot be described and compared in the plane geometry of outlines, angles, and axial orientation used for standard burins. (How, for example, can one speak of trigon profiles when the burin facets involved more likely occupy the ventral face rather than the margin of the piece?) For another, and very likely the root cause of the difficulty, any given Raysse burin has by its very nature passed through a series of transformations, each of which has broadened the opportunity for it to depart from whatever ideal design notions its makers may have had. If these transformations involved actual breakage and rejuvenation (a question to which we will return), then the randomizing roles of chance and artisanal opportunism were of course greatly enhanced and such departures even more likely. None of this prevents one from attempting a generic definition of Solvieux's Raysse burins, which shows that Movius and David's classic description of the type admits a considerable range of expression.

Ideally, a Raysse burin possesses at least two progressively spalled flat-faced burin facets and special retouch in the form of tertiary modification that has removed the original biseau (or biseaux) from all but the one most recently spalled (plates 47 through 52). The affected burin facets then exhibit a 'cut-short' configuration and lack a negative bulb of percussion. The degree of ventral encroachment attained by the successive facets of these specimens varies greatly, ranging from an essentially lateral position (plate 47g, plate 50b) to ones that actually extend to the opposite margin of the piece (plate 47e, plate 52d). The latter effect can be produced by pieces that assume an essentially transverse profile

(plate 48f distal). Usually, however, it is the result of progressive spalling, whose advance may leave only distal remnants of earlier spalls (plate 51b) and normally entails progressive loss of the original truncation. The degree of loss involved even in only moderately worked specimens is illustrated by two specimens to which burination spalls have been refitted (plate 51f, g). Sometimes this loss is represented by an angled edge formed by tertiary modification that replaces the left side of the truncation when the piece is viewed dorsally (plate 47g, plate 50d). Yet the progression of burin facetting can result in such a flat-faced orientation in the plane of the ventral surface that it attains the opposite margin without modifying the original outline profile of the piece at all (plate 48a; plate 52a).

One fairly rare form of special interest in this connection is the 'full-circle' burin, which has passed through the usual polyhedral progression only to have its final facet struck on the original lateral margin from which the first one was removed. Only some of Solvieux's examples of full-circle burins lend much support to Movius and David's (1970:454) contention that this procedure was adopted because the burin had figuratively gone full-circle—that is, its penultimate facet lay so nearly parallel to the ventral face that further spalling was impossible (plate 47a). In the rest it seems that the artisan simply decided that the lateral margin offered a better purchase for further burination even though sufficient room remained for it ventrally (plate 52a).

Tertiary modification is variable. Sometimes it assumes the form of dihedral spalls directed dorsally from the earlier biseau(x) and encroaching upon the original truncation. These spalls may be too small for their nature to appear clearly in typological illustrations (plate 48g), although they are often of moderate size (plate 50d). Occasionally, heavy dihedral spalling appears either in the form of a single massive removal that encroaches heavily upon the truncation (plate 48c) or one or two spalls that virtually remove it altogether (plate 50e). Tertiary modification may also be directed ventrally-dorsally in the manner of ordinary truncation retouch (plate 48a); it often blends in so well with the original truncation that, were not the proximal portions of the earlier

burin facets obviously missing, it would not be recognized as tertiary modification at all (plate 52g). Sometimes breakage and reworking render tertiary modification essentially unclassifiable. And by no means uncommon are pieces where all that remains in view dorsally is a line of diminutive spalling, the original truncation and tertiary modification having been carried away by the drastic reworking of the burin, as their ventral faces show (plate 47f).

About one-fifth of a Raysse burin sample from Solvieux could be considered atypical. This component consists mostly of burins whose rejuvenation is maladroit or perfunctory, which is usually a matter of misdirected, chopped, or minimally spalled facets. The effects are similar to those encountered among standard burins and do not require illustration. Many other atypical specimens are either broken or exhausted in the sense that they have been so extensively reworked that not enough edge remains to offer sufficient purchase for renewed burination. Occasionally, as we have seen, these specimens are respalled into full-circle burins (plate 48d). A few of them bear a massive burin spall that obliterates so much of the active part that its Raysse status is in doubt, even though remnants of previous burination are evident. Thus the piece illustrated in plate 49b could have as easily been rejected as accepted.

There are additional problematic forms, happily uncommon, whose inclusion in the Raysse sample some typologists might question. One is a burin that carries obvious tertiary modification but exhibits only a single burinated facet. On close inspection, the piece usually suggests a typical Raysse burin whose last ventral spall was simply heavy enough to carry away all traces of its predecessors (plate 49f, g). Another problematic form, essentially the contrary of the first, is a truncation burin exhibiting progressive burination but lacking signs of tertiary modification. This particular syndrome is shared by an especially heterogeneous group of specimens. A few, upon closer inspection, prove to be crude or minimally spalled versions of full-circle burins whose original tertiary modification was obliterated by spalling superimposed on the more laterally oriented facets only after the most ventral one was struck. But most bear a prior burinated facet whose cut-short status is in doubt, along with tertiary mod-

ification which, if it exists, involves ventral-dorsal spalling blending into the pre-existing truncation retouch (plate 49d). These pieces must be judged individually.

Lastly, some pieces exhibit a final, unused episode of tertiary modification, that is, modification that was not subsequently burinated (and that does not, by the way, happen to give the piece the configuration of a burin-point). David refers to such pieces as 'modified truncation burins' (see § 9.5.3). They suggest a Raysse burin that for some reason was abandoned prematurely during its career, but, in our view, a Raysse nonetheless. They are rare at Solvieux.

9.5.2 The Solvieux samples

The following comparison of the Solvieux Raysse burin samples reveals two interesting patterns. One is that each sample differs from the others in certain specific stylistic features, such as the manner in which tertiary modification is applied. The other is that, despite their apparent variation, the relative degree to which Raysse burins were actually spalled is fairly constant from one sample to the next. It is the specific number of spalls and consequent amount of breakage and renewed tertiary modification that it took to achieve these constants that is primarily responsible for the quite different aspects of the samples. Not surprisingly, these latter variations are strongly correlated with blank morphology.

Couche 2-III sample

We infer from David's (1985) exhaustive survey of the other samples that the 2-III sample of 244 Raysse burins must be the largest such collection ever recovered from a single archaeological horizon. Its piece distribution and behavior in combination tools (see table 9.6) are virtually the same as those of the 6-M and 4-M samples. Its blanks differ significantly from those of 2-III standard burins. Black and brown flint tend to be knapped in the same fashion and display the same range of blank variation. Black makes up 50% of the sample (as opposed to 67% of standard burins), brown 43%, and miscellaneous flints the remaining 7%. Although they show much of the robustness and nonlaminar aspect of the standard burins, Raysse supports differ

Table 9.28. Blank morphology of 2-III Raysse burins. Cross-tabulation of Blank Variety and Blank Width.

	Blade	Flake	Square Flake	
2 cm	50 39.7	18 17.8	0 —	68 27.9
3 cm	60 47.6	46 45.5	5 29.4	111 45.5
4 cm	15 11.9	28 27.7	8 47.1	51 20.9
≥ 5 cm	1 0.8	9 8.9	4 23.5	14 5.7
	126 51.6	101 41.4	17 7.0	244

G-supports: 52.5%

R-supports: 47.5%

Average width = 3.05 cm

$\chi^2 = 40.00$ ($p < .001$)

$\phi = .405$

Note: Solid line demarcates G- and R-supports;
dashed line demarcates R1- and R2-supports

from them nonetheless (table 9.28). Blades appear in essentially the same proportion and width distribution, but the flakes are decidedly narrower and tend to have more regular outlines. The latter is in part reflected by the reduced frequency of square flakes, but lies even more in a feature not shown in table 9.28—that parallel-sided quasi-flakes constitute a significantly higher percentage of the flakes in general. Equally important, despite their relative narrowness, Raysse supports are much thicker in vertical section: true chunky pieces are common (comprising nearly one-fifth of the blades alone), and many of these are true blocks.

Representative 2-III Raysse burins appear in plates 47 through 49. The illustrated specimens demonstrate the more common blank forms encountered in the 2-III sample, ranging over fairly conventional standard blades and flakes but also including diminutive forms (plate 48b), particularly large forms (plate 47g), and pieces so chunky as literally

to constitute blocks as thick as those an Aurignacian knapper would choose for the manufacture of carinate scrapers (plate 47d, e; plate 48e). The sculptured aspect of the last forms is especially characteristic of the 2-III sample. The degree of ventral encroachment attained by the burin facets of these specimens varies greatly. According to Breece, in 58% of the 2-III specimens successive ventral spalling has progressed as far as or beyond the midline of the piece; in an additional 25% this approaches the opposite margin so closely as to leave insufficient room for further spalling. An average of 2.13 spalls were struck on the burins after their original burination and the first application of tertiary modification.

The 2-III collection includes six reasonably good examples of full-circle burins. In only two of them do further opportunities for ventral spalling seem to have been exhausted at the time the original lateral margin was reburinated (plate 47a, plate 48d).

Tertiary modification, at least among those specimens where it is expressed with reasonable clarity, modally assumes the form of fine (plate 48g) and moderate (plate 47d, e, g; plate 48e) sized dihedral removals. Very occasionally, heavy dihedral spalling appears, either in the form of a single massive removal encroaching heavily upon the truncation (plate 48c) or one or two spalls that virtually remove it altogether (plate 48b proximal). But second in popularity to the common, less dramatic expressions of dihedral spalling is ventral-dorsal tertiary modification that tends to blend in with the original truncation (plate 47b, plate 48a).

Approximately one-fourth of the sample is atypical, comprising mostly exhausted specimens and those spalled in the maladroit fashion often seen in couche 2-III's other burin groups. The special problematic forms cited previously are rare except for several specimens on flakes that bear successive burination encroaching onto the ventral face but whose tertiary modification is not obvious. A few of these may simply be polyhedral versions of the chunky, flat-faced, and left-handed T5 wide lateral forms that play such a prominent role in 2-III's truncation burin sample. The coarse texture of these black cortical flakes tends to obscure the details of their spalling and modification (plate 49d). They constitute

the one troubling zone of possible intergradation between Raysse and standard burins in the 2-III sample.

Couche 6-M sample

Although their piece distribution and association patterns in combination tools are the same as those seen in couches 2-III and 4-B, Raysse burins are proportionately somewhat less common in the 6-M assemblage: they comprise only 40% of the burin group as a whole and are essentially equal in numbers to truncation burins. They resemble 6-M standard burins in displaying approximately equal proportions of black and brown flint (along with 5% miscellaneous), but they differ significantly in blank morphology (table 9.29). The Raysse sample has notably fewer blades and G-supports, even if it tends only slightly toward greater blank width. Blanks are also thicker in vertical section, even though they are decidedly less blockish than those of 2-III. Obviously, 6-M knappers preferred a distinct blank morphology when making Raysse burins, one that, within the limits dictated by the generally more gracile technology they produced, at least inclines in the direction of the robustness displayed by 2-III Raysse burins.

Characteristic 6-M Raysse burins like those illustrated in plates 50 and 51 have counterparts in the 2-III sample; indeed, none would look out of place here. Yet the overall aspects of the two samples are noticeably different in that 6-M is much more homogeneous and, in effect, banal. In part, this may simply be the result of sampling: possessing only half the number of tools as 2-III, it is much less likely to include the rarer and more arresting permutations of attributes that Raysse burin dynamics can potentially elicit. But two other factors are of greater importance. One is that 6-M displays noticeably less internal contrast in blank morphology. Truly diminutive forms (plate 50c) are appreciably rarer than in couche 2-III, and rarer still are really large ones (plate 50j). But the real difference stems from the virtual absence of truly chunky and blockish forms that generate the three-dimensional, sculptured aspect often seen among 2-III Raysse burins. To the extent it exists at all, sculpturing assumes a special form: due to their thick but narrow blanks, which are often triangular in section, the dorsal

Table 9.29. Blank morphology of 6-M Raysse burins. Cross-tabulation of Blank Variety and Blank Width.

	Blade	Flake	Square Flake	
2 cm	30 41.7	4 9.38	0 —	34 28.3
3 cm	36 50.0	20 48.8	7 100.0	63 52.5
4 cm	6 8.3	15 36.6	0 —	21 17.5
≥ 5 cm	0 —	2 4.9	0 —	2 1.7
	72 60.0	41 34.2	7 5.8	120

G-supports: 58.3%

R-supports: 41.7%

Average width = 2.93 cm

Note: Solid line demarcates G- and R-supports;
dashed line demarcates R1- and R2-supports

spalling on 6-M Raysse burins can be somewhat reminiscent of a carinate or muzzled scraper (plate 50g, h; plate 51f).

The second, and probably key, factor is that 6-M burins have been subjected to less work and rejuvenation. This is, of course, closely related to the first factor, because the more two-dimensional morphology of 6-M Raysse blanks offers less opportunity for shaping by intensive spalling. This morphology accounts for their seemingly flat and banal quality in comparison to the more sculptured aspect of the 2-III sample. At the same time, of course, the scale effect is at work: their relative gracility makes them more susceptible to the effects of only moderate spalling. One of Breece's more interesting findings is that, even though they carry only an average of 1.8 burin facets spalled posterior to the original tertiary modification (as opposed to 2.1 in the 2-III series), 6-M Raysse burins actually do not vary significantly from those of 2-III either in the amount of the ventral surface affected by spalling or in the proportion (25%) of those that lack sufficient purchase area for one additional facet. As a result,

repeatedly spalled specimens are infrequent, and exhausted burins are more often of diminutive size.

Tertiary modification assumes a somewhat different character, and its expression is more clear-cut because, as we have seen, 6-M Raysse burins are less likely to have received it more than once. We have seen that the norm in 2-III consists of a succession of relatively delicate or moderate-size removals. This kind of modification appears here as well (plate 51a, g). But even more common, partly as a result of the scale effect, is a succession of fewer but more substantial removals that are noticeably heavier in their expression (plate 50b, d; plate 51d, e). Tertiary modification also occasionally involves a single massive removal that sometimes suggests that the primary modification of the piece's end actually took the form of a dihedral edge rather than a true truncation (plate 50c). Tertiary modification in the form of ordinary truncation retouch is much less common (plate 50j, plate 51c); in smaller specimens it can assume the form of a single heavy spall that removes much of the original truncation (plate 50a).

Atypical forms are decidedly less common than in couche 2-III, comprising less than one-fifth of the 6-M sample. Most consist of burins that are broken or that carry maladroit, perfunctory spalling. Because 6-M Raysse burins are less often rejuvenated, exhausted forms are rare. And presumably it is the absence of truly chunky blanks that accounts for the rarity of specimens displaying polyhedralism without tertiary modification—a form that we have seen presents a troublesome, if quantitatively unimportant, zone of intergradation with standard truncation burins in 2-III. The reverse, that is, tertiary modification without subsequent respalling, is also quite rare. The three specimens coded as full-circle burins were respalled on their lateral margins even though sufficient room for additional spalling remained on their ventral face.

Couche 4-B sample

The 77 Raysse burins from couche 4-B make up a small but instructive sample that both confirms and augments our picture of Raysse burin dynamics. Its departures from standard burins in piece type distribution and relative frequencies may be more apparent than significant, because they lie well within the

Table 9.30. Blank morphology of 4-B Raysse burins. Cross-tabulation of Blank Variety and Blank Width.

	Blade	Flake	Square Flake	
2 cm	19 —	2 —	0 —	21 30.0
3 cm	17 —	17 —	1 —	35 50.0
4 cm	3 —	4 —	3 —	10 14.3
≥ 5 cm	0 —	2 —	2 —	4 5.7
	39 55.7	25 35.7	6 8.6	70

G-supports: 54.3%

R-supports: 45.7%

Average width = 2.96 cm

Note: Solid line demarcates G- and R-supports;
dashed line demarcates R1- and R2-supports

bounds of sampling error. Here Raysse burins resemble standard burins in possessing equal proportions of black and brown flint (46% each, with the remaining 8% consisting of miscellaneous types). But in most respects the contrast in blank morphology between the two is quite marked (table 9.30). Again, this suggests that, despite the seeming flexibility with which it receives expression, Raysse burin manufacture entailed a fairly specialized selection of blank forms. As in the case of the 6-M sample, the proportions of both blades and G-supports are significantly lower than among standard burins even though average blank width is only slightly greater. While possessing very few true blocks, 4-B Raysse burins tend to be made on appreciably chunkier blanks, which gives them an overall aspect more closely approximating the 2-III sample (plate 52).

Although by no means elegant, 4-B Raysse burins may on the whole be somewhat better made. Their smaller sample size, little more than half that of 6-M and less than one-third that of 2-III, of course reduces the variability one is likely to

observe. Yet they illustrate more fully than does 6-M the range of variation inherent in Raysse burin typology. This differentiation is due primarily to their chunkier blanks, which provide a more three-dimensional aspect and greater opportunities for repeated rejuvenation. Breece's observations are telling. Here again ventral spalling carries beyond the midline of the piece in slightly more than half of the specimens, and one-quarter of them lack sufficient purchase area for additional spalling. Yet on average, 2.5 facets were spalled subsequent to the original tertiary modification, which surpasses the 2.1 of 2-III and far exceeds the 1.8 of the 6-M sample.

As a result, even among typical forms it is rare for the biseau to remain close to the original lateral margin (plate 52e). More often it either traverses the full width of the piece to approach the opposite side (plate 52b, d distal) or at least cants heavily onto the vertical face (plate 52c, g). This last feature seems to be a particular hallmark of the sample and, in association with repeated and/or broad spalling of burin facets, often creates a sculptured appearance that brings many 2-III pieces to mind. Particularly chunky blanks especially lend themselves to it (d), but it is seen as well on more ordinary blanks (plate 52c).

Tertiary modification is also reminiscent of the 2-III pattern: relatively fine dihedral retouch is the norm (plate 52b, d, f), a considerable number of pieces are modified by re truncation (plate 52c, g), and examples of heavy dihedral spalling are rare (plate 52c). A few specimens carry marginal chipping whose extent and location suggest a secondary scraper front (plate 52g); otherwise, marginal retouch is rare and sketchy, as is true of the two other Raysse samples.

Atypical forms comprise less than one-fifth of the sample, mostly consisting of broken, overstruck, or perfunctorily spalled specimens. There are no convincing examples of tertiary modification without respalling and only two cases of its logical opposite, progressive polyhedralism without tertiary modification. Special forms are restricted to five full-circle burins. These are of particular interest because, unlike their counterparts in 2-III and 6-M, at least most of them conform to Movius and David's

ideal definition of the type: a Raysse burin whose ultimate facet had to be struck on the original lateral margin because its penultimate facet lay too close to the ventral plane to provide sufficient purchase for striking an additional facet alongside it (plate 52a).

9.5.3 The boundaries of Raysse burins

Other typologists may not agree with the writer about how to draw the boundaries between Raysse burins and their typological neighbors. This is certainly true of Jean-Philippe Rigaud (1982b) and Nicholas David (1966, 1985), who have described the two principal groups of Rayssian industries—those from Flageolet I and the Abri Pataud—with which the Solvicux assemblages are compared in chapter 12. By our standards, both of these fine typologists seriously underreport the numbers of Raysse burins at their disposal (§ 11.3.3).

The issues raised by Rigaud's analysis are straightforward and easily resolved. They simply stem from his (in our view) overconservative practice of inventorying as Raysse burins only those textbook pieces that unambiguously display both tertiary modification and polyhedral ventral spalling. Otherwise similar specimens that depart from the ideal because one of these features is masked by subsequent breakage and rejuvenation are inventoried as flat-faced truncation burins. (They account for more than half of his truncation burin collections, which, of course, would be an inordinately high proportion if one were dealing with samples made up of standard truncation burins alone.) Not surprisingly, Rigaud's illustrations and textual descriptions indicate that nearly all specimens so assigned would constitute Raysse burins if judged by our criteria. The special notice given to them in his text in fact reveals a clear appreciation of the similarities they show to the more ideally typical specimens he does inventory as Raysse burins. That the two forms in fact constitute no more than alternative expressions of one and the same range of Raysse burin typological variation may have been less obvious at Flageolet I. For the burin samples from this site are too small to display that variation in other than somewhat discontinuous, piecemeal fashion.

Our differences with David are more complex. The analysis of the Raysse burin samples from

Solvieux was initially inspired and guided by his seminal work on burins with tertiary modification (Movius and David 1970). But examination of his subsequent monograph (1985) on the Pataud samples indicates that he and the writer have implemented the somewhat schematic and idealized picture of burin dynamics presented in Movius and David 1970 in slightly different fashion, particularly as this involves the more generous boundaries we have drawn for Raysse burins in comparison with his own. The boundary dispute largely concerns David's 'modified truncation burins.' These are truncation burins over whose previous spall(s) is superimposed tertiary modification that did not in turn serve as the striking platform for subsequent burination in the fashion of a Raysse burin. These forms have been recognized only infrequently at Solvieux, and then only as a minor subset of 2-III's Raysse burin component. At Pataud, on the other hand, they are supposedly numerous. Furthermore, they are regarded as typologically distinct from Raysse burins and are assigned to the standard truncation burin categories—of which they account for essentially one-third. Again, as in the case of Rigaud's flat-faced forms, this would constitute an astonishingly high proportion were we actually dealing with a sample composed of standard truncation burins alone.

It is possible that modified truncation burins play a special typological and numerical role at Pataud that they do not play at Solvieux. Yet it is clear from David's tool illustrations that a significant number of them display the overall morphology of Raysse burins, being (among other things) left-handed burins with polyhedric spalling that more often than not cants progressively onto their ventral face. Indeed, some of them bear, in the typical fashion of heavily respalled Raysse burins, remnant distal portions of additional facets that obviously derive from an earlier, and profoundly different, stage or stages in their history when the biseau lay much closer to the left lateral margin. Even if the tertiary modification such pieces carried at the time of discard was unexploited (or perhaps underexploited), it is more reasonable in our view simply to regard them as Raysse burins—as at least they certainly once were—rather than return them to the fold of standard truncation burins.

Given that even full-scale typological illustrations (and those of the Pataud samples, although superb, are reproduced only at 60%) cannot adequately convey a sufficiently detailed picture, one can only speculate as to the precise configuration of the area of the biseau and tertiary modification on many of these pieces. Often the situation is ambiguous, because in many cases burination removes only a small portion of the tertiary modification laid down in its preparation. In many more cases the exact relation between the two is obscured by wear and breakage. In any event, it seems obvious that David makes more exacting demands than we would make when judging such pieces as potential candidates for inventorying as Raysse burins.

Although numerically of much lesser consequence, a related problem arises with respect to some of the pieces he identifies as burin-points on truncations. To be sure, some of those illustrated for this quite heterogeneous category are indeed sharply pointed forms that differ from Raysse burins with respect to several features. But some clearly look like typical Raysse burins whose biseaux simply happen to be relatively narrow but by no means actually pointed.

What accounts for our different approaches to Raysse burins? In part it is simply a matter of two researchers drawing somewhat different, and admittedly arbitrary, lines of demarcation in areas of formal intergradation where types spill beyond the confines of their idealized definitions. Yet something more subtle, and more interesting, is going on as well. As David points out, the distinctive features of burin samples in what we call Rayssian (Late Noaillian, in his terms) industries can be regarded from two different points of view. One focuses on special techniques of manufacture, in this case the use of tertiary modification in making and 'sharpening' truncation burins. The other emphasizes the equally special, but more general, typological result of those procedures, that is, the formal artifact classes of Raysse burins, burin-points, and modified truncation burins. It so happens that David takes the first point of view, we the second.

Thus, when categorizing relevant pieces, David tends to focus rather narrowly on the specific expression assumed by the technique of tertiary

modification in and of itself. We, on the other hand, tend to regard morphological variation in terms of its overall typological configuration; consequently, our notion of what constitutes a Raysse burin is more generous. To us a piece is a Raysse burin if it either looks like one or looks like it once had been one. Because it is in the form's nature to obliterate its past as it proceeds through its use-life, we find it unrealistic to demand that a piece necessarily retain the full complement of Raysse attributes at the time of discard in order to remain a member of the type. It would seem that to David, however, a piece is a Raysse burin only if, among other things, its last episode of tertiary modification was clearly and cleanly interrupted by a subsequently removed burin spall. If not, it is a modified truncation burin even though it may look like a Raysse burin and even though, at least in the case of a heavily spalled and modified specimen, he too might agree it had actually once been one. Similarly, because of his emphasis upon the sharpening effect tertiary retouch can have, he might more likely see a burin-point in a piece which we, emphasizing its overall typological configuration, would regard as a Raysse burin whose biseau happens to be quite narrow.

Why does David emphasize the technique and we the broader artifact class in which the technique simply plays a key role? The question entails methodological issues that go beyond the purpose of this discussion. Suffice it to say David's position reflects his emphasis upon a subtypological (§ 5.6) approach to understanding formal variation: tertiary modification constitutes a technological style, a re-sharpening technique peculiar to truncation burins in Rayssian (Late Noaillian) industries. In his view, the Raysse burins and related forms produced by this modification are probably not functionally distinct from regular truncation burins. Hence it is the specific attributal expression of tertiary modification that captures his intention rather than the manner in which pieces that bear it happen to segregate into artifact classes. (This emphasis, by the way, is responsible for some major ambiguities we encounter in his tool inventories when this discussion resumes in § 11.3).

Now, we, too, emphasize attributes, but—at least in the present study—less as a basis for an independent approach than as a means for illuminat-

ing and augmenting conventional morphological typology (see § 5.6). Thus we retain the conventional interest in designing clear-cut artifact types that produce clear-cut inventories. We also retain the notion of a banal, universal standard truncation burin for purposes of comparative industrial analysis. As we have seen, this provides a common ground on which to compare the dynamics of burin morphology from one assemblage to the next; at the same time, as will be seen in chapter 11, it provides a common backdrop for comparing the roles played in them by special, industrially diagnostic, types of burins. All this inclines us to favor what David would regard as a too broadly defined Raysse burin. For it is our aim to distinguish as cleanly as possible the two categories of standard truncation burins and Raysse burins rather than obscure the issue by restricting the latter to ideal specimens only and creating what is virtually a third, intermediate category: truncation burins that, at the time of discard, possess Raysse burin traits only in a piecemeal fashion. This category is recognized at least in *de facto* manner by both David and Rigaud, but it is not by us. We believe that what we label as Raysse burins do in fact share a common design and do make up a reasonably coherent artifact class. Tertiary modification is a key attribute of this class, but not one that is invariably present, or at least always still visible, on the discarded artifact.

For the rest, our thinking remains in the realm of morphological typology. We have no strong opinions about whether Raysse burins and standard truncation burins are functionally distinct, just as we feel insecure about attempting to make functional distinctions within standard burins or between them and dihedral burins. (It bears mention that Rigaud's treatment of Raysse burins strikes a somewhat ironic note. He does happen to view them as functionally distinct from regular truncation burins. Yet at the same time he blurs the distinction between the two by inventorying many of them as simply flat-faced versions of the latter, as if they were only stylistically different in David's sense.)

There is, by the way, one test implication to our claim that a good proportion of David's modified truncations are in reality Raysse burins. If we are correct, the two forms should have proportionally constant relative frequencies over the relevant strata

at the Abri Pataud. David states that they do not, because modified truncation burins decrease in their absolute (global assemblage) percentages as Raysse burins increase (1985:110–111). In fact, however, when more realistically viewed in terms of their restricted sample frequencies (that is, as percentages of all burins, standard and otherwise, bearing truncations), the two types appear to covary pretty much as constants.

9.5.4 Two unanswered questions

Why are Raysse burins virtually always left-handed? David states that there is no good technological explanation for this (1985:141), a conclusion with which the writer agrees. Some quantitative data provided by Breece may be at least tangentially relevant, however. His analysis of 288 single standard truncation burins drawn from all three of Solvieux's Rayssian assemblages shows that only 40% are spalled on the left and that left-handed specimens are more likely to be carried on flakes and right-handed ones on blades. Thus, the highly laminar part of the sample drawn from couche 6-M is strongly right-handed (89%), while left-handedness slightly predominates among specimens from couche 2-III, which modally are much flakier. This finding translates in no obvious fashion into Raysse burin typology, given the highly diverse range of blanks to which it is adapted. But at least it suggests that the answer to handedness among Raysse burins has nothing to do with truncation burin dynamics as such, but instead somehow involves the special spalling it entails.

The second question involves Movius and David's (seemingly unexamined) assumption that the Raysse burin's highly distinctive form of polyhedralism is not the product of a single episode of manufacture but instead represents periodic rejuvenation of the burin over the course of its use-life. The validity of the assumption is hard to test, even assuming, as seems reasonable, the burin was itself an active tool rather than a nucleus for obtaining a particular form of delicate spall that served some special function of its own. That the excavations at locality 6 yielded a great many Raysse burin spalls, but only a handful that can be refitted to the actual Raysse burins recovered there, would seem to support Movius and David's contention. Such refittings

appear to have been more common at Flageolet I, however (Jan Simek, personal communication). But a more convincing demonstration of their theory of periodic rejuvenation would, in any event, be that Raysse burins were not discarded until they were truly exhausted. This is seemingly not the case, because 75% of the Raysse burins in Solvieux's three Raysse Perigordian localities were discarded in a condition when they still offered sufficient purchase for additional rejuvenation. Equally significant, members of double Raysse burins are no more likely to show exhaustion than single pieces, a finding that fails to support the theory that a double tool was made only when the original tool carried on the blank was worn out. In short, we do not know how much of the manifold spalling observable on a Raysse burin was actually essential to its operation at any one time and whether its functioning active part actually comprised only the most recently fashioned biseau.

9.6 Summary of the couche 2-III, 6-M, and 4-B industries

The three Rayssian assemblages—2-III, 6-M, and 4-B—are very similar in most respects. Their common toolkits are essentially identical statistically and show the same pattern seen in Solvieux's Magdalenian assemblages in which burins are more than three times as common as scrapers, and scrapers are usually three times as common as any of the remaining typological groups. To this toolkit are added equally strong components of Raysse burins whose numerical impact upon the global sample is comparable to that of raclettes in couche 3-A and backed bladelets in couche I/II.

The relative frequencies of the three standard burin varieties are virtually the same. They differ fundamentally from the Magdalenian industries in showing truncation burins more than twice as common as dihedrals; break burins appear in slightly higher proportions. The distribution of the piece types, as well as their proportional differences from one typological group to the next, conform to the generic pattern (§ 6.1). For example, endscrapers show a marked propensity to join burins in composite pieces, whereas burins themselves are especially prone to associate with one another in multiple

pieces. The proportion of these multiples is double that seen in the Magdalenian assemblages due to the penchant of Raysse burins to combine not only with one another but with seemingly all types of burins. Scrapers, perforators, and truncations are all banal in form, while neither points nor microliths play a significant role.

Marginal retouch has little importance. All the Rayssian assemblages are made up of black and brown flint in roughly equal proportions; the latter is dominated by Ivy League, to which is added a small assortment of other zoned and banded varieties of Bergerac flint.

Eluding precise definition, but of major importance to their typological character, is the style of workmanship the Rayssian industries exhibit. Their artisans were not unskilled, as is witnessed by the Raysse burin itself. But more often than not they accepted wide ranges of tolerance in realizing their type notions, and they subjected their tools to heavy usage and often crude rejuvenation before finally discarding them. As a result, these assemblages exhibit a rather makeshift and maladroit aspect in comparison to Solvieux's Magdalenian industries.

Despite their basic homogeneity, the Rayssian assemblages do show intriguing contrasts. One is in blank morphology, where the robust and often flaky supports of 2-III contrast sharply with the gracile laminar forms that dominate 6-M supports, giving the two assemblages quite different characters that tend to mask their fundamental similarities in artisanship and design. Wide angles and laterally ori-

ented biseaux are more common among the burins in the 2-III assemblage, for example, and this assemblage possesses more numerous examples of the less standardized typological groups promoted by flakes such as miscellaneous scrapers and truncations. (In the area of blank morphology, the 4-B sample falls somewhere in between, at least in part simply because it is numerically too small to yield a consistent picture in its own right.)

In addition two basic typological differences are of particular interest to the current debate over the systematics of Rayssian industries. One concerns the dissimilar roles played by Noailles burins both in these couches and in their ancillary horizons. Over most of its reach the 4-B horizon seems to possess no Noailles burins of its own, but it incorporates several at and beyond the point where it stratigraphically intersects a distinct lower horizon in which they are plentiful. A similar, if stratigraphically less clear-cut, situation seems to obtain with respect to couche 2-III. Couche 6-M, on other hand, is not affiliated with any ancillary horizons of this nature and has itself yielded only one quite atypical Noailles burin. The second difference concerns the relative importance of the three couches' Gravettian component of backed pieces, which is moderately strong in couche 6-M, weak in 2-III, and negligible in 4-B. Given the numerical size of these assemblages and the relatively broad horizontal surfaces of the exposures from which they derive (over which tool types distribute essentially at random), the difference is not to be explained in terms of sampling. It must instead be considered industrially significant.

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10

Beauronnian Industry Couche 2-IV

We come now to Solvieux's most exceptional industry, the Beauronnian of couche IV. Its stratigraphic position in locality 2 shows it must date to early Upper Paleolithic times, somewhere in the range of the Aurignacian and Chatelperronian (§ 4.6). Yet its industry is unlike either and may be unique. The issues it poses for archaeological systematics are discussed in the next chapter (§ 11.4). Here we define its typological makeup. Readers may wish to turn at this point to the summary of the industry that closes this chapter (§ 10.7).

What follows has profited from the PhD dissertation of Linda (Taranik) Grimm, a long-term associate of the project (1977). That our interpretations of the typology and dynamics of the industry can differ from those of her early study in no way detracts from the high standard it reached or its continuing interest as a rigorous attribute-based analysis.

10.1 Preliminaries

Because of its typological distinctiveness, describing and analyzing the Beauronnian calls for a different format of terms and systematics than that used for the other Solvieux industries. Tables 10.1 and 10.2 inventory the assemblage by a piece count and tool count respectively. Sample sizes for both the Solvieux truncation and burin groups could eas-

ily be increased by 15% if they included pieces identifiable as to general typological group but too broken to qualify for detailed analytic description. The categories used in these counts are ordered differently from those used for Solvieux's other industries, and they are not numbered in terms of the standard type-list. The reason is that conventional Upper Paleolithic systematics does not accommodate Beauronnian typological variation, which—once one penetrates beyond its crudeness and use-worn state—is seen to involve fundamentally different notions of type design and execution. In short, the Beauronnian differs in kind.

Tool supports are made almost exclusively of black and brown flints, the latter being ordinary Ivy League and what seems to be one of its special variants that is caramel colored and has a soapy aspect. These flints resemble the much later 6-M sample in having a relatively fresh and unpatinated aspect, owing presumably to the considerable depth at which they lie buried. Black accounts for somewhat more than half the total but is nearly matched in popularity by brown in most artifact groups. A high proportion of the industry as a whole is laminar and, judging from the orientation of the dorsal rides, is produced by a prismatic core technique. But the technique is a primitive one in the sense that the blanks are crude, thick in vertical section, irregular in horizontal outline, and often bear a considerable amount of cortex.

Table 10.1. Piece Count: couche 2-IV
Beaurennian assemblage

	N	%
Scraper group		
Endscraper	20	3.58
Flake scraper	4	0.72
Carinate scraper	4	0.72
	<u>28</u>	<u>(5.02)</u>
Composite group		
Scraper + burin	3	0.54
Scraper + Solvieux truncation	5	0.90
Burin + Solvieux truncation	6	1.08
	<u>14</u>	<u>(2.52)</u>
Perforator group		
Percoir	0	0.00
Bec	3	0.54
Thorn	2	0.36
	<u>5</u>	<u>(0.90)</u>
Burin group		
Dihedral burin	32	5.73
Facet burin	28	5.02
Flank burin	25	4.48
Break burin	15	2.69
Truncation burin	68	12.19
Retouched edge burin	14	2.51
Retouched flank burin	13	2.31
Multiple burin (all types)	18	3.23
	<u>213</u>	<u>(38.17)</u>
Truncation group		
Solvieux truncation (ST)	226	40.50
Double Solvieux truncation	10	1.79
Standard truncation	9	1.61
	<u>245</u>	<u>(43.91)</u>
Ad hoc group	2	0.36
Marginally retouched group	2	0.36
Retouched bladelet group	46	8.24
Diverse group	1	0.18
Total	<u>558</u>	<u>100.02</u>

Cortex is especially common among black pieces, presumably—despite the fairly large tool supports involved—because they average nearly the same in size as brown ones but come from smaller nodules. Extensive refitting studies of couche 2-IV's tools and debitage conducted by Grimm should throw much important light on the technological practices of Beaurennian flint knappers.

Conventional marginal retouch like that seen in Solvieux's Magdalenian and Rayssian industries is virtually absent. The relatively little marginal alteration that does appear involves an abrupt and

Table 10.2. Tool Count: couche 2-IV
Beaurennian assemblage

	N	%
Scrapers		
Endscraper	28	4.75
Flake scraper	4	0.68
Carinate scraper	4	0.68
	<u>36</u>	<u>(6.12)</u>
Perforators		
Percoir	0	0.00
Bec	3	0.51
Thorn	2	0.34
	<u>5</u>	<u>(0.85)</u>
Burins		
Dihedral burin	37	6.27
Facet burin	33	5.59
Flank burin	30	5.08
Break burin	20	3.39
Truncation burin	81	13.73
Retouched edge burin	15	2.54
Retouched flank burin	14	2.37
	<u>230</u>	<u>(38.98)</u>
Truncations		
Solvieux truncation (ST)	257	43.56
Standard truncation	9	1.53
	<u>266</u>	<u>(45.08)</u>
Ad hoc pieces	2	0.34
Marginally retouched pieces	4	0.68
Retouched bladelets		
Direct	1	0.17
Indirect	45	7.63
	<u>46</u>	<u>(7.82)</u>
Diverse	1	0.17
Total	<u>590</u>	<u>99.99</u>

encroaching retouch that is usually heavy and sometimes assumes the form of denticulation.

The behavior of combination pieces in the Beaurennian recalls in many respects that seen elsewhere at Solvieux. Endscrapers and burins, for example, appear on composites in essentially equal numbers even though burins are ten times more common. Still, 8% of burins belong to multiple pieces, whereas double endscrapers are absent (which in part may reflect sampling error). Solvieux truncations tend not to combine into either composites or double pieces.

Understanding the quite special nature of the Beaurennian industry calls for an analytic description organized rather differently from what has gone

before. Burins, commensurate with their numbers, are taken up only after we deal with couche 2-IV's dominant and most distinctive tool family, Solvieux truncations.

10.2 Solvieux truncations

The Solvieux truncation accounts for 45% of the Beauronnian industry. Despite its great distinctiveness, it is not a specific morphological type in any narrow sense. Instead, it should be regarded as a multidimensional typological group whose members exhibit remarkable heterogeneity but still remain linked by a basic commonality of design and a common functional dynamics. Solvieux truncations vary greatly in size. Otherwise, however, their heterogeneity arises not so much from variation in the forms in which they were originally manufactured as from the quite diverse patterns of breakage and rejuvenation to which they were subjected during use. Here, in other words, we are not dealing with an essentially static tool class like those that supposedly characterize Upper Paleolithic industries. Instead, Solvieux truncations involve a highly dynamic reduction sequence whose end-products may vary markedly both from one another and from the forms in which they were originally made.

Presenting this novel and complex family of tools poses problems of exposition not encountered when dealing with the conventionally recognized typological groups. It is necessary first to create a general picture whose details are then explored in a more piecemeal fashion that necessarily entails some redundancy. Thanks to the skill of Jean Gausson, the discussion is particularly richly illustrated with typological drawings (plates 53 through 61). These plates deserve careful examination, especially because they contain many more concrete illustrations of the specific points being discussed than can be practicably cited in the text.

10.2.1 Definition

A word is in order regarding the terminology used in describing and analyzing Solvieux truncations. As in burins, the active part of the tool describes a triangle and is designated the "trigon." The trigon is delimited by a perpendicular drawn across the long

axis of the piece from the truncation's lateral nick-point. Its edges then constitute the truncation itself and the "margin" it intersects on the opposing (almost invariably, right) side of the support. The truncation and margin converge to form the "apex" at the distal extremity of the trigon.

The Solvieux truncation is best defined dynamically in terms of an ideal prototype that, through usage and rejuvenation, gives rise to a considerable variety of form. The support of this ur-type is a robust, if fairly narrow, blade that rarely bears marginal retouch distinct from that of the active part itself. The latter comprises an abruptly retouched and highly oblique truncation that departs from the left margin of the piece, crosses it, and intersects the right margin at a sufficiently acute angle to form a distal apex whose outline is that of a pointed bec (plate 53g, n; plate 58a). This pristine form undergoes modification, often to a dramatic degree, during the course of its working career. For one thing, although rarely intentionally retouched, the portion of the right margin lying opposite the truncation may carry use-wear (plate 56j; plate 57h, k). Use-wear, breakage, and rejuvenation are even more markedly expressed on the truncation edge and on the distal apex. The truncation is often undercut by heavy usage or is reshaped by wear, breakage, and rejuvenation into a different profile (and, as a rule, lower) angle of obliquity (plate 56d, plate 59n). And the apex is often worked either intentionally or by usage into a pointed (plate 56o) or rounded (plate 58l) form.

An intriguing feature of these departures from the idealized prototype is that these progressive modifications of the margin, apex, and truncation can proceed quite independently of one another. Indeed, one may be carried to a marked degree without involving any notable difference—apart from concomitant geometric changes—of either or both of the others from what was their pristine state. Thus, the right margin may show moderate use-wear while the apex and truncation remain unchanged (plate 54g), or conversely, the truncation may be heavily modified while the right margin remains fresh (plate 60b).

The end result is often a broken tool that is either discarded or reworked into a piece whose active part falls into another typological class

altogether. Two varieties of the latter are of particular significance. One involves an apex that, through breakage and progressive modification, becomes so blunted and rounded as to approach the form of an atypical endscraper (plate 58g). The more extreme examples of this alteration in fact warrant classification as scrapers, at least by the tenets of conventional morphological typology (plate 60f, plate 711). The other represents a more dramatic transformation. This is a Solvieux truncation whose distal end has been lost, and what remains of its truncation in turn has been spalled so as to convert the piece into a truncation burin (plate 66e, plate 67f). We will see that probably most of what at first glance appear to be conventional truncation burins in the Beauronian industry in fact derived from Solvieux truncations in this manner (§ 10.3.3).

10.2.2 Generalities

We begin by reviewing the outline shapes, or profiles, of couche IV's Solvieux truncations, the make-up of their sample, and the supports that carry them. To make the dense typological discussion a bit less cumbersome, the Solvieux truncation is often referred to simply by the acronym "ST."

ST profiles

Examination of the typological plates reveals that the multidimensional nature of Solvieux truncation morphology defies simple organization. As is the case with burins, ordering STs according to the profiles described by their trigons makes sense typologically and promotes considerable insight into their dynamics. We employ three attribute sets that codify ST profiles according to three somewhat different points of view: Closing Angle, Apex Type, and a combination of these two, Contour Type.

The first, Closing Angle, recognizes four profiles that are reminiscent of those involved in defining standard burin profiles. They are the most convenient and informative means of organizing Solvieux truncations on a laboratory table and they consequently provide the basic organization for our typological plates:

- < 35° Very narrow (plates 53, 54)
- 35 to 50° Narrow (plates 56 through 58)
- 50 to 65° Medium (plates 59, 60)
- > 65° Broad (plate 61)

The very narrow category has been added because the trigons of STs often show appreciably more acute closing angles than do burin trigons.

Contrary to how burin contours are coded, the relation of the apex to the long axis of the piece is not considered when using closing angles to define ST profiles. The majority display what would be the equivalent of a lateral, or at least quasi-lateral, profile among burins. Axial forms do occur, particularly among narrower trigons, but they do not result, as in the case of burins, from mechanical and geometric contingencies involved in spalling. Instead, they are dictated by the natural contours of the support, in particular distal tapering of its margins (particularly common among slender blades) and the configuration of its cross section in the area through which the truncation must pass (plate 53j, plate 55c). It bears noting that the closing angle is not a direct measure of the angle at which the truncation itself rises with respect to the piece, as the opposite margin of the trigon as often as not converges to some degree in approaching the distal end of the piece. Hence, truncation obliquity tends to be somewhat steeper than the closing angle might suggest.

The more specific profile of this portion of the trigon that falls close to the distal extremity is codified in terms of three Apex Type attributes: narrow convergent (bec type), broad convergent (point type), and round (front type). The basic distinction involved is between convergent apexes, which are more or less pointed (plate 56j), and round apexes, which assume the form of a front comparable to that of an endscraper (plate 58q). To qualify as the latter an apex must exceed 1 cm in width and be shaped by spalling (whether intentional or use-wear). Even though they usually display signs of usage, most STs are convergent. In narrow convergent specimens the sides of the apex meet at less than a 50° angle (plate 54a), while broad convergent specimens exceed it (plate 56o). This angle is measured directly proximate to the distal end and is not necessarily the same as the overall closing angle of the trigon itself. Because the edges involved tend not to be straight and the distal tip more often than not is blunted to some degree, distinguishing between narrow and broad apexes can be an arbitrary business. Consequently, one's decision in practice is based more on

a typological impression than an actual measurement. In short, narrow apexes have the outline of a bec and are frequently actually disengaged, whereas broad ones have the silhouette of a pointed blade and are more continuous with the margins from which they emerge.

The ST Contour Type attributes simply represent the nine combinations that result when the first three closing angles are joined with the three apex classes, along with a tenth category that accommodates all trigons with wide closing angles exceeding 65°. The handful of pieces falling into this last category pose something of a problem: they do not look like ordinary STs because, on geometric grounds, they cannot bear convergent apexes comparable to those seen on narrower specimens. Yet most show obvious signs of extensive rejuvenation (plate 61g), and almost certainly they constitute heavily modified versions of specimens that, in their original state, were considerably narrower. Although largely excluded from the analytic description (§ 10.2.3), they still deserve to be classified with the more typical Solvieux truncations rather than with the even smaller handful of pieces that seem to qualify as conventional standard truncations (§ 10.6).

Table 10.3 provides the inventory of the ST analytic sample organized in terms of these ten contour types. The breakdown they provide is not regarded as a meaningful typology in its own right but is simply a heuristic that lends organization to one's observations. Many, if not most, STs passed through several contours over the course of their use-life. Even casual inspection of this table indicates that the tools are not evenly distributed over the closing angles and that the angles do not interact randomly with the apex types.

The ST sample

The 251 Solvieux truncations suitable for analytic purposes number considerably less than the samples indicated on the piece and tool global counts. Fifty-two specimens that deserve to be inventoried on the general counts were excluded from the analysis because they are too fragmentary for detailed study. Those omitted consist of 39 single pieces that are broken, that is, lacking a significant portion of their trigons; 11 tips representing only the distal extremity of the trigon; and two STs belonging to combi-

Table 10.3. Inventory of 2-IV Solvieux truncations according to profile types (tool sample)

			N	%
< 35°	Bec	36	40	15.95
	Point	4		
	Front	0		
35°-50°	Bec	66	120	47.81
	Point	41		
	Front	13		
50°-65°	Bec	21	77	30.68
	Point	45		
	Front	11		
> 65°	—	14	14	5.58
			251	100.02

nation tools—one a composite, the other from a double. (It is because of this last specimen that only seven doubles are listed in the piece sample although 15 tools are indicated as being derived from doubles.)

Combination pieces involving STs (plate 62a-f) account for somewhat less than 2% of the global piece count, a low proportion indeed in comparison to what is seen among numerically important typological groups in Solvieux's Magdalenian and Rayssian industries. It also contrasts with the 12% of couche 2-IV's burin sample deriving from multiple and composite pieces. Singleness appears then to be an integral feature of ST typology. Of the 11 STs belonging to composite pieces, four associate with burins (plate 62a, e, f, i), five with endscrapers (plate 62b, c, d, h), and two with standard truncated forms. Exaggerating a trend seen elsewhere at Solvieux, the number of composite pieces uniting STs with endscrapers is particularly high given that the latter are only one-tenth as common as burins in the assemblage as a whole. Even in the Beauronnian, endscrapers seem to have an agglutinative affinity for members of other typological groups.

ST supports

Solvieux truncations are carried on crude and irregular blades that are thick in cross section, rarely carry marginal retouch, and often bear cortex. The flint types are restricted to black (55%) and brown

(45%), virtually all of the latter being Ivy League. The morphology of ST supports is presented in the standard format in table 10.4. Two features make the table particularly interesting. One is the heavy concentration of blank widths in the 2 cm and 3 cm categories; the falloff is abrupt in passing to 4 cm, and only a single specimen exceeds this width. The other feature is the overwhelming dominance of blades, which account for 96% of the entire sample. All but one of the 11 blanks counted in the flake column are actually quasi-flakes. Due to the extreme skewness of the distribution toward blades, flakes and R-supports are much too uncommon for either Blank Variety or Support Type to make useful cross-classifications in contingency tables. Hence, the primary attribute set used to represent blank morphology in the statistical analyses that follow must obviously be Blank Width. Supports made of black flint tend to be slightly narrower than those of brown, but the difference is not statistically significant. Blanks carrying STs on combination pieces average somewhat wider than singles, but the dif-

ference is slight (3 mm), and their actual numbers are quite small. Despite this strict selection of blank forms, individual STs can be quite diminutive (plate 53d; plate 56a, b) and, especially, quite large and/or massive (plate 57i, o).

Thickness of cross section is a distinctive trait of supports that strongly influences Solvieux truncation typology. As the typological illustrations show, thick blanks are common, and often their height at least equals half their width. Support thickness is most usefully characterized for typological purposes by truncation height: the maximum ventral-dorsal height attained by the truncated edge in traversing the blank (which more often than not equals the actual maximum thickness of this height). Three broad divisions of truncation height are recognized: medium, ranging from 0.5 to 1.0 cm; low below this range; and high above it. The last qualifies the piece to be termed chunky in the sense in which we have used the term among Solvieux's other industries.

10.2.3 Analytic description

Our working assumption in approaching Solvieux truncations is that essentially all of their variation not directly attributable to mechanical and geometric contingencies arising from blank morphology is due to use-wear and rejuvenation. Rejuvenation here means the reshaping of a worn or broken edge by spalling produced by further use, by purposeful retouch, or by a combination of the two. It must be stressed that the distinction between these two types of spalling is arbitrary, not only on morphological grounds but on technological ones as well. Given the fact that the ST was clearly designed in the knowledge it would undergo more or less profound modification during its use-life, it is reasonable to assume that use-wear was employed just as intentionally as 'purposeful' retouch to reshape its broken edges.

Much of this modification is virtually impossible to convey in tool illustrations, and indeed the validity of our working assumption might not be obvious to one who examined Solvieux truncations only briefly or only piecemeal. Their shaping retouch tends to be fairly crude to begin with, and as a result, it is often not easy to distinguish by appearances alone the spalling that was original to any

Table 10.4. Blank morphology of 2-IV Solvieux truncations. Cross-tabulation of Blank Variety and Blank Width.

	Blade	Standard Flake	Square Flake	
2 cm	87 —	1 —	0 —	88 36.1
3 cm	115 —	7 —	0 —	121 49.6
4 cm	31 —	3 —	0 —	34 13.9
≥ 5 cm	1 —	0 —	0 —	1 0.4
	233 95.5	11 4.5	0 0.0	244

G-supports: 83.2%

R-supports: 17.2%

Average width = 2.77 cm

Note: Solid line demarcates G- and R-supports;
dashed line demarcates R1- and R2-supports

given specimen from that produced by rejuvenation. Yet on many pieces the distinction is obvious, and the two behave systematically in ways that indicate fairly standardized reduction sequences. Recognizing these patterns is more a business of gradually giving order to subjective impressions, the finger knowledge of the journeyman typologist, than of examining contingency tables. But an occasional table can be used to verify and give formal shape to one's impressions. And the mechanical logic underlying these sequences is further illuminated by independently examining breakage patterns as they are reflected by "tips" (that is, distal remnants of truncations) and the raw edges of broken pieces that were discarded rather than rejuvenated.

Aspects of profile

Our point of departure is the closing angle. As the table 10.3 inventory shows, the distribution of tools over the closing angles is quite skewed toward narrower ones, with 64% falling below 50°. Inspection of the 47 pieces excluded from the analytic sample because of breakage indicates that the distribution would be further skewed toward the more acute angles had they been included. The configuration of well over half the 39 broken pieces lacking a significant portion of their trigon shows this (plate 55i, j, k), while all eleven tips are quite narrow angled (plate 54j, k, l).

Table 10.5 shows an interaction wherein narrower closing angles associate with narrower supports and broader ones with wider supports; STs in the > 65° category are, for obvious reasons, excluded from this cross-tabulation. Clearly at work are contingencies of the kind we are habituated to seeing among burins, involving the interrelated factors of control and economy in flint knapping. Perusing the typological plates should make the point clear. Narrower closing angles call for truncations of higher obliquity—and, hence, proportionately greater length with respect to blank width—than those of broader closing angles. At the same time, the absolute length of the truncation that needs to be successfully spalled is obviously less among narrower blanks than among wider ones. The tendency of narrow ST supports to converge naturally in approaching the distal end even further reduces this length than would otherwise be the case. For this same reason,

Table 10.5. Solvieux truncations: 2-IV tool sample (STs > 65° omitted). Cross-tabulation of Closing Angle and Blank Width.

	< 35°	35-50°	50-65°	
2 cm	26 65.0	41 34.2	16 20.8	83 35.0
3 cm	13 32.5	60 50.0	43 55.8	116 49.0
≥ 4 cm	1 2.5	19 15.8	18 23.4	38 16.0
	40 16.9	120 50.6	77 32.5	237

$$\chi^2 = 24.90 (p < .001)$$

$$\phi = .324$$

as has been noted, axially disposed apexes are not uncommon among narrower supports (plate 53j, n; plate 54c, h, n), whereas apexes are more often lateral among wider ones.

Yet the matter is really not so straightforward. It is obvious upon inspection that Solvieux truncations with broader closing angles exhibit greater signs of usage than those with narrower angles, indicating they were originally narrower themselves. (Unfortunately, this usage cannot be conveyed by ordinary typological illustrations, although some idea of at least the grosser results of breakage can be gained by referring to the tips and broken pieces illustrated in plates 54 and 55.) This fact is significant, although it may not abrogate the principle of economy as being the key factor accounting for the interaction pattern seen in table 10.5. In any event, use-wear and the principle of economy work together to produce the same result. Wider supports are more likely than narrower ones to carry wider closing angles, and, at the same time, they are inherently more capable—by virtue of their greater robustness—of sustaining the kinds of damage and rejuvenation that promote broadening of their closing angles. Inspection of the typological plates should make this evident.

We now turn to the apex types. Unlike the closing angles, they fail to show statistically significant interaction with blank width (table not shown). They are only secondarily dependent upon the morphology of the support, through the intermediary

Table 10.6. Solvieux truncations: 2-IV tool sample (STs > 65° omitted). Cross-tabulation of Closing Angle and Apex Type.

	< 35°	35-50°	50-65°	
Bec	36 90.0	66 55.0	21 27.3	123 51.9
Point	4 10.0	41 34.2	45 58.4	90 38.0
Front	0 ±	13 10.8	11 14.3	24 10.1
	40 16.9	120 50.6	77 32.5	237

$$\chi^2 = 42.08 (p < .001)$$

$$\phi = .421$$

role played by closing angles, with whom they show a clear-cut and strong pattern of association (table 10.6). Apart from a very few point-like broad convergent apexes (plate 53a; plate 54e, i), all STs with very narrow closing angles (< 35°), assume the narrow convergent bec form (plates 53 and 54). Among 35 to 50°, or narrow, closing angles, broad convergent point-like apexes account for 34% of the total (plate 56c, g; plate 57c; plate 58g-m), and an additional 11% are round fronts (plate 58n-r). Finally, it seems that closing angles between 50° and 65° (plates 59 and 60) are a bit too broad to carry bec-like apexes, as narrow convergent specimens are only half as common as broad ones here and closely approach them in form (plate 59e, plate 60a); at the same time, round front-like apexes account for 14% of the group (plate 60f-n).

These associations are the straightforward product of geometry and usage working in concert. A convergent apex represents to a large degree a continuation of the closing angle of a trigon that has escaped drastic breakage at least (although, to be sure, a broad convergent apex is somewhat more likely to show wear and be blunted, whereas a narrow one is more often fresher and sharper). It is clear from inspection of both intact and broken pieces, on the other hand, that a round apex represents the rejuvenation of a trigon that has sustained enough breakage to generate what is virtually a scraper front. Such a trigon almost necessarily has a medium or wide closing angle, because the broken end of a nar-

rowly angled trigon will probably lack sufficient width to bear a true round apex; it will instead be rejuvenated simply into a blunted broad convergent apex (plate 54i). Moreover, if such a piece had been broken drastically enough to provide sufficient width to accommodate a true round apex (plate 55j), wear and rejuvenation would probably have transformed it into a Solvieux truncation that qualified for a somewhat broader closing angle category in the first place (plate 58s). For obvious reasons, breakage and rejuvenation that generate round apexes tend to produce forms reminiscent of asymmetric or skewed endscrapers on narrower supports (plate 58 n-s), and shouldered or cantilevered endscrapers on broader ones (plate 60f, m).

The truncation

The Solvieux truncation's most salient feature is, of course, the truncation itself. Its retouch is abrupt or semi-abrupt, engaging the full vertical thickness of the piece in the zone of the trigon. Because supports tend to be quite thick, so usually are truncations; many are actually chunky, that is, thicker than 1.0 cm (plate 53n, plate 57l). Low truncation height is restricted to slender blades (plate 54c). And, since piece thickness correlates at least in a general fashion with the overall robustness of the support, it is not surprising to find that truncation height associates in a predictable manner with blank width (table 10.7).

With three exceptions (plate 55d proximal; plate 58d, e), the truncation invariably departs from the left margin of the support. Except for a single inversely retouched specimen (plate 58f), it is invariably direct. In one-fifth of STs the typological orientation opposes technological orientation, that is, the trigon lies in the direction of the bulbar end. This was done to avoid fashioning a truncation on a distal end that constitutes a hinge fracture, bears heavy cortex, or otherwise presents obstacles to the easy fashioning of a suitable tool. Particularly in robust specimens, the truncation more often than not terminates where it intersects the principal dorsal edge, even when this results in a trigon whose area actually lies to the left of the midline of the support (plate 55b, plate 59o).

Although frequently producing a more or less vertical edge, truncation retouch is considerably less

elegant and regular than that seen on Gravettian backed pieces, comprising instead heavy and broad spalling that is abrupt, encroaching, and often even denticulated. At its best it resembles a crude, heavily encroaching form of Aurignacian retouch and, like the latter, its margin often bears crushing (*écrasement*) that appears to be an integral part of the retouching process (plate 53g, plate 54e). Even heavier crushing often seems to have been added subsequently to part or all of the truncation as a result of usage (plate 54f, n). It is only among particularly thin pieces that any significant departure from the norms of truncation retouch is found. In this case the characteristic heavy modification is replaced by the peculiar form of abrupt spalling that occasionally appears as marginal retouch on pieces in most of the assemblage's typological groups (plate 53f, plate 58o, plate 59h, l).

In a dozen specimens marginal retouch continues down the left side of the piece below the truncation nickpoint. (Purposeful retouch, as opposed to use-modification, occupies an analogous position on the right side in only three specimens.) Ordinarily in such cases either the truncation is delimited by an obvious shoulder at the nickpoint (plate 56n) or the marginal retouch itself differs from it in form and intensity, being usually the typical abrupt retouch noted above (plate 54i, plate 58q). But in four or five specimens it is heavy and encroaching and merges with the truncation to produce the effect of a robust, if crudely backed, piece (plate 56k, plate 55e, plate 59j). The most elegant example in the analytic sample is an otherwise anomalous one bearing a marked shoulder and an intentionally retouched trigon margin (plate 56n). In another handsome but unfortunately broken specimen, the retouched margin describes a continuous curve (plate 55j). In any event, such quasi-backed pieces are very few in number and quite varied in form, and they seemingly represent no more than isolated and somewhat anomalous permutations of Solvieux truncation morphology. In short, in the Beauronnian industry there is no distinctive component of backed pieces that accompanies, or is incorporated within, this group.

Of some interest is the specific contour described by the edge of the truncation. This contour can be categorized as straight, convex, or concave.

Table 10.7. Solvieux truncations: 2-IV tool sample. Cross-tabulation of Truncation Height and Blank Width.

	Low	Medium	High	
2 cm	22 66.7	59 36.0	8 14.8	89 35.5
3 cm	10 30.3	84 51.2	30 55.6	124 49.4
≥ 4 cm	1 3.0	21 12.8	16 29.6	38 15.1
	33 13.2	164 65.3	56 21.5	251

$$\chi^2 = 29.80 (p < .001)$$

$$\phi = .345$$

A fourth category, irregular, could be added, but inspection indicates it almost invariably represents an edge that was originally straight and subsequently altered by heavy breakage. Irregular specimens are therefore included in the straight group and are considered to have greater relevance to use-wear than to contour itself.

Fifty-one percent of ST contours are straight (of which one-sixth are irregular), 27% convex, and 22% concave. Straight would appear to be the norm, because heavy usage and breakdown of the truncation edge seem to account for most convex (plate 53a, plate 55f distal, plate 57m, plate 60d), concave (plate 56h, plate 57k), and irregular (plate 54n, plate 57b, plate 60b) examples.

In addition, contour of the truncated edge exhibits a special relationship to blank width (table 10.8): convex contours tend to associate with narrow blanks and concave ones with wide. The former seems to be accounted for by truncations superimposed on the naturally tapered flanks that often pre-shape the distal end of slender blades (plate 53c, m). The association of concavity with wide blanks specifically stems from the fact that intentionally shaped concave contours tend not to describe arcs of circles but are in reality "hipped" straight truncations, inset by retouch toward the midline so that they can achieve a high angle of obliquity despite the breadth of the blank that carries them (plate 56m, n; plate 58a; plate 59f).

Table 10.8. Solvieux truncations: 2-IV tool sample. (STs > 65° omitted). Cross-tabulation of Truncation Contour and Blank Width.

	Straight	Convex	Concave	
2 cm	44 37.0	29 44.6	10 18.9	83 35.0
3 cm	57 47.9	31 47.7	28 52.8	116 49.0
≥ 4 cm	18 15.1	5 7.7	15 28.3	38 16.0
	119 50.2	65 27.4	53 22.4	237

$$\chi^2 = 13.85 (p < .01)$$

$$\phi = .242$$

It is unnecessary to show in a table the interaction between truncation contours and trigon closing angles. It is essentially random except for two associations of an obviously geometric nature—very narrow profiles show some preference for straight truncations, whereas very broad ones tend to avoid concave contours. Interactions of a secondary nature exist between truncation contours and the apex types that need not be tabled: concave contours associate with narrow convergent becs (plate 56h, m, n), whereas convex ones associate with points and fronts (plate 58d). These ought not to be taken too seriously for their geometric basis is obvious. Indeed, a kind of halo effect, or redundancy of measurement, is involved here because (contrary to the case of straight truncations) it is difficult to tell precisely where a convex or concave truncation leaves off and the apex itself begins.

The margin

The portion of the margin included within the trigon rarely bears intentional retouch (plate 56n, plate 59f). But it often exhibits the stigmata of usage in the form of nicking, nibbling, and/or scaling, which is difficult to quantify without entering the realm of spurious precision. In about half of the sample it is sufficiently continuous and marked to deserve the designation of light use-wear (plate 53h, plate 56i, plate 57m). In an additional 30% retouch could be termed moderate (plate 59e, plate 60h); only rarely does it deserve to be termed heavy (plate 54g). The

remaining 20% has no visible modification apart from the discontinuous light nicking that can be found on the margin of nearly any blade. Marginal use-wear usually lies within a few centimeters of the apex. It can continue downward from the end of the trigon in a manner that, in the case of a convergent apex, gives the piece the aspect of an atypical perforator (plate 61g, plate 54e). More often, however, it concentrates somewhat apart, giving the appearance of a secondary active part that functioned more or less independently of the remainder of the piece.

This independence is also indicated by the fact that marginal wear only weakly correlates with any other feature of Solvieux truncation morphology. It in fact can be heavily expressed on pieces whose closing angle, apex, and truncation themselves seem to be in a relatively pristine condition (plate 56j, plate 62d distal). Usually, however, it simply exhibits a weak tendency to appear somewhat more often on STs whose other features suggest significant breakage and rejuvenation. Very likely the cause of this association is not functional linkage but simply that such tools presumably had a longer or more intensive use-life and therefore exposed the margin to longer wear.

10.2.4 Commentary

Solvieux truncations could undergo great mutations in form during their use-life, owing to breakage and rejuvenation in what appears to have been a multi-directional reduction sequence. Precisely what, and how many different, functions and modes of employment this sequence entailed is a challenging question. The formal variation resulting from these successive transformation challenges not only functional typology but descriptive typology as well. A researcher who worked with a sample of Solvieux truncations too small to display systematically all of their permutations might easily fail to grasp the dynamics involved and, consequently, the fundamental kinship of the members of this group. Seeing them only piecemeal, he or she would simply regard them individually as atypical representatives of such diverse typological groups as standard truncations, perforators, scrapers, and backed knives, and assign them accordingly. And, of course, he or she would fail altogether to appreciate the genesis of a large number of the pieces that had been classified

without hesitation as truncation burins. Whether or not this has happened is a matter to which we will return in the next chapter (§ 11.4.5).

10.3 Burins

Burins constitute somewhat over a third of the Beauronnian industry, which matches their popularity in the Magdalenian and Rayssé Perigordian assemblages. But their morphology is quite unlike that seen among burins in Solvieux's other industries. They tend to be crude, atypical in form, and heavily modified by use-wear and rejuvenation. Even more significant, they are largely the product of quite different design notions. Fifteen percent of the sample consists of conventional, or standard, dihedral burins. Most of the rest, however, are various forms of burins on adapted or adopted edges involving various sorts of natural facets or the truncations of broken Solvieux truncations. Burin manufacture is a business of producing biseaux by means of spalling that accommodates the exigencies of blanks rather than of superimposing rigid design notions upon them. In other words, it was the practice of Beauronnian knappers not so much to modify the blank to conform to preconceived type designs as it was to fashion the trigon to conform to the blank. Despite their opportunistic flavor, the burins that result are fairly standardized, to a considerable degree because the blanks themselves were chosen with some care. But the groups into which they fall are not the standard ones recognized in the Upper Paleolithic type-list, whose use would be somewhat cumbersome and misleading for our purposes. We begin then by outlining a system of burin typology that is designed expressly to accommodate the special nature of the couche 2-IV sample.

10.3.1 The 2-IV burin system

Beauronnian burins lend themselves equally well (and equally poorly) to more than one classificatory format. The system used here is a compromise designed to satisfy two somewhat contradictory goals. One is to provide the vehicle for an analytic description of a burin typology that seems to be fundamentally different from that ordinarily encountered in the Upper Paleolithic. The other is to incorporate within the system enough terms and notions from

conventional burin systematics to prevent readers from losing their way in the sheer novelty of the typology involved. In short, the system is designed to survey an alien typological landscape using familiar benchmarks. We will find useful in describing it an acronym introduced by Movius et al. (1968:23): the SRS (spall removal surface), which refers to the edge that serves as a platform from which a burinated facet is spalled. Thus, the SRS of a truncation burin is a truncation, that of a break burin is a broken edge, and so forth.

The following six types make a useful system for describing the formal variation of couche 2-IV burins and the dynamics that lies behind them (see table 10.9). Each is well illustrated among the typological plates.

Dihedral burins

The dihedral burins that concern us here are typical in the sense that both sides of their trigon comprise conventional burinated facets. In the other Solvieux assemblages the dihedral group includes a certain number of atypical forms, among which one side of the trigon constitutes an unmodified edge, that is, a

Table 10.9. 2-IV burin inventory (tool sample)

		N	%
Dihedral		37	16.09
Typical	28		
Atypical	9		
Unmodified edge		63	27.39
Miscellaneous facet	33		
Flank (quasi-dihedral)	30		
Break (B5)		20	8.70
Truncation		81	35.22
Typical	58		
Atypical	14		
Truncation remnant	9		
Retouched edge		15	6.52
Retouched flank (quasi-truncation)		14	6.09
		<u>230</u>	<u>100.01</u>

Note: Sample is two less than Piece Count (Table 10.1), which has two multiple pieces bearing at one end a broken burin whose typology is indeterminate.

broken edge or a preexisting facet of the blank. These forms outnumber typical dihedrals by a considerable margin in the 2-IV sample, and they consequently deserve to be regarded as characteristic of Beauronnian burin typology in their own right rather than simply as atypical members of the dihedral group. They constitute our second type.

Burins on unmodified edges

Burins on unmodified edges subdivide into two fairly distinct forms. In one, the SRS is a "flank," that is, a marginal longitudinal facet of the support blank that more often than not is steeply inclined. Because this flank is unmodified, the tool constitutes a sort of "quasi-dihedral flank burin." In the other, a "burin on a miscellaneous facet," the SRS constitutes any unmodified edge that happens to be neither a flank nor a broken edge that would qualify the piece for membership in the break burin type.

Break burins

In a break burin the SRS constitutes a broken edge and the trigon has the B5 profile. On morphological grounds it can be regarded simply as an alternate form of burin on a miscellaneous facet. But the type is distinguished here to make a point about the nature of 2-IV burin typology. The outstanding characteristic of a break burin is of course its ordinarieness. It therefore seems significant that, despite the seemingly opportunistic character of the 2-IV sample as a whole, this most opportunistic of all burin types is no more common here than in the Rayssé Perigordian assemblages. This reinforces our impression that the design notions underlying Beauronnian burins are different, not simply more elemental, than those behind Solvieux's Magdalenian and Rayssian burin industries.

Truncation burins

Truncation burins in the Beauronnian industry resemble standard truncation burins in terms of their general morphological typology, but close inspection reveals that in the bulk of them the SRS represents what was originally the truncation of an ST. They are, therefore, a kind of burin on an adapted edge—analogue, but seemingly not homologous, to truncation burins elsewhere at Solvieux. The makeshift atypical specimens that accompany them reinforce

their distinctiveness and suggest that the design notion of a standard truncation burin may not have been part of a Beauronnian knapper's repertory.

Burins on retouched edges

In this type of burin the retouched edge seems to have been destined from the start to serve as an SRS. Unlike the encroaching and invasive retouch of a conventional truncation, however, it consists of a line of abrupt retouch that does not significantly modify the contour of the margin to which it is applied, even though it remains thick enough to receive the full width of the biseau.

Retouched flank burins

Retouched flank burins describe the same morphological range as the flank subtype of burins on unmodified edges defined above, except that light regularizing retouch is present in the area of the biseau. But this retouch falls well short of a regular truncation or retouched edge in its expression and it is still the flank itself that serves as the SRS. Members of this group may be referred to as "quasi-truncation flank burins" as opposed to the unretouched quasi-dihedral flank burins. These terms are used only as a matter of convenience for descriptive purposes and ought not be taken too seriously. For the two varieties of flank burins resemble each other more closely than either resembles typical members of the dihedral and truncation burin groups.

The couche 2-IV industry includes no special burins apart from six specimens that individually could qualify as Corbiac burins but that clearly fall into the range of variation of some of the above types. These will simply be noted in passing.

Although our classification of six burin types proves quite serviceable for purposes of descriptive typology and defining burin dynamics, its use does call for some flexibility. One reason is that Beauronnian burins tend to be crude both in execution and as a result of frequent, quite rough-and-ready rejuvenation. Another is that their profiles are often difficult to categorize, due in part to the ambiguity entailed in orienting the irregular blanks that bear them and in part to the fact that the edges of their trigons are often canted toward the dorsal and ventral faces of the piece, as a result of which the outline described by the trigon assumes a quite

different form depending upon the face from which it is viewed.

10.3.2 Generalities

The Beauronnian burin sample is inventoried according to the above six types in table 10.9. Its blank morphology is summarized in table 10.10. This table is less informative here than it is in Solvieux's other burin samples because the blank morphology involved does not lend itself to easy generalization—the choice of support tends to vary significantly from one burin type to the next. Yet the general pattern is of interest. Beauronnian burins are, on the whole, clearly less laminar and somewhat wider than Solvieux truncations (see table 10.4). In summary statistical measures like average width and the proportions of blades and G-supports they are consistent with the other Solvieux burin samples, suggesting a slightly more gracile version of the 3-A pattern (see table 7.9). Yet in certain important respects they differ significantly from 3-A and, indeed, all the other samples. Square flakes are rare, accounting for little more than 1% of the total. Blanks are heavily concentrated in the 3 cm width category, and their numbers rapidly fall off on either side of it, particularly in the 2 cm width class. Even the very robust 2 III burin sample has a higher proportion of 2 cm-wide blanks even though its supports are, on the average, considerably wider and nearly half of them are flakes (see table 9.7).

The essentially two-dimensional format of table 10.10 obscures additional aspects of Beauronnian supports that play a strong role in burin typology. These supports are, for example, considerably more irregular in outline than those of any other Solvieux burin sample. Although most of them qualify as blades in terms of their length-width ratio, little more than half possess dorsal ridges indicating they were produced by a prismatic core technique. Cortex is common, flanks are often steeply angled and/or comprise atypical spall scars, and vertical thickness is frequently great—equaling or even surpassing blank width itself. Black flint is only slightly more common than brown, and its blanks tend to be somewhat more laminar and narrower. Marginal retouch is rare and is limited to the abrupt variety that occasionally appears on the flanks of Solvieux truncations.

Table 10.10. Blank morphology of 2-IV burins. Cross-tabulation of Blank Variety and Blank Width.

	Blade	Flake	Square Flake	
2 cm	43 27.2	1 2.1	0 —	44 21.2
3 cm	95 60.1	28 59.6	2 66.7	125 60.1
4 cm	18 11.4	11 23.4	1 33.3	30 14.4
≥ 5 cm	2 1.3	7 14.9	0 —	9 4.3
	158 76.0	47 22.6	3 1.4	208

G-supports: 66.8%

R-supports: 33.2%

Average width = 3.02 cm

Note: Solid line demarcates G- and R-supports;
dashed line demarcates R1- and R2-supports

The behavior of Beauronnian burins in multiple and composite pieces is virtually the same as that of standard burins in the 3-A sample: 85.6% of the pieces are singles, 10.1% multiples, and 4.3% composites. In six of the nine composite pieces involving burins, the latter join with Solvieux truncations (plate 62a, e, f, i), and in the remaining three with endscrapers (plate 62g, j, k). The burin types show no obvious tendency to join with their own kind in forming multiples. The supports of combination pieces are somewhat less laminar and slightly wider than those of single pieces, but the differences have only slight significance statistically or otherwise.

10.3.3 Analytic description

Dihedral burins

The industry contains a small but significant component of dihedral burins, most of which would not look out of place in Solvieux's Magdalenian or Raysse Perigordian assemblages. Their profile type frequencies and overall pattern of interaction between profiles and support types fully meets the expectations of the generic model of burin dynamics

Table 10.11. 2-IV dihedral burins (tool sample).
Cross-tabulation of Burin Profile and Support Type.

	D1	D2	D3	D4	D5	
G-support	10	4	0	3	3	20
	—	—	—	—	—	54.1
R-support	1	2	3	4	7	17
	—	—	—	—	—	46.0
	11	6	3	7	10	37
	29.7	16.2	8.1	18.9	27.0	

(§ 6.3.2) despite the small number of pieces involved (table 10.11). D1 narrow and D2 medium axial specimens account for nearly half of the sample (plates 63a–d; 69e distal), and only occasionally occupy the thick and irregular support that so often appears elsewhere in the industry (plate 63h). The first two specimens shown on plate 63 carry the abrupt and fairly crude retouch that occasionally appears on tool margins throughout the industry. Consistent with the generic pattern, the D3 wide axial profile is poorly represented (plate 67a proximal), whereas the D4 medium lateral profile essentially equals its axial (D2) counterpart in numbers (plate 62e proximal, plate 63i). The D5 wide lateral profiles here, as elsewhere, can appear on fairly gracile supports (plate 63e) even though most are quite robust (plate 63j).

Several of the illustrated pieces carry dorsal burin scars. Spalling canted onto the ventral face of the support is even more common, and, when combined with the first, creates a biseau that can be wider than the vertical thickness of the blank itself (plate 63c, d). In one specimen opposing polyhedral burin scars form a particularly wide biseau that lies parallel to the plane of the support, whose original outline is hardly changed at all (plate 63f).

About one-quarter of this group consists of burins that are dihedrally spalled but still atypical because of their general form (plate 64a) or because they bear chopped or minimal (plate 64b) facets. In one example of a minimum facet, the spalling consists of little more than regularizing retouch on the flank of a piece that otherwise would have been classified as a quasi-dihedral flank burin (plate 64f).

Burins on unmodified edges

Due to their numbers in the 2-IV sample, burins on unmodified edges deserve to be regarded as an integral typological group in their own right instead of as atypical dihedral burins. They are nearly twice as common as true dihedrals. Table 10.12 shows the distribution of piece supports and profiles. Because only one side of the trigon bears a burinated facet, seven profile types (E1 through E7) are recognized; in this case their silhouettes are analogous to those used for standard truncation burins (T1 through T7). Table 10.12 gives a picture of profile frequencies and interaction patterns that contrasts with the generic patterns we have seen among dihedral and truncation burins. One reason for these differences is that unmodified edges, in contrast to the burin spalling and truncations that define the trigons of most standard burins, appear in fairly random configurations due both to their nature and to the irregular outlines of the supports that bear them. Another reason is that break burins, which logically might be considered part of the adopted edge group, are excluded from it for purposes of exposition. Their presence would strongly increase the numerical representation of the E5 category. A third reason is that half of the group consists of flank burins, which, in contrast to many miscellaneous facets, almost by definition possess a relatively narrow transversal profile (E7). This profile is as common here as the broad lateral profile (E5).

More than one-third of the miscellaneous facets are easily recognized because they are clearly demarcated from the edge of the piece (plate 62k distal, plate 64k, m). Ventral spalling is not uncommon (plate 64g), and it is rarely diminutive (plate 64h). The majority of miscellaneous facets, however, lie more oblique to the axis of the piece and often consist of a break or a pre-existing spalled edge that constituted the blank's margin when it came from the nucleus (plate 64i, j, l; plate 65i distal). As the illustrations suggest, sometimes pieces bearing the older spalled edge are distinguished only with difficulty from true dihedral burins, especially because burin spalling itself tends to be crude throughout the sample. Particularly in the case of chunkier specimens, close inspection is required to show that the

Table 10.12. 2-IV burins on unmodified edges (facet and flank) (tool sample). Cross-tabulation of Burin Profile and Support Type.

	E1	E2	E3	E4	E5	E6	E7	
G-support	16 —	9 —	2 —	5 —	5 —	4 —	7 —	48 76.2
R-support	1 —	4 —	1 —	1 —	4 —	2 —	2 —	15 23.8
	17 27.0	13 20.6	3 4.8	6 9.5	9 14.3	6 9.5	9 14.3	63

Note: The silhouettes of the E1 through E7 profiles are analogous to the profiles of standard truncation burins (T1 through T7)

side of the trigon comprising one large scar results from spalling that had no direct connection with the subsequent manufacture of the biseau and that probably preceded the production of the blank itself.

Equally opportunistic but more distinctive are unmodified edge burins spalled against a natural flank, that is, a lateral facet that runs more or less the full length of the support. Although burins on miscellaneous facets are somewhat narrower than dihedral burins (their average width is 2.9 cm versus 3.03 cm), they are still narrower (2.6 cm) and, almost by definition, more laminar and regular in outline. Relatively few pieces enter the area of intergradation between the two varieties (plate 65j). The profiles of flank burins are either transversal (plate 65a, b, g) or narrowly axial (plate 67g proximal). Some biseaux approach that of a Corbiac burin (plate 62i distal; plate 65f), but an especially thin biseau is usually avoided by opposing low-angled flanks with ventral spalling (plate 62g, plate 65c). As in the case of dihedral burins, this biseau can be polyhedral and yet so canted onto the ventral face that the original outline of the blank is modified very little (plate 65d, h, i). Contrary to burins on miscellaneous facets, among which sidedness appears at random, less than one-quarter of flank burins are left-handed, that is, possess a trigon bearing the burin scar on its left side (plate 65c, e).

Break burins

The B5 burin is no more common here than in the Raysse Perigordian assemblages (9%). It tends to be narrow (the average width is 2.6 cm). While most are quite banal, some break burins are noteworthy. These include a specimen whose break was buri-

nated on either margin (plate 64e), a particularly diminutive double (plate 64d), and a break burin associated with a Solvieux truncation whose end was obviously used after the original apex was broken off (plate 62f). Especially noteworthy is a break burin whose ventral end constitutes a kind of splintered piece, a form extremely rare at Solvieux and otherwise unknown in the Neuvic sector (plate 64c).

Truncation burins

Truncation burins fall into three fairly distinct groups: typical (58 tools), atypical (14 tools), and burins on truncation remnants (9 tools). We begin with the first, noting that typical means simply that the pieces are relatively well made (at least by the crude standards that obtain in the 2-IV industry) and at least superficially resemble standard truncation burins in the other assemblages. In fact, however, the bulk of them did not begin their careers as truncation burins at all, but were instead Solvieux truncations that were spalled like burins apparently only after having suffered damage.

Truncation burin trigons in the Beauronnian industry lend themselves to codification by our standard profile types: narrow or T1 (plate 67d), medium axial or T2 (plate 66e, f; plate 67a distal; plate 68f, g); wide axial or T3 (plate 66a; plate 67c, e, g); medium lateral or T4 (plate 66d e, h; plate 67b, f); wide lateral or T5 (plate 66b); semi-transverse or T6 (plate 68h); and transverse or T7 (plate 68d). Yet the attribute interaction between trigon profiles and support types among the typical group approximates in only very general fashion the generic pattern seen among its counterparts elsewhere at Solvieux (table 10.13). The profile distribution is also skewed, with

Table 10.13. 2-IV truncation burins (tool sample).
Cross-tabulation of Burin Profile and Support Type.

	T1	T2	T3	T4	T5	T6	T7	
G-support	4 —	4 —	11 —	10 —	6 —	1 —	1 —	37 63.8
R-support	1 —	5 —	7 —	4 —	3 —	0 —	1 —	21 36.2
	5 8.6	9 15.5	18 31.0	14 24.1	9 15.5	1 1.7	2 3.5	58

T3 trigons being essentially twice as common as usual and T5 trigons only half as common (see tables 7.11 and 9.9). As the plates show, skewness affects the individual profiles themselves, with axial trigons more often than not being asymmetric and lateral trigons more often quasi-lateral.

All this is consistent with the conclusion that, while they individually might be regarded as standard truncation burins, the members of this type in the ensemble have a close kinship with Solvieux truncations. Much additional information helps confirm this kinship. For example, the truncations of these burins are invariably on the left, tend to be highly oblique, often possess a geometry that recalls breakage patterns characteristic of STs, and are as a rule more heavily spalled than those found on standard truncation burins in the other Solvieux industries. The last feature means that their truncations often seem to be out of proportion with the burinated facet in terms of either their weight, length, or both. In addition, trigon closing angles are appreciably broader than would be expected given the obliquity of their truncations with respect to the support, even though, as we have seen, broad-angled lateral T5 specimens are underrepresented. The same is true of the ST sample itself (the bulk of which fall into the small, over 65° group of closing angles).

Also noteworthy is the relative paucity of particularly narrow T1 trigons in a group where highly oblique truncations and narrow blades are common. Presumably, T1 trigons are scarce because narrow-angled STs, due to their relative fragility, tend to break in such a way that the entire distal end of the tool is lost (see § 10.2.3). Hence, if subsequently burinated, they would unlikely assume the T1 pro-

file. Finally, the truncation itself exhibits signs of breakage and rejuvenation rarely seen among ordinary truncation burins. In some instances it is heavily undercut; in others it terminates in an abrupt angle whose shape and retouch represent the broken and reworked apex of a Solvieux truncation (plate 66e, f).

Of course, typological intuition enters into our interpretation of the genesis of typical couche 2-IV truncation burins. On the basis of an explicit formal attribute analysis, perhaps no more than one-half to two-thirds of these burins could actually be demonstrated beyond a reasonable doubt to be reworked Solvieux truncations. Yet the morphological gestalt of the ensemble is compelling. And it is reinforced statistically by the fact that the distribution of profile types among these burins differs from the distribution of profile types among truncation burins elsewhere at Solvieux along the same lines that ST profiles differ from it. Also noteworthy is that, like Solvieux truncations and unlike other truncation burin samples, these burins do not join in doubles with their own kind.

In any event, the more challenging question posed by the sample is not whether every individual typical specimen is a burinated Solvieux truncation but whether many are not actually STs that happen to have been broken in a fashion that fortuitously mimics a burin. Due either to their configuration (plate 66f), their sheer massiveness (plate 66d, plate 67c), or both, many of the burin facets in the sample are quite atypical in form. The blow that produced them might very well have been simply one more kind of shock to which they were subjected in their role as Solvieux truncations rather than intentional burin spalling. Were it not for obvious traces

of utilization along their biseau-like spalled edge, some of these pieces might not have found their way into the burin sample at all.

Thus, the issues raised by so-called typical 2-IV truncation burins are twofold. First, are most or even essentially all of them a kind of burin on an adopted edge in which the edge constitutes the truncation of a former Solvieux truncation? We believe this is very likely the case. Second, were all, or even most, of them burinated intentionally; or do they represent STs whose usage spalled a kind of facet that mimics a burin scar, the biseau of which was in turn employed in a way that created use-wear like that often found on regular burin biseaux? Resolution of this second question is presumably to be found in edge-wear studies that extend beyond the reach of morphological typology.

The vestiges of earlier burin spalling preserved on many specimens suggest that typical truncation burins often underwent considerable rejuvenation (plate 67a). Especially among narrower blanks this often carried the biseau so far across the width of the piece that ultimately only a remnant of the original truncation remained to receive it (plate 68a, b, d). The progressive burination involved is clearly witnessed in the first two illustrated examples, by vestigial scarring in one case (plate 68a) and the successful refitting of a previous spall in the other (plate 68b). Yet, while the nine tools making up this truncation remnant group are somewhat distinctive, there is little to suggest that they represent anything other than a late stage in the reduction sequence of truncation burins as they are defined above.

The 15 members of the atypical group, on the other hand, make up a heterogeneous lot that does not intergrade with the typical specimens. This, in addition to their haphazard quality, not only reinforces our interpretation of the genesis of the typical group but raises the question of whether couche 2-IV artisans ever really had the design notion of a standard truncation burin in mind. Interestingly enough, most of the atypical pieces describe a broad lateral (T5) trigon, which we have seen is as rare among supposedly typical Solvieux truncation-derived specimens as it is common in all other Solvieux truncation burin samples. Here the SRS comprises either a one-blow truncation (plate 68j) or a facet

carrying perfunctory spalling (plate 68i, k). These specimens in fact more closely approach the burins on miscellaneous facets described above than they do standard truncation burins. The remaining members of the group mostly suggest opportunistic burination of crudely spalled edges.

Burins on unretouched edges

Although clearly related to the truncation burin family, the 15 tools in this group exhibit little intergradation with the forms just mentioned. They tend to be wider than other burins (averaging 3.5 cm in width), and nearly half of them appear on flakes. Substituting for the truncation here is a line of abrupt retouch that does not appreciably alter the preexisting margin yet remains wide enough to receive the full width of the biseau (plate 62j; plate 69a, b, d, g). Admittedly, however, the biseau may be thin enough to approach, or actually constitute, a Corbiac burin on a retouched edge (plate 69c, f). Virtually all of these specimens share a family air: the trigon of a burin on a retouched edge describes a transverse profile and, as in the case of virtually all couche 2-IV burins that in some sense approximate truncation burins, is burinated on its right side. The only exception is an atypical member of a multiple piece whose SRS consists of a short segment of a margin bearing inverse retouch (plate 69e proximal).

Retouched flank burins

Despite their name, retouch plays only a minor role in the 14 retouched flank burins, at most only regularizing a flank that itself comprises the SRS. Like burins on retouched edges, quasi-truncation flank burins describe a right-handed transverse profile, but unlike them they are usually narrow (3.0 cm average width). The burin is most often produced by spalling against a steep flank whose width is great enough to accommodate the entire biseau (plate 70a, b, d). Again, where the flank happens to be low angled, a biseau of sufficient width is obtained by canting the burin removals onto the ventral face of the piece (plate 69h, plate 70c). The basic kinship of quasi-truncation and quasi-dihedral flank burins is obvious, and spalling refitting would seem to indicate that a rejuvenated flank burin might easily have belonged to both types at different stages of its career (plate 70e). A double life was also led by a

polyhedral burin struck against the flank of what was formerly a Solvieux truncation (plate 69i); it was originally a truncation burin, but the unmodified portion of the flank served as the SRS for the second burination.

10.3.4 Commentary

The typological system we have employed here to review Beauronnian burins is a pragmatic device chosen for its usefulness in exposition. Alternative systems are equally feasible, and indeed two of them were used successively in earlier phases of the analysis. One of these orders couche 2-IV burins into two principal groups—dihedrally spalled burins and burins on adopted and/or adapted edges, the latter subdividing in turn into flanks, miscellaneous facets, retouched edges, truncations derived from Solvieux truncations, and so forth. Apart from being entirely reasonable on morphological grounds, this organization checks one's natural inclination (derived from conventional systematics) to view the world of burins as comprising two great centers, dihedrals and truncations, around which nontypical forms are simply to be allocated to typological suburbs. Among other things, this system helps one to keep in mind that typical Beauronnian truncation burins are not standard truncation burins and that quasi-dihedral and quasi-truncation flank burins are morphologically much more similar to each other than either is to the burin types after which they are named.

The second alternative system recognizes three principal classes: dihedrally spalled burins, non-dihedrally spalled burins with transverse profiles, and all other burins. What it highlights is the basic pattern that, once dihedrally spalled burins are set aside, well over half of those that remain, regardless of whether their SRS is retouched or unmodified, possess a right-handed transversal profile. Although our analysis may not have stressed the point sufficiently, this profile constitutes a dominant typological theme in the 2-IV sample, and its pervasiveness can make the SRS morphology of the biseau under consideration seem a thing of secondary importance. This second system works well, however, only if one uses it while viewing the sample spread out on a laboratory table. Otherwise, the terminology and typological distinctions it calls for depart so far from convention that they tend to obscure, rather

than illuminate, the special nature of the burins involved.

10.4 Scrapers

The couche 2-IV scraper inventory is diverse but quite small, its size perhaps suggesting that the functions scrapers ordinarily performed in conventional Upper Paleolithic industries were met in the Beauronnian by some forms of Solvieux truncations, especially those bearing round apexes suggesting fronts.

Although they are made on narrow and fairly regular blades, endscrapers are few and atypical in comparison to those encountered elsewhere at Solvieux. These 28 specimens are only one-tenth as common as burins. Yet like their counterparts in other assemblages, they show a strong tendency to form composites with members of other typological groups. There are eight of these altogether: three that join endscrapers with burins (plate 62g, j, k) and five with Solvieux truncations (plate 62b, c, d). None is double.

For purposes of description it is convenient to divide this small sample into three groups, which admittedly intergrade. The first (10 specimens) comprises endscrapers bearing conventional fronts that are reasonably broad and rounded. Two on composite pieces are fairly typical (plate 62b, k), but most are maladroit (plate 71h) or minimally retouched (plate 62j, plate 71i, m), even when the blank could accommodate a relatively elevated front (plate 71d, k). The second group (also 10 specimens) consists of narrowed endscrapers on supports whose margins converge in such a fashion that the width of the front is only half that of the support (plate 71a, c, j). We have seen that this distal narrowing often characterizes relatively gracile blades in the Beauronnian industry. The third group (eight specimens) involves shouldered or cantilevered endscrapers, which represent Solvieux truncations that were broken and subsequently reworked (or reused) into a kind of endscraper (plate 71l, perhaps g). Several additional pieces might warrant being transferred to this group from the ST sample (plate 60f). Of course, these three groups are ideal categories, and some specimens could almost be assigned to any one of them. Marginal retouch of any kind is absent in the endscraper sample.

Four pieces qualify as flake scrapers (plate 72d, f). Their fronts are somewhat denticulated, and they share little commonality of form.

The 4 pieces inventoried as carinate scrapers pose a problem. Two are fairly typical (plate 72c, e), while the other two are atypical enough to be regarded as quasi-rabots (plate 72a, b). All four warrant their classification on morphological grounds when regarded in piecemeal fashion. But they are accompanied by 40 additional nuclei of similar size and shape that obviously served as bladelet cores and whose faces are not regular enough to assume the form of carinate fronts. Very possibly the four carinates could be viewed as falling within the range of variation of these bladelet cores rather than as distinct scraper forms in their own right.

10.5 Retouched bladelets

Retouched bladelets constitute the only group in the Beauronnian industry apart from Solvieux truncations and burins that is typologically distinctive and numerically important. Many of them were recovered in the laboratory from bags of debitage sorted by Linda Grimm and her associates. The sample consists of 45 specimens bearing fine inverse retouch (type 95) that share a family air suggesting a fairly standardized class. They are thin, somewhat irregular, and average 0.9 cm in width (ranging from 0.5 to 1.5 cm). They are sometimes twisted longitudinally (*torse*) and more often than not come to a natural point. Their right margin bears abrupt or semi-abrupt nibbling retouch created by *raclage* that rarely extends to the pointed end and, in any case, never shapes it. Characteristic examples are illustrated in plate 73 (a–u). Many of these delicate pieces are broken, having lost their distal end. Even at its heaviest, the retouch encroaches only moderately onto the flank of the piece (plate 73h, q, u) and obviously results from use rather than intentional shaping. Ordinarily, the left margin is unaffected or shows only irregular knicking and squilling due to use. One exception is a piece whose left flank carries a distinct notch (plate 73v). In another, the flank is partially retouched dorsally, which, in combination with the inverse retouch on its right flank, creates a bladelet with *retouche alterne* that on tech-

nical grounds might qualify it as a somewhat atypical Dufour bladelet (plate 73x). When viewed in context, however, this piece seems to be part of the range of variation of the group as a whole and is unlikely therefore to have any special industrial significance apart from them.

Because of their thinness and consequent translucence the flint type of these specimens is difficult to determine. Most of them, however, seem to be of black flint, which also prevails among the 40-odd bladelet nuclei mentioned above (§ 10.4). Two of these nuclei are of caramel flint, which also recurs among the retouched bladelets. None of the bladelets have been refitted to any of these nuclei, which may not be surprising since the latter appear to have been discarded in a condition of exhaustion.

One additional specimen (plate 73y) bearing heavy dorsal nibbling qualifies as a bladelet with fine direct retouch (type 94). A handful of bladelets exhibits miscellaneous signs of use that is not extensive or regular enough to warrant inventorying them in a regular type-list category (plate 73z). No piece in this sample remotely approaches the morphology of a backed bladelet.

10.6 Other typological groups

Perforators

If Solvieux truncations in their pristine form can be considered a kind of bec, then the 2-IV industry has an extremely rich component of special perforators. But pieces meeting the criteria of standard perforators are few indeed. They comprise a corner (plate 70h) and a pointed thorn (plate 70i), two pointed becs (plate 70j), and one robust end bec (plate 70g). Percoirs are absent altogether.

Standard truncations

Noted on the count sheets are nine truncations that do not obviously exhibit any of the special attributes of Solvieux truncations. Most of them are atypical or broken, and it is quite possible that some fall within the ST range of variation (plate 61n, l; plate 62h distal). Others may represent the miscellaneous and diverse truncated forms that appear in small numbers in all Upper Paleolithic assemblages. The

latter include two medial oblique forms (plate 61j, m) and an inversely spalled traverse truncation (plate 61k).

Marginally retouched pieces

Lacking conventional marginal retouch, the Beauronnian industry lacks marginally retouched pieces in the ordinary sense. Four pieces do qualify for this class on technical grounds. The left margin of the only complete specimen bears use-wear, its right a particularly heavy form of the abrupt marginal retouch that very occasionally appears on burins and scrapers (plate 72g). The rest consist of major distal portions bearing an abruptly retouched edge (plate 72h).

Ad hoc and diverse pieces

A score or more sizable fragments of pieces recovered with the 2-IV assemblage bear heavy and/or denticulate retouch on their margins, but on close inspection most reveal themselves to be broken fragments of Solvieux truncations. Convincing specimens are restricted to one notched piece (plate 72j) and possibly a denticulate fragment (plate 72i). Thus, despite its apparent crudity, the Beauronnian seems to lack a significant component of ad hoc tools.

A truncation superimposed upon what qualifies as a splintered piece (*pièce esquillée*) (plate 72k) is assigned to the diverse category. Such pieces are extremely rare in the Neuvic sector.

10.7 Summary of the couche 2-IV industry

Technically and typologically the Beauronnian qualifies as an Upper Paleolithic industry, but it is unlike any other. It is characterized by an unusual and seemingly primitive method of blade production and by a quite special typological inventory that resists ordering in conventional Bordesian typelists. Tool design seems highly atypical at first glance, but it in fact involves flexible styles of execution that opportunistically take advantage of the geometric and mechanical contingencies dictated by supports selected with some care. The members of some tool groups also have undergone profound changes in form during their use-lives as a result of reduction sequences that equal in intensity those

seen in the Mousterian. A large tool collection, comparable to the nearly 600 pieces that make up the 2-IV sample, is probably called for if one is to recognize the Beauronnian's quite special typology and work out its underlying dynamics.

The industry is carried on supports of fresh black and brown flint that are usually blades which are characteristically irregular in outline, thick in vertical section, and bear much cortex. Despite their apparent crudity, they have been chosen within narrow ranges of tolerance, obviously with an eye towards their effect upon tool design and breakage patterns. Marginal retouch among supports is restricted to an occasional edge bearing abrupt, crude, and sometimes denticulated spalling.

Forty-five percent of the industry consists of Solvieux truncations, a highly diverse family of steeply truncated pieces that began their careers as pointed forms whose variations in outline profile depend narrowly on the geometry of the support. During their use-life, they were radically altered by breakage and rejuvenation into end-products that range from atypical becs through heavily undercut truncations to shouldered endscrapers and, in significant numbers, burins.

Burins, which account for 39% of the industry, are also crude and heavily reworked. Fifteen percent of them consist of more or less typical dihedral forms. Most, however, are atypical by conventional standards and represent a seemingly more opportunistic approach to burin design and manufacture. Forty-four percent of the sample consists of truncation burins derived from Solvieux truncations that became burinated only late in their careers. Most of the remainder are quasi-transversal burins spalled on various kinds of edges that may or may not be slightly regularized by retouch but that blur the conventional distinction between dihedral and truncation burins.

A third distinctive typological element, retouched bladelets, accounts for 8% of the assemblage. These are curved, are naturally pointed, and carry inverse use-nibbled retouch on their right margin. None looks like a backed bladelet, and only one bears a retouched margin opposing the inversely nibbled one in the manner of a Dufour bladelet. The more than 40 exhausted bladelet nuclei attest to the importance of these forms in the Beauronnian.

The rest of the industry is nondescript and numerically poor. Endscrapers are only one-tenth as common as burins. Most are maladroit, and many are Solvieux truncations whose broken end has been reworked into a beveled front. A handful of unstandardized flake and carinate scrapers appears, although only two of the latter are reasonably typical, and all of them otherwise resemble the exhausted bladelet nuclei. Perforators, standard truncations,

and marginally retouched pieces are modest in numbers and quality. Fragments bearing heavy and/or denticulated retouch are numerous, but they seem to derive from broken Solvieux truncations and consequently are not included in the tool count. Real ad hoc tools are virtually absent despite the crudity of the industry. The diverse category is limited to a splintered piece.

11

Interpretation

Solvieux and the Archaeological Sequence

This chapter continues our involvement with questions of systematics, but now the scale of the investigation shifts from the level of ordering artifacts to that of ordering assemblages. Our immediate goal is to examine the placement of Solvieux's Magdalenian, Raysse Perigordian, and Beauromnian industries in the archaeological sequence of the Greater Perigord. Apart from being necessary and important in its own right, this exercise sets the stage for researchers who will use the Solvieux samples as type-assemblages (*séries de référence*) in future research. But it will necessarily involve us in the pursuit of a larger goal, that of examining the industrial variability, or *structuration*, of the traditions that make up that sequence. None of the complex issues of Upper Palolithic systematics will be resolved, but at least some will be reformulated, taking on sharper definition when viewed in the light of the Solvieux assemblages and what our analyses show about the factors at work in their industrial variation. Solutions often begin with redefining the terms in which questions are asked rather than with simply collecting more data in an old framework.

The backdrop to our discussion is provided by figure 11.1, which summarizes the chronostratigraphy of the Upper Palolithic sequence of the Perigord. The figure draws on a variety of sources and attempts a consensus, to the extent this is possible. The radiocarbon chronology has been stretched

backward in its earlier portion to bring it more in line with results obtained from accelerator radiocarbon dating (e.g., Mellars and Bricker 1986; Bricker and Mellars 1987). The rhythm of environmental change involved in Recent Wurm times is suggested by the figure's shaded phases, which represent the milder climatic oscillations recognized by palynologists for France as a whole. At these times the Perigord was often a parkland of temperate forest and fens, while during the much more rigorous periods that intervened it was dominated by cold meadowland and even steppe conditions. The significance of these phases and their correlation with one another and with the results of radiocarbon dating, paleontology, and sedimentology are the subject of debate and investigation. Although obsolescent in some respects, the key source in English for the Perigord succession remains Laville, Rigaud, and Sackett 1980.

11.1 Couche 3-A: the Early Magdalenian or Badegoulian

The discussion begins with a review of Magdalenian systematics in general and is followed by a more detailed examination of the structuration of the Early Magdalenian, or Badegoulian, in the Greater Perigord. We then examine the specific placement in this regional scheme of Solvieux's couche 3-A and

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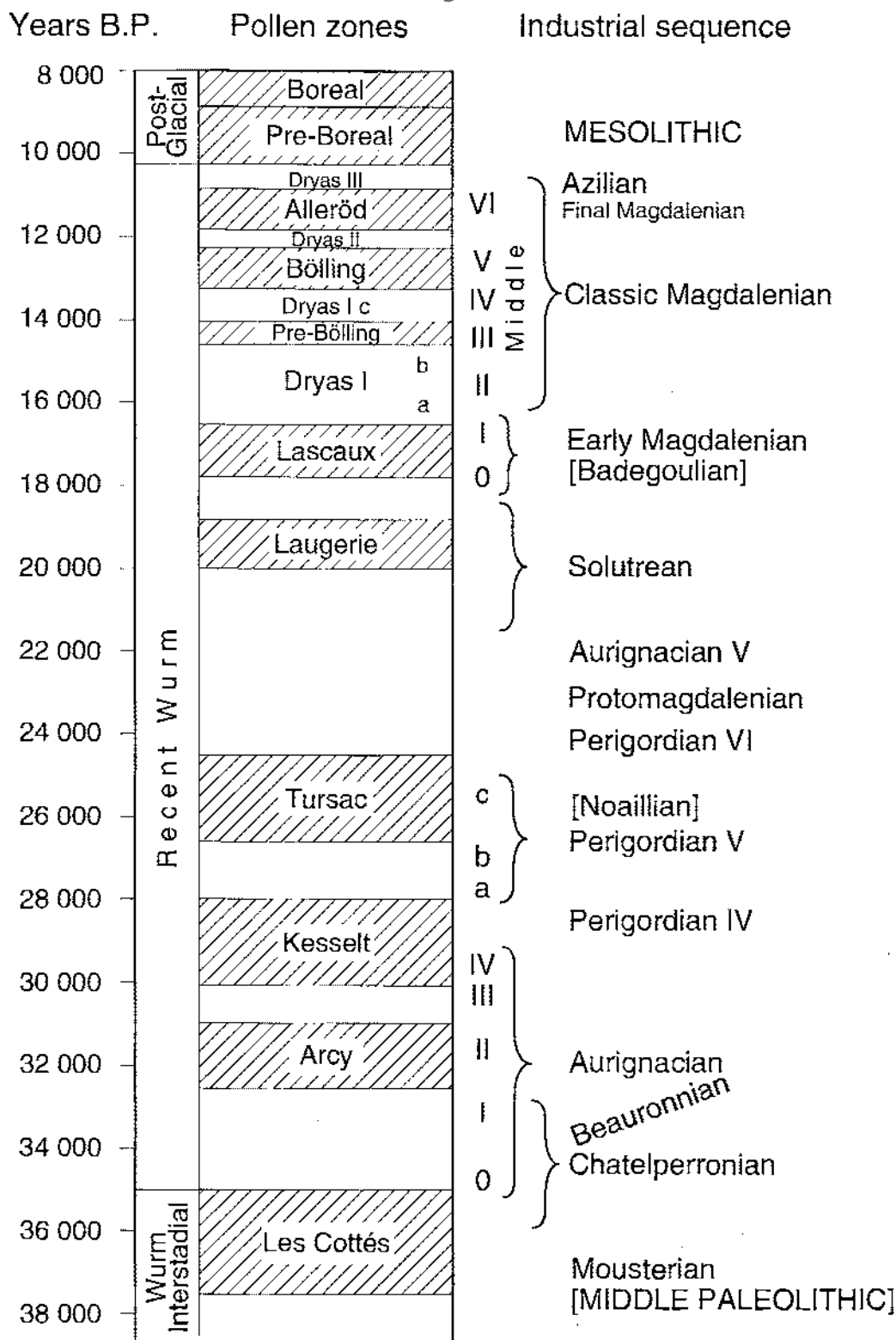


Figure 11.1. Chronostratigraphy of the Upper Paleolithic of the Perigord. The shaded pollen phases represent milder climatic oscillations; the unshaded phases, more rigorous ones.

other related industries from the Neuvic sector. A final section deals with the use and abuse of backed bladelets in early Magdalenian industrial systematics. Readers will not have completed the review, however, until they have gone over the closing discussion in § 11.2.2, which deals with the transition from Early to Middle Magdalenian. It is placed at the end of the next section because it in part hinges upon issues of Middle Magdalenian systematics and industrial variation that arise from our investigation of Solvieux's couches I and II.

11.1.1 Magdalenian systematics

The Magdalenian industrial tradition spans the last nine millennia of Upper Paleolithic times in the Perigord. Its current systematics still reflects much of the classic scheme of Henri Breuil (1913), who subdivided the tradition into six successive stages distinguished primarily by diagnostic bone and antler *fossiles directeurs*. Breuil's system never really proved satisfactory, because, among other things, it is inapplicable to the numerous Magdalenian sites (including most in the open air) whose artifacts made from organic materials are poorly preserved or absent altogether. The empirical grounding of the scheme was enhanced considerably by the greatest of the Perigord's traditional prehistorians, Denis Peyrony, who concerned himself as much with stone tools as with the bone and antler diagnostics. His results, augmented by subsequent excavation and amended by modern taxonomy (de Sonneville-Bordes 1960), have led to two unsettling conclusions. First, Magdalenian stone tools fail to display enough chronological change in their own right to satisfy the needs of refined lithic industrial systematics. Second, they do not evolve in a fashion that equates directly with the classic succession of bone and antler diagnostics; indeed, in the eyes of some researchers, stone tools may even cast doubt on the view that the Magdalenian constitutes a single, unitary industrial tradition.

For these reasons a certain amount of flexibility must be allowed in the structure and terminology of Magdalenian systematics. At least in the archaeological heartland of France, stretching from the Loire to the Garonne, it can be organized as follows. Where emphasis falls upon the bone and antler tools, the six stages of the Breuil-Peyrony scheme

can still be ordered into the scheme's original broad Lower and Upper divisions. The Lower Magdalenian stages (I–III) are characterized by specific forms of pointed sagaies and certain decorative elements, while in the Upper Magdalenian stages (IV–VI) progressively more elaborate forms of harpoons appear.

But where emphasis falls upon the lithic industries, the Breuil-Peyrony stages are grouped in quite different fashion into two successive industrial blocks. The earlier of these blocks comprises industries attributable to Magdalenian stage I, along with some that are still earlier and that (at least in the Greater Perigord) are consequently assigned to the Magdalenian 0 (zero) stage. Magdalenian I, of which Solvieux's couche 3-A is a prime example, consists of fairly laminar industries whose most characteristic form is the raclette. The Magdalenian 0, on the other hand, is dominated by crude flake tools and may lack raclettes altogether. So far in this monograph it has proven convenient to refer to this block of industries as the Early Magdalenian. However, prehistorians who wish to emphasize its distinctiveness from the 'classic' Magdalenian that follows refer to it by an alternative name, the Badergoulian. This term seems to be winning out in the literature, more perhaps for the clarity and bite it brings to exposition than for its implication of industrial autonomy. We consequently adopt it for this discussion, even though we ultimately argue the brief for continuity between the Early and Middle Magdalenian.

The second and later industrial block may be termed the Middle Magdalenian. It is characterized by a reasonably well-made and laminar banal toolkit accompanied by an important microlithic component dominated by backed blades. Its interassemblage variability is great but *polymorphique*—the label used by French prehistorians for industrial variation that in general seems to resist refined taxonomic organization and in particular has no apparent chronological significance (which to many researchers means the same thing [Sackett 1991]). One possible exception to this rule are industries whose microlithic component includes a significant number of geometric microliths in the form of triangles, which traditionally, if not necessarily correctly, have been assigned to Magdalenian stage II. Exceptions of potentially greater significance are

industries enriched by parrot-beaked truncation burins and certain *fossile* stone points (such as Azilian and Laugerie-Basse points) considered diagnostic of the end of the Magdalenian development (stage VI). Convenience and convention dictate that this typologically enhanced industry be designated Final Magdalenian, even though the stone points at least sometimes appear much earlier in small numbers and this industry's basic typological structure in any case remains that of the Middle Magdalenian.

A reasonably solid picture of Magdalenian chronostratigraphy in the Perigord is beginning to emerge (figure 11.1). Magdalenian 0 (or earlier Badegoulian) dates to the latter half of a rigorous climatic phase following the mild Laugerie oscillation, when the region was a cold and dry meadowland with areas of steppe vegetation that saw the appearance of the Saiga antelope. Magdalenian I (or later Badegoulian) falls in the Lascaux climatic oscillation, which represents milder and more humid conditions during which the region became a mixture of parkland and forest. The Middle, or classic, Magdalenian industry appears with the Dryas I phase, which saw the return of cold and fairly steppic conditions interrupted only briefly by the mild Pre-Bölling oscillation. Magdalenian stages II and III fall within Dryas I itself, being replaced around the beginning of the Bölling oscillation by stage IV, which introduces Upper Magdalenian bone and antler assemblages characterized by harpoons. Bölling and Alleröd represent an increasingly temperate regime (broken only very briefly by the rigorous Dryas II phase), near the end of which the great Pleistocene fauna disappear and the Perigord becomes occupied by extensive stands of temperate forest. Final Magdalenian (stage VI) industries seem to be present by the beginning of the Alleröd, before whose end the Magdalenian is replaced by the epipaleolithic Azilian tradition.

11.1.2 The Badegoulian of the Perigord

That Badegoulian industries lend themselves to chronological ordering along an industrial continuum and their systematics perhaps best takes the form of a seriation has been shown by researchers like Trotignon (1984:9) and, with somewhat less success, by Hemingway (1980:93–113).¹ Here we propose a scheme for the Badegoulian of the Greater

Perigord that updates these previous attempts and, more importantly, reduces considerably more of its alleged polymorphism to a coherent picture (figure 11.2). It is the product of two somewhat novel principles of design. One is to ignore the behavior of backed bladelets and other microliths; they are noted, to be sure, but their potential diagnostic importance is examined only after the seriation itself has been framed (§ 11.1.4). The other principle is to lay less emphasis than is customary upon supposedly time-dependent changes in specific tool types and type frequencies. This conventional but essentially fragmented, piecemeal view is replaced with a more comprehensive one that regards the Badegoulian industrial tradition as an organic whole whose basic toolkit has undergone a fundamental transformation over time prompted by changes in the nature of its tool supports. The principles underlying this approach are, of course, grounded in the picture of the nature and dynamics of industrial variation provided by our analyses of Solvieux's Magdalenian assemblages in chapters 7 and 8.

The core of our seriation is made up of assemblages from four multilevel rock shelters that also furnish independent chronostratigraphic information in the form of radiocarbon dates, paleoclimatological data, or both. The most important of these assemblages derive from Bordes' excavations at the classic shelter of Laugerie-Haute Est near Les Eyzies (1958, 1984; de Sommeville-Bordes 1967; Laville, Rigaud, and Sackett 1980:299–313). These data are not altogether free of problems; not the least of which is that they never received detailed publication commensurate with their importance. But they remain fundamental.² The other core industries derive from three shelters excavated in recent decades immediately to the south and southeast of the Perigord in Agenais and Quercy. The shelter of Cassegros in Lot-et-Garonne has provided assemblages whose only flaw is their small size (Le Tensorer 1981:296–338). Those from the Grotte de Pégourié in the department of Lot are larger but have been too perfunctorily described and illustrated (Hemingway 1980:384–399; Séronie-Vivien et al. 1981). Finally, the rich and numerous industries from Le Cuzoul in the same department promise to be of surpassing importance to Badegoulian studies, but so far they have been summarized only in preliminary

	EARLY BADEGOULIAN	MIDDLE BADEGOULIAN	LATE BADEGOULIAN
NEUVIC SITES	Guillassou Lacaud	Le Chatenet	Solvieux 3-A Parrain Ouest La Croix de Fer
PERIGORD SHELTERS	Laugerie 18-20	Laugerie 16,14	Laugerie 12 Badegoule, etc.
GIRONDE			Birac III
AGENAIS & QUERCY	Cassegros 10 Le Cuzoul 28-22	Cassegros 9 Le Cuzoul 21-2 Pégourie 8	Cassegros 7 Maubin Pégourie 9
MIDI			Lassac, ?Riviere
CENTRE	Fritsch 6,5d,5b	Fritsch 5a	Fritsch 4,3
NORD			Les Beaugards

Figure 11.2. Chronological seriation of principal Badegoulian (Early Magdalenian) assemblages

fashion simply in terms of broad Magdalenian 0 and Magdalenian I divisions (Clottes 1983:483–484, 1985: 361–362; Clottes, Giraud, and Savelle 1986; Clottes and Giraud 1989; Lorblanchet 1989:240). Despite their limitations, these last three sites confirm and help fill out the industrial and chronostratigraphic picture furnished by Laugerie-Haute.

Table 11.1 summarizes the makeup of these core assemblages in terms of the typological indices defined in § 5.3.5. We would obviously prefer that, instead of these indices, one or more of the inventory count sheets used for the Solvieux assemblages provided the terms of comparison. The specific information on types and type frequencies needed for this is not, however, systematically reported by the conventional Bordesian format in which the core assemblages are presented in the literature. Le Cuzoul is omitted from the table because too little specific information on its industries has yet been published.

The figure 11.2 seriation is organized in terms of three successive industrial types that do not represent discrete stages but instead characterize a more or less continuously ongoing industrial evolution.

Early Badegoulian dates to the latter half of the rigorous climatic phase in which the Magdalenian first appears, and equates with its stage I. Its industry is best represented at Laugerie-Haute by a composite assemblage derived from the conjoined couches 18 and 20; it also recurs at Cassegros (couche 10) and probably in at least some of the Magdalenian 0 levels at Le Cuzoul (couches 28 through 22).

The Early Badegoulian must be summarized in detail because the industries that follow it are to a considerable extent defined and ordered in terms of how they depart from its archaic features. The Early Badegoulian presents a strong component of ad hoc tools comprising notches, denticulations, and side-scrapers—the last as a rule consisting of no more than fairly regular denticulated flakes. Numerous splintered pieces accompany this group. Endscrapers, in contrast to the rest of the assemblage, are reasonably well made and occupy true blades. Out-numbering them by only a narrow margin are burins, whose most characteristic form is reported to be a transverse burin on a notch. But this is no more than a kind of typological shorthand for denoting a

Table 11.1. Typological indices of Badegoulian (Early Magdalenian) industries

	SOLVIEUX 3-A	LE CHATENET	GULLASSOU Levels 20-18	LAUGERIE-HAUTE Level 12	CASSEGROS Level 10	Level 9	PEGOURIE Level 9	Level 8	BIRAC Level III	
IG	7.0	7.0	19.6	23.9	15.5	11.6	7.4	14.0	11.9	9.5
IB	34.2	41.9	47.6	25.3	34.3	12.2	9.5	33.7	19.0	28.1
IBd	20.9	24.9	21.0	9.5	23.6	5.2	5.8	21.5	11.7	19.2
IBt	10.3	9.6	6.3	4.4	6.4	0.6	2.2	7.6	6.7	4.8
IBtv	1.2	6.6	15.7	8.8	2.7	5.2	1.5	2.5	1.5	1.2
IBs	33.5	33.5	47.6	25.3	34.3	11.6	9.4	31.9	19.0	28.1
IBds	19.9	10.9	15.1			1.7	2.2	14.1	8.4	13.6
IBbs	1.6	14.0	5.9			3.5	3.6	7.4	3.3	5.6
IBbds	20.9	24.9	21.0	9.5	23.6	5.2	5.8	21.5	11.7	19.2
IBts	11.5	16.2	22.0	13.2	9.1	5.8	3.7	10.1	8.1	6.0
IBbds/ts	1.8	1.5	1.0	0.7	2.6	0.9	1.6	2.1	1.4	3.2
IC	2.8	-	0.6	2.6	3.4	1.7	2.9	-	2.0	3.0
IPB	3.7	3.1	11.6	8.1	12.5	14.0	10.9	11.7	13.1	2.1
IT	1.7	-	-			-	-	7.6	3.3	2.5
ILR	5.4	0.4	0.4			10.5	5.8	-	0.3	4.0
IR	33.3	29.3	12.0	0.7	15.6	5.8	15.9	7.6	24.3	36.8
IAH	6.9	7.0	1.2	21.7	9.0	30.8	21.0	20.3	13.0	12.5
IMO	3.5	-	-	-	0.5	-	17.4	3.2	14.6	0.3
	N = 2184	N = 229	N = 510	N = 272	N = 558	N = 172	N = 138	N = 163	N = 358	N = 606

Note: Typological indices are defined in figure 5.1. A dash indicates that the typological group is not represented in the assemblage; an empty space indicates no information about it is available. The indices are calculated from quantitative data provided by the following sources: Solvieux I/II (see table 7.1); Le Châtenet (Gausson and Moissat 1990); Gullassou (Gausson 1980); Laugerie-Haute (Bordes 1984); Cassegrós (Le Tensorer 1981); Pegourie (Séronie-Vivien et al 1981); and Birac III (Lenoir 1983).

burin series that, as a whole, is crude, opportunistic, and adapted to short, chunky flakes. The principle of economy involved in burinating such flakes dictates that their trigon closing angles be wide; at the same time their stocky length/width ratios render questions of orientation irrelevant. As a result, truncation burins bearing the T3, T5, and T7 profiles are all common, constituting no more than intergrading variations on one and the same typological theme. (The dynamics involved here are discussed in § 6.33 and are concretely illustrated by the truncation burin series of Solvieux's 3-A [§ 7.2.3] and 2-III [§ 9.2.1] industries.) In all of them the retouch from which the burin spall is struck frequently consists of a notch, which is often the only practicable way of preparing the equivalent of a truncation on a thick amorphous flake. Wherever the configuration of the flake allows, burin facets are multiple, and they are almost always crude. Dihedral burins also tend to be crude, wide-angled, and made on flakes; one side of their trigon as often as not consists of a broken or pre-existing edge. Perforators in the form of becs are common and often have multiple projections. A microlithic element of retouched or backed bladelets is virtually absent. Raclettes may also be absent, and where they do appear they are rare, atypical, or both.

The brief global description available for the rich Magdalenian 0 assemblages at Le Cuzoul suggests that at least some of them represent an even earlier and cruder industry that is almost totally dominated by the ad hoc tool component of splintered pieces, denticulations, and other 'anarchistically' retouched flakes. The radiocarbon dates for this group are consistent with a placement somewhat earlier than Laugerie 20 through 18 but still in the same climatic phase. No equally primitive initial Badegoulian industry seems to have been reported elsewhere in France.

The Middle Badegoulian emerges in the Lascaux climatic oscillation. It equates with the earlier Magdalenian I industries and is transitional in character. Foreshadowing the evolved Badegoulian that is to follow, burins now dominate endscrapers numerically, raclettes become reasonably typical and numerous, and stockier becs give way partly to more delicate, and often multiple, percoirs. None-

theless, the banal toolkit retains a strong archaic flavor, especially in its most important component—burins. This stage is best represented by the composite couche 16 through 14 assemblage at Laugerie-Haute Est, of which raclettes account for 25%. (Unfortunately, most of the quantitative information provided for this assemblage is too imprecise to be converted into the table 11.1 indices.) Also belonging here is the Cassegros couche 9 industry, whose more modest (16%) and still somewhat atypical raclette series is accompanied by several multiple percoirs and, surprisingly, a strong component of backed blades (17%). Finally, it would seem that most, if not all, of the Magdalenian I industries from Le Cuzoul (couches 21 through 1) belong here. Raclettes are said to be abundant, and star perforators make their appearance, but the common tool kit is archaic and its most characteristic forms are transverse burins on flakes. Although these Le Cuzoul assemblages are often rich, backed bladelets occur only very sporadically in them.

The Late Badegoulian follows in the latter part of the Lascaux oscillation and equates with the later (and considerably more numerous) industries conventionally assigned to Magdalenian I. Raclettes maintain their diagnostic importance, but the banal toolkit is transformed as blades replace flakes as tool supports. One of the consequences of the typological standardization and refinement promoted by blades is that ad hoc tools like denticulates become greatly diminished in importance. The frequencies reported for transverse burins also plummet, which is but one expression of the fact that the entire distribution of trigon profiles has shifted to a pattern more consistent with the typological dynamics fostered by laminar supports. In other words, they become more clearly differentiated, and there is an overall shift toward narrower and more axial forms. Dihedral burins now substantially outnumber truncation burins, a pattern that holds throughout the course of the subsequent Middle Magdalenian.³ Although it has always been present, marginal retouch seems to play a more noticeable role than before, perhaps because of the increased opportunity for its expression provided by the burgeoning importance of blades and the more regular edges they present. Percoirs are relatively numerous and

include multiple forms typified by the star perforator. Backed bladelets are usually reported, at least in small numbers.

Late Badegoulian is best represented in our core sample by the couche 12 assemblage at Laugerie-Haute. A very small tool collection from the higher levels at Cassegros (principally couche 7), which includes raclettes and laminar burins but lacks backed bladelets, probably belongs here. Perhaps even the uppermost of the several Magdalenian I industries at Le Cuzoul retain so many archaic features that they deserve placement only intermediate between the Middle and Upper stages. This also may be the appropriate spot for the older of the two assemblages from Pégourié. The two are said to be similar, yet in the lower one raclettes account for only 8% and diverse ad hoc tools for more than 20% of the assemblage, whereas the proportions of these two typological groups are more than reversed in the upper. Backed bladelets reportedly increase from 2.5% in the lower couche to 12% in the upper.

The Late Badegoulian is also represented by several Magdalenian I industries recovered from other classic rock shelters in the Perigord, including Raymonden-Chancelade and Jean-Blancs (de Sonneville-Bordes 1960: in passim), Abri Lachaud (Cheynier 1965), and the lower level at Badegoule itself (Cheynier 1939). These industries repeat the more or less laminar common toolkit seen in Laugerie 12 and document the considerable range of seemingly polymorphic variation seen in raclette and backed bladelet frequencies in late Badegoulian times. Otherwise, their interest is primarily historic, as they were neither excavated nor curated adequately by modern standards and consequently have limited value for detailed comparative analysis.

11.1.3 Solvieux and the Neuvic Badegoulian

Solvieux and its neighbors in the Neuvic sector constitute a sample of Badegoulian sites as rich and diverse as any known in France. Unfortunately, they lack a chronostratigraphic framework of radiocarbon dates and paleoclimatological data. Yet, thanks to their geographic proximity and consequent industrial parallelism to the sites in our core sample, all but those few with extremely small lithic assemblages can be comfortably fitted into the seriation.

Their general features and bibliography have already been reviewed (§§ 1.3, 1.4), and here attention falls exclusively upon their industries. The taxonomy of those apart from Solvieux couche 3-A is discussed in various publications by Gausсен, to whose views no important contradictions are offered by what follows.

Early Badegoulian is represented by the pavage and two seemingly ancillary work areas at Guilla-sou (§ 1.3.1) (table 11.1), and by the elemental site of Lacaud (§ 1.3.5). Both industries are dominated by altogether characteristic series of archaic burins on flakes, of which Gausсен's descriptions are among the best in the literature. As elsewhere in this otherwise archaic stage, endscrapers are well made and laminar. Perforators are represented by becs, which are numerous and occasionally multiple; at Lacaud, presumably reflecting the specialized function of the site, they account for 38% of the assemblage and assume stocky carinate forms (that have counterparts in Cassegros 10). Lacaud has no raclettes, while at Guilla-sou they are rare and mostly atypical. Neither site possesses anything resembling a backed bladelet. (In fact, no significant microlithic element is to be found anywhere in the Neuvic Badegoulian apart from Solvieux 3-A.) Ad hoc tools like notches, denticulations, and sidescrapers are present, if not abundant, while splintered pieces are virtually nonexistent.

The Middle Badegoulian appears at Le Chatenet (§ 1.3.5). It is dominated by a flaky burin series, and archaic traits appear elsewhere in the assemblage. Perforators, however, although rare, now include fairly delicate percoirs. And, most significantly, altogether typical raclettes make up nearly 30% of the assemblage (table 11.1).

Couche 3-A at Solvieux is obviously a Late Badegoulian industry. Typical raclettes account for nearly a third of the assemblage. The banal toolkit is very laminar, is relatively well made, and bears a significant amount of marginal retouch. None of the archaic features that typify earlier Badegoulian stages play more than a negligible role. Burins are as common as raclettes and dominate endscrapers by a ratio of four to one, dihedrals outnumber truncation burins, and trigon profiles adapted to flakes (such as transverse burins) are rare. Percoirs and

star-shaped perforators are not uncommon, and a distinctive, if numerically modest, note is provided by microliths and pointed blades (table 11.1).

Precisely which Neuvic industries should be included along with Solvieux 3-A in the Late Badegoulian is not entirely clear, because ambiguity surrounds some candidates that are very small or seemingly too specialized. Only suggestive at best, for example, is the sample of 11 tools collected from the three *cabanes* at Le Breuil (§ 1.4.3), which includes one raclette, one unquestionable (in fact, bidirectionally retouched) backed blade, and which is otherwise laminar if typologically banal. And frankly enigmatic is the sample of 45 tools from Le Cerisier (§ 1.3.4), whose claim for our attention here rests upon one atypical sidescraper and a burin series dominated by dihedral forms; otherwise, the assemblage is remarkable for its strong component of notches and denticulated pieces, which is unique in the Neuvic sector and which perhaps has more bearing on the specialized function of this elemental site than on industrial systematics. More relevant is the assemblage of 50 tools from La Croix de Fer (§ 1.3.2), which includes 13 typical raclettes, some well-made percoirs, and a laminar burin series in which dihedrals predominate. Although attributable to the later Badegoulian, the La Croix de Fer industry stands somewhat apart because its tool supports are pseudo-Levallois forms produced by a discoidal nucleus technique. The technique apparently occurs sporadically elsewhere in the Perigord and in the neighboring Gironde (Lenoir 1988:403).

There remains one assemblage of great relevance to Solvieux 3-A. It was only recently recovered from Parrain Ouest, a locality on Plateau Parrain distinct from those where previously only Middle Magdalenian manifestations had been identified (§ 1.3.3). The Parrain Ouest assemblage is small (122 tools), but its general statistical makeup and typological aspect are very reminiscent of Solvieux 3-A. Typical raclettes account for 21% of the assemblage. The banal toolkit is quite laminar and also seems to share couche 3-A's distinctive robustness. With due regard for the effects of sampling error, the burin varieties appear in proportions and profile distributions comparable to those seen in the Solvieux 3-A series. Marginal retouch is not

uncommon, especially on endscraper supports. Of particular interest are four pointed blades that seem to approach those of 3-A even though in only one of them is the point formed by a continuation of marginal retouch. That no retouched or backed bladelets were recovered might be due either to the small size of the assemblage or to the fact that Parrain Ouest was excavated in a hurried campaign of salvage archaeology conducted in adverse weather. The industry suggests, in any event, that this plateau adjacent to Solvieux had a later Badegoulian occupation that was at least quasi-contemporary to that which produced couche 3-A. (We will see that the two neighboring terrains may later have shared closely related occupations during Middle Magdalenian times.)

The similarities Solvieux 3-A shares beyond the Neuvic sector are of a fairly general nature. Obviously, it resembles Laugerie 12 and the Magdalenian I industries recovered in former years from other rock shelters in the Perigord. But the opportunity for more precise comparisons is lacking because no significant new industries have been recovered in this region in recent decades either in shelters or the open air. The possibilities may be somewhat better in two neighboring regions we include in the Greater Perigord. Michel Lenoir's thoughtful and thorough reviews of the Magdalenian of the Gironde indicate that Badegoulian sites are plentiful to the south and west of Solvieux in the lower valleys of the Dordogne and Garonne Rivers (1983:262-310; 1988). Essentially all are in the open air, but they occupy superficial deposits disrupted by cultivation, as a consequence of which only modest demands can be made of their lithic collections. It is clear, however, that both earlier and later Badegoulian industries are represented, that they are quite polymorphic, and that some may show specific parallels to the Neuvic stations. That there may exist sites directly comparable to Solvieux 3-A is suggested by a surface collection of tools made at the open-air station of Birac III (Lenoir 1983:277-284) (table 11.1). Raclettes account for a third of its assemblage, percoirs are relatively abundant, burins significantly outnumber endscrapers, and dihedral burins dominate truncation burins. The assemblage is strongly laminar in contrast to most Badegoulian industries

in the Gironde, among the typological consequences of which is a distribution of burin profiles reminiscent of that of Solvieux 3-A. A few backed bladelets also appear.

The later Badegoulian industries from the sites in our core sample lying immediately to the south and southeast of the Perigord—Cassegras, Pégourié, and Le Cuzoul—are a varied group, none of which seem particularly reminiscent of Solvieux 3-A. Our industrial seriation assigns all of them to earlier phases. Perhaps closer in time and content is a collection of 176 tools gathered from the surface of the open air site of Maubin in Lot-et-Garonne, in which both Le Tensorer (1981:338–344) and Lenoir (1988:403) see parallels to Birac III. Raclettes are abundant (38%), burins are almost equally so and with a preponderance of dihedral forms, and diverse tools are uncommon. Yet Le Tensorer's description of the Maubin industry suggests important dissimilarities from Solvieux 3-A. Endscrapers are few and rarely laminar, for example, and one side of the trigons of dihedral burins more often involves a broken edge than a true burinated facet; no microliths seem to have been recovered. The comparison between Maubin and Solvieux 3-A is no more than suggestive.

Beyond the Greater Perigord massive open air sites exist comparable in extent to Solvieux 3-A and perhaps even larger. Geographically these sites extend from France's greatest (and depositionally most confusing) concentration of Badegoulian sites in the Bois des Beauregards in the Paris Basin (Schmider 1987) to the unhappily destroyed station of Lassac in the Midi of southeastern France, which apparently covered several hectares and incorporated cobblestone features perhaps reminiscent of those at Solvieux itself (Sacchi 1986). None, however, offer any new or enlightening industrial parallels to Solvieux 3-A, and all by way of contrast confirm its regional distinctiveness.

Now, can anything be said regarding Solvieux 3-A's taxonomic placement beyond the fact that it obviously belongs to the Late Badegoulian? Perhaps not a great deal. Because the assemblages that meet the typological requirements for membership in this phase still exhibit broad ranges in their frequencies of raclettes and many other tools, it is tempting to search for more refined patterning among them. At least as it is reported in the literature, however, their

interassemblage variability constitutes a polymorphic array in which no more specific groupings, temporal or otherwise, are apparent. Some researchers attempt to superimpose order on this apparent randomness by giving taxonomic priority to individual tool types, focusing either upon supposed temporal changes in the morphology of raclettes in and of themselves or upon interassemblage differences in the relative frequencies of backed bladelets. Why the former do not help discriminate among industries, at least once they attain Late Badegoulian status, has already been discussed (§ 7.12.1). And that the latter are of questionable value, at least given present standards of typological reporting, will be discussed shortly (§ 11.1.4).

Perhaps more significant is our impression that Solvieux 3-A is both more laminar and more elaborate typologically than most or even all of the other regional assemblages with which it can be compared. In terms of our view of typological dynamics underlying the Badegoulian development, we may be seeing at Solvieux the increased standardization and proliferation of tool forms that might logically follow broad scale adoption of laminar tool supports. The developmental tendencies at work in this case would suggest an evolved, and hence chronologically quite late, position along the industrial continuum.

But the argument is not conclusive. The seeming typological wealth of Solvieux 3-A may in part express what we have termed its generic nature, in contrast to some Late Badegoulian assemblages that may represent more restricted and functionally specific site occupations. And this wealth may be due partly to its sheer numerical size, which allows certain distinctive but relatively rare forms the opportunity to assume an apparent industrial significance that would otherwise elude them. For example, the distinctive typological themes provided by the assemblage's 33 pointed blades and 66 retouched bladelets would probably have gone unnoticed had the industry been sampled by a collection numbering only a few hundred tools. In this case each would have been represented by too few specimens to establish the presence of a distinct group, and their contribution to our impression of enhanced typological proliferation would be lost. It takes a fairly numerous family to produce a family air.

11.1.4 Backed bladelets

A word is in order regarding our doubt about the diagnostic value of backed bladelets in Badegoulian systematics. We believe they have limited value as time indicators because they fail to behave consistently with respect to those basic and numerically more substantial components of the Badegoulian industry which do show linked temporal trends and upon which, consequently, our seriation is grounded. To be sure, backed bladelets are seemingly absent in the Early Badegoulian and are perhaps more likely to appear in the Late phase than in the Middle phase; yet the latter trend is not consistent, as they can be rare or absent altogether in Late industries (for example, Solvieux 3-A and Laugerie-Haute 12) and numerous in Middle industries (for example, Cassegros 9). There are also suggestions of a geographic pattern whereby backed bladelets are lacking in the Centre of France, are of sporadic occurrence in the Greater Perigord, and are fairly abundant in the Sud-Est. The possibility casts further doubt upon their value as general chronological indicators.

In any event, the rationale for using bladelets in seriation rests neither upon the evidence of Badegoulian industries themselves nor upon chronostratigraphic considerations. Instead it is based upon the assumption of continuity between the Badegoulian and the classic Middle Magdalenian that follows it, and upon a corollary assumption that backed bladelets found in the former must necessarily presage those of the latter. Using broader Magdalenian systematics in this way to resolve a more specific issue of Badegoulian taxonomy is, of course, a kind of question-begging.

In any case, it does not provide results that are altogether satisfactory, as is evidenced by previous seriation schemes. Backed bladelets are used in tempered fashion in Trotignon's seriation, which in most respects resembles our own in form if not in design. She simply tags on a fourth phase, *industries évoluant vers le Magdalénien vrai*, which houses assemblages that are otherwise Late Badegoulian in our terms but that happen to include a backed blade component (1984:91).

Hemingway's seriation, on the other hand, is more categorical, being emboldened by a rigidly linear conception of industrial evolution uniting the Badegoulian and Middle Magdalenian and by the

unexplained assertion that backed bladelets and raclettes are somehow 'structural' and even functional equivalents. Consequently, the taxonomic significance of the former, once it appears, is to be gained at the expense of the latter. His giving priority to backed bladelets in this manner results in major departures from both Trotignon's and our own schemes. Perhaps the most notable entails placing Cassegros 9 considerably later than Laugerie 12 as an evolved Badegoulian. Trotignon, on the other hand, mindful of the former's fairly archaic toolkit and rather sparse and partly atypical raclettes, agrees with the writer in relegating it to a *Badegoulien moyen* phase placed well before Laugerie 12.

In any case, it seems best to assume an agnostic position with respect to the potential use of backed bladelets in seriation until two more fundamental questions are answered. One concerns sampling. It is true that backed bladelets do not appear in some assemblages from Badegoulian sites where excavation was fairly extensive areally and of sufficient quality to recover representative series of equally diminutive lithics such as burin spalls. But Le Tensorer's experience at Cassegros reminds us that the industrial significance of their presence and absence need not be obvious where excavation is areally constricted—which more often happens to be the case. The entire component of 27 backed blades in Cassegros 9 was found concentrated within 1 m² (of an exposure that totaled only 17 m²). Thus, whether the couche 9 industry was found to contain none, a few, or relatively very many backed blades depended upon if and how that particular areally restrained concentration happened to be sampled during excavation (Le Tensorer 1981:324).

Of even greater importance is the basic typological question raised by Solvieux 3-A's microliths. Although the two samples do overlap, the retouched bladelets of 3-A are distinguished as a group from the backed bladelets found in Solvieux's Middle Magdalenian couches I and II in both the geometry of their cross-section and the nature of the modification that produced their 'backs' (§ 7.11.3). Moreover, despite their more than superficial similarity, the technological evidence does not force the conclusion that these earlier abruptly retouched bladelets are necessarily prototypes of the later typical backed bladelets.

At the same time, it is easy to suspect that a similar situation exists elsewhere in the Badegoulian—in short, that the so-called backed bladelet reported for its industries is not always the same tool as the one that goes by that name later on in Middle Magdalenian times. In part, the confusion between the two is fostered by conventional methodology. Indiscriminately recognizing all bladelets with retouched edges as backed bladelets is in fact promoted by the old de Sonnevile-Bordes and Perrot (1954-56) type-list that continues to dominate most research, for the simple reason that it provides no categories to receive them other than *lamelle à dos*. The solution here would be to adopt something along the lines of the distinction between *lamelles à dos abattus* (backed) and *lamelles à dos grignoté* (nibbled), which approximates the distinction we have made in describing Solvieux 3-A's microliths. In any event, the perfunctory description and illustration afforded microliths in the Badegoulian literature falls far short of making the case that typical backed blades are always or necessarily involved. More work is needed along the lines attempted here in which Badegoulian microliths are analyzed in detail and in their own right without regard to their purported industrial connection to what came later. Needless to say, a similar effort must be devoted toward investigating morphological variability within and between retouched and backed bladelets in the classic Magdalenian, whose microlithic series are themselves by no means homogeneous typologically (§ 8.8; see also Allain 1987:201; Lenoir 1987b:255).

11.2 Couches I and II: the classic Magdalenian

The assemblages yielded by couches I and II in Solvieux Sud fall into the broad, polymorphic, and somewhat ambiguous block of industries encompassed by the term Middle Magdalenian (§ 11.1.1). There would be no profit in attempting to clarify the systematics of this block akin to the manner we have done for the Badegoulian; the effort would entail a score of pages and yet say little, if anything, new. A more refined picture of the structuration of the Middle Magdalenian must wait, at least in the Perigord. What of significance can be said involves two more

delimited topics. One of course concerns the placement of the industries from Solvieux Sud within the context of the Magdalenian world of the Neuvic sector specifically and the Perigord in general. The other concerns the nature of the transition from the Badegoulian to the classic Middle Magdalenian, upon which turns the question of the integrity of the Magdalenian tradition as Breuil and Peyrony conceived it. The question was posed by our analysis of the Solvieux 3-A industry, but its answer has been deferred to this section because it calls for a knowledge of the structure and typological dynamics of industries like couches I and II.

11.2.1 Solvieux I/II and the Magdalenien Neuvicois

Couches I and II in Solvieux Sud represent a Middle Magdalenian complex seemingly ubiquitous to the Neuvic sector, an industry we find convenient to refer to as the *Magdalénien neuvicois* (§ 1.4.1). All of the sites involved, just like Solvieux Sud, have been subjected to intensive cultivation and erosion that have left little of their archaeological horizons undisturbed; most in fact are known only from surface collections. But systematic excavation has recovered assemblages comparable to those from Solvieux at both Le Mas de Sourzac (§ 1.4.1) and Plateau Parrain I (§ 1.3.3), whose differences from the couche I/II composite industry and from Gausсен's sample from Solvieux Sud are minor and, indeed, lie largely within the range of random sampling error (table 11.2). Both exhibit essentially the same proportion of nongeometric microliths as couche I/II, and in both these are again wedded to a particularly banal assemblage in which burins numerically dominate scrapers and dihedral burins heavily outnumber truncation burins. Except for a single raclette and what may be one broken triangle from Plateau Parrain I, neither these nor any of the other Magdalenien neuvicois sites in fact add anything novel to the typological inventory established at Solvieux Sud.

As Gausсен suggests (1992b), a finer grouping might be recognized within these sites on the basis of the highly distinctive Solvieux point, which at Solvieux seems to be restricted to couche II (§ 8.7). A dozen or more such points appeared at Plateau Parrain I (the exact number is obscured on the type

Table 11.2. Typological indices of comparative sample of Middle Magdalenian industries

	SOLVIEUX SUD I/II Gausсен	PLATEAU PARRAIN I 7.9	LE MAS 1 & 2 14.7	LAUGERIE-HAUTE Mag II 13.4	LAUGERIE-HAUTE Mag III 17.5	FLAGEOLET II Couche 9 8.1	ROC DE MARCAMPS 4.5	LA ROCHE DE CASTELMORON 7.1
IG	11.2	9.3						
IB	45.5	44.2	36.4	41.9	30.6	24.1	12.6	29.1
IBd	38.8	35.1	32.3	32.6	23.4	16.7	6.1	19.6
IBt	4.2	4.2	1.8	7.8	5.1	4.1	4.4	4.2
IBs	45.5	44.2	36.4	36.6	30.6	24.1	12.0	25.5
IBds	37.3	29.0	26.7	31.0			2.7	7.5
IBbs	1.5	6.1	5.6	1.6			3.4	2.7
IBds	38.8	35.1	32.3	32.6	23.4	16.7	6.1	10.1
IBs	5.1	4.4	3.2	8.5	7.1	6.1	5.2	3.7
IBds/ts	7.6	8.0	10.0	3.8	3.3	2.7	1.2	2.7
IC	3.4	3.0	5.0	1.6	1.0	5.6	3.2	1.2
IPB	3.3	1.0	5.6	0.8	7.2	3.4	0.2	2.2
IT	3.1	1.4	3.5	1.6			3.5	5.3
ILR	1.3	0.8	—	0.8			7.0	5.8
IR	—	—	0.3	—	—	2.5	—	—
IMd	14.9	23.0	15.0	19.4	26.8	19.9	58.1	8.4
ITr	—	—	0.3	—	5.2	1.0	2.4	25.3
	N = 552	N = 496	N = 341	N = 129	N = 97	N = 393	N = 657	N = 604
								N = 550

Note: Typological indices are defined in figure 5.1. ITr = *indice de triangles* (not on Solvieux type-list). A dash indicates that the typological group is not represented in the assemblage; an empty space indicates no information about it is available. The indices are calculated from quantitative data provided by the following sources: Solvieux I/II (see table 8.1); Gausсен Solvieux Sud, Plateau Parrain I, and Le Mas de Sourzac 1 & 2 (Gausсен 1980); Laugerie-Haute (Bordes 1984); Flageolet II-9 (Rigaud 1982b); Roc de Marcamps (Lenoir 1983); and La Roche de Castelmoron (Le Tensorer 1981).

count because some were inventoried as becs), which also yielded a number of large tablet flakes of sidewalk flint like those of couche II; the same industry appears nearby on the same terrain at the exposure known as Parrain II. Very possibly then Plateau Parrain and Solvieux were the scene of closely related, even contemporary, occupations during the Middle Magdalenian, just as they seem to have been earlier in Badegoulian times (§ 11.1.3). A perfectly typical Solvieux point has also come to light as an isolated find outside the hamlet of Pariot immediately to the north of Plateau Parrain and less than a kilometer from Solvieux. Two somewhat less typical points appear in the surface collection from La Caillade, a large but heavily disturbed Middle Magdalenian open air site located immediately across the river from Solvieux (commune de Sourzac). One more point is included in a similar industry found in deblais excavated from Abri Jumeau, a rock shelter neighboring the engraved cave of Gabillou two kilometers further downstream.

Regardless of whether it lends itself to finer subdivision along such lines, the Middle Magdalenian of the Neuvic sector seems to be industrially cohesive, presumably occupying a fairly restricted period of time. The total absence of supposedly late special Magdalenian forms, such as Azilian backed points and Laugerie Basse foliate points, argues for relatively early placement within the Middle Magdalenian range, as might also perhaps a relative lack of elegance in the lithic industry as a whole compared to many in the classic Magdalenian block. The virtual absence of triangles would, however, seem to exclude, again from the perspective of conventional systematics, membership in the Magdalenian II stage of the Breuil-Peyrony scheme. All this seems to point to the Magdalenian III stage as this has been defined at the regional type-site of Laugerie-Haute. Despite sketchy description and lack of a detailed inventory, the Magdalenian III type-assemblage of couche 2 recovered by Bordes in the Est portion of this site seems to provide a reasonably good fit with the Neuvic industries (table 11.2). Apparent confirmation of this placement comes from the engraved cave of Gabillou. Test excavation in an occupational deposit at its entrance has yielded a small assemblage of 55 pieces) that is rich in backed bladelets (67%) and possesses a banal toolkit reminiscent of

the Magdalenien neuvicois (Gausson 1964:62–64). Significantly, the only bone remains available from the Neuvic sector appear here, including nine sagaie points bearing longitudinal grooves—a diagnostic of the Magdalenian III artifact inventory. Consistent with this placement in Magdalenian systematics are the Saiga antelope represented both in the faunal remains and the cave's engravings, which belong to a presumably late phase of style III in Leroi-Gourhan's chronological scheme of Paleolithic art (1968).

It must be kept in mind, however, that the concept of Magdalenian III rests upon older industries recovered and curated by standards that fall well short of modern needs. And, while recent decades have seen important work at late Magdalenian sites in the Perigord (Laville, Rigaud, and Sackett 1980: 316–343), relatively little new information has come to light at those with archaeological deposits attributable to the Middle Magdalenian. Three important exceptions are summarized in table 11.2. Two of these, couche 9 from Le Flageolet II in the Black Perigord (Rigaud 1970; 1982b:402–424) and couche 2b from Roc de Marcamps in the Gironde (Lenoir 1983:356–368), are rock shelter industries assigned to Magdalenian III. These two are more or less contemporary with the stage's type-assemblage at Laugerie-Haute, and they bear a fairly close resemblance to each other. Their banal toolkits show the standard Middle Magdalenian statistical structure (although break burins seem to be inordinately popular at Le Flageolet II) and are accompanied by very strong series of backed bladelets. Both have a single specimen each of Azilian and Hamburgian points (accompanied at Flageolet II by two shouldered points), to which some triangles are added.

Triangles assume a very important role in the third industry that deserves mention, which was recovered from deblais produced by the destroyed open air site of La Roche de Castelmoron in the department of Lot (Le Tensorer 1981:356–368). Persistence of older tool types is supposedly represented here by a handful of raclettes and a couple of star perforators (assuming that these do not derive from an unrecognized earlier horizon), while none of the supposed late Magdalenian forms are present. La Roche's wealth in triangles suggests it should be assigned to the Magdalenian II stage, although solid

geochronological confirmation is lacking; it is also clear that triangles can play an important role in much later industries in the Perigord, such as Gare de Couze (Fitte and de Sonneville-Bordes 1962).

Refinement of Middle Magdalenian systematics must wait upon the recovery of many more industries such as these. But they do seem to confirm our general placement of the Neuvic assemblages and, by way of contrast, heighten our sense of their stereotypical uniformity. That backed bladelets are only half as common in the Neuvic sites as in many recently dug sites elsewhere may very well be the result of excavating clayey soils that tend either to be extremely hard or extremely muddy. (Water screening was impossible at all of them except Solvieux, and it was introduced there only after work had largely ended at locality 1.) That typically Badegoulian tools, triangles, and the late Magdalenian point forms are virtually or entirely absent cannot now be explained. Their absence may indicate that the Magdalenien neuvicois represents a fairly specialized occupation of the sector which, as we have suggested, ran its course in a relatively brief period of time.

Yet it remains surprising that no Final (stage VI) Magdalenian occupations have come to light in the Neuvic sector, given that in the shelters of the Perigord this is the most frequently represented phase of the Magdalenian, and indeed of the Upper Paleolithic as a whole. Neither the size of our sample of Neuvic sites nor its topographic disposition would seem to account for this lack. Nor do environmental factors seem to have played an obvious role, as the sector was occupied earlier when similar climates reigned. Depositional factors could, however, be relevant. For example, one might reason that Late Magdalenian horizons are absent because, being stratigraphically the most superficial of the Paleolithic series, they were the first to be destroyed by erosion and cultivation—agencies that we know have heavily damaged the Middle Magdalenian throughout the sector. But the argument can also be made that the lithic traits that supposedly signal Final Magdalenian times may in fact represent special activities rather than chronological sequencing (Rigaud 1977; Laville, Rigaud, and Sackett 1980: 340–341). In this case, instead of being temporally significant, their absence in the Neuvic group would

be one more indication of the rather special character assumed by industrial variation in the open air. It might also indicate that the Magdalenien neuvicois, while Middle Magdalenian on industrial grounds, occupies a much longer period of time than its industrial homogeneity otherwise suggests.

11.2.2 The transition from Badegoulian to classic Magdalenian

Nowhere in France is the nature of the transition from the Badegoulian to the classic Magdalenian well understood. In the Centre, for example, the long Badegoulian sequence that is particularly well defined at Abri Fritsch in the Loire Valley retains strong archaic features up to the end, even though it begins later and probably ends later than its counterpart in the Perigord (Trotignon 1984:94). Moreover a significant hiatus in the archaeological record separates it from the much more laminar and bladelet-rich Middle Magdalenian that follows. A similar situation obtains in the Paris Basin, except that here the classic Magdalenian that ultimately appears displays special regional traits not seen to the south (Schmider 1987). In the Midi of southeastern France, on the other hand, the Badegoulian assumes the form of a supposedly evolved industry in which backed bladelets enjoy considerable popularity at the expense of raclettes (Sacchi 1986). Researchers like Trotignon and Hemingway consequently regard it as being already transitional to the classic Magdalenian of the region, even though the two are by no means identical in their basic toolkits. This is presumably among the reasons why local workers prefer instead to regard it as a late Badegoulian undergoing acculturation from a Middle Magdalenian already established in the region. In passing from one region to the next we thus do not always seem to be dealing with the same Badegoulian or the same classic Magdalenian, let alone the same kind of transition (or lack thereof). And nowhere is the evidence sufficient to answer our question.

Even in the Perigord, where data are probably the most plentiful, relevant assemblages, whose industries equate with Magdalenian II and III of the Breuil-Peyrony scheme, are not particularly common, and most fall short of modern standards of quality control. It is again Laugerie-Haute Est that provides our type-industries, which overlie

Laugerie 12 in couches 1 through 8. Chronostratigraphically these belong to the phase that saw the return of cold and fairly steppic conditions following the close of the mild Lascaux oscillation. As we have seen, the Middle Magdalenian industry is fairly straightforward. Its banal toolkit is even more laminar than that of the Late Badegoulian, but the incidence of marginal retouch is reduced, star perforators are rare, and raclettes appear only sporadically. Most importantly, backed bladelets are now as important proportionately as raclettes had been before.

It is this marked, seemingly reciprocal shift in the relative frequencies of these last two tools that attracts the most attention. Even those who wish to see continuity between the Badegoulian and Middle Magdalenian are willing to admit that the transition is unlikely to have taken place as abruptly as the Laugerie-Haute evidence suggests (for example, Bordes 1984:283).⁴ The need to bridge it explains why Trotignon is moved to stress the importance of backed bladelets in later Badegoulian industries, and why Hemingway is compelled to declare the otherwise somewhat archaic Cassegros 9 industry to be late simply because backed bladelets are fairly numerous there. It also explains the interest they and other researchers show in the bladelet-rich Badegoulian of the Midi.

In our view such arguments are somewhat beside the point. We have seen that it may be misleading to draw major inferences from the behavior of backed bladelets reported in the literature, especially since it may not always be one and the same tool that is being referred to (§ 11.1.4). Moreover, it seems questionable to assume that an industrial transition that is archaeologically best documented in the Perigord is best explained in terms of assemblages borrowed from the rather sketchy industrial sequence of southeastern France. Both arguments would be premature in any case, because at least a good part of the explanation of the transition lies in the evidence we have already reviewed.

For one thing, it is noteworthy that, thanks to our knowledge of the intermediate Middle stage, no one seems to find it difficult to derive the Late Badegoulian of the Perigord from the Early—even though the raclettes whose abundance typifies the latter are at most only rare and atypical in the for-

mer. Why then cannot the regional Middle Magdalenian, represented by industries like Solvieux I and II, where diagnostic backed bladelets appear in abundance, have as easily derived from the Late Badegoulian, where they are relatively few and perhaps mostly atypical? The jump actually seems to be less in this case, since it is a matter of rapid but piecemeal shifts in the popularity of *fossiles directeurs* that seem to behave relatively independently of the rest of the industry. (Interestingly enough, the shifts are less dramatic than those shown by Gravette points and Noailles and Raysse burins in the Upper Perigordian, whose basic integrity is defended by some of the same researchers who question the unity of the Magdalenian.) A second point is that, aside from the emergence of raclettes, the transition from earlier to later Badegoulian ultimately involves a 'leptolithic' reorganization of the banal toolkit, entailing a standardization and proliferation of typological form that accompanied the replacement of cruder flake supports by more regular blades. As we have seen, this reorganization is basic and broad, ranging from a marked decrease in the incidence of ad hoc tools to a nearly complete transformation of the burin series. Furthermore, except for becoming even more laminar and refined, this toolkit is essentially the same one we see in the Middle Magdalenian.

An interesting conclusion suggests itself, therefore, if we exchange a piecemeal emphasis upon raclettes and backed blades for a more comprehensive one that stresses how an industry develops according to typological dynamics contingent upon changes in the nature of its tool supports. It is that the Middle Magdalenian of the Perigord simply constitutes a somewhat more evolved expression of the same regional industrial trends that govern the emergence of the Late Badegoulian from the Early Badegoulian.

To be sure, there are typological details to be accounted for apart from the question posed by raclettes and backed bladelets. But most of these, such as the rarity of raclettes and star perforators in Middle Magdalenian times, can probably be dismissed as 'stylistic' features that by their very (if unexplained) nature enjoyed only limited life spans. And there are others to which more importance has been attached than they deserve. For example, the

Aurignacian traits that supposedly distinguish the Badegoulian—elevated carinate and muzzled scrapers, scaled marginal retouch—have likely been overemphasized. So-called Aurignacian scrapers are common in the Badegoulian only where blocks and thick flakes are common; otherwise, as in Solvieux 3-A, they are infrequent and rarely bear lamellar retouch like that seen in the Aurignacian (Lenoir 1983:302; Hemingway 1980:110). While it is true that marginal retouch is more common in the Badegoulian than in the Middle Magdalenian, it may well be (again as at Solvieux) that it actually assumes the scaled Aurignacian form more often in the latter than in the former. (Conversely, by the way, the complementary claim that backed bladelets necessarily lend a Perigordian aspect to the Middle Magdalenian seems to ignore the fact that these same tools also abound in late Solutrean contexts [de Sonneville-Bordes 1967: ccxxix].) Other typological details at the same time point toward continuity. Chief among these is the growing numerical dominance dihedral burins show over truncation burins as we progress to later Badegoulian and then on into the Middle Magdalenian. It especially deserves mention because it must be independent of contingencies arising from the nature of tool supports and involves a matter of typological choice that seems to have particular industrial significance (§ 6.3.4).

It appears then that a strong brief could be made for continuity between the Badegoulian and Middle Magdalenian grounded largely, but by no means wholly, upon what might be termed an organic view of their industrial commonality. Yet the brief for discontinuity cannot be dismissed altogether. Although the common toolkits of the Late Badegoulian and Middle Magdalenian are indeed similar, only part of the similarity involves specific features such as the behavior of dihedral burins. A good part is generic in nature, expressing the constraints and opportunities that may come into play wherever the banal typology common to the Upper Paleolithic as a whole happens to be realized on highly laminar supports. Furthermore, while we have shown why changes in the proportions of racettes and backed blades might be regarded as ancillary to the banal toolkit, indeed of secondary importance to it, we have still not accounted for the abrupt shifts in their relative frequencies in passing from the Late Bade-

goulian to the Middle Magdalenian. In short, while the gap between these two industries may be less than that between the Late and Early Badegoulian, it has not, unlike the latter, been bridged empirically. The case for continuity will perhaps never be clinched unless and until a typologically intermediate assemblage is found in the proper chronostratigraphic context and in a region where its industrial precursors and successors can both be clearly identified. This may happen in the Perigord but it is unlikely to happen at Solvieux.

11.3 Couches 2-III, 6-M, and 4-B: the Perigordian maze

Perhaps no segment of Upper Paleolithic times has challenged or embroiled modern taxonomists more than that in which Solvieux's Rayssian industries fall. Even the name we have given them for purposes of exposition will no doubt be controversial. Our aim in what follows is to address the tangled questions of systematics that they raise without diverging too far from our primary responsibility of laying forth as solidly as possible their contributions to, and implications for, empirical research. The discussion is lengthy but in fact not long enough, for nowhere more than here has the need to be succinct forced us to be more dogmatic than the issues warrant.

11.3.1 Perigordian systematics

Thanks to the legacy of Denis Peyrony (1933), the regional expression of the pan-European Gravettian complex is known as the Perigordian. Perigordian industries are characterized by Gravette points and microgravettes, which are usually accompanied by an assortment (most of it fragmentary) of additional backed blades and bladelets. This Gravettian element is abundant in the earliest stage, Perigordian IV, dating around 28,000 BP to the mild and humid Kesselt climatic oscillation (see figure 11.1).⁵ A basically similar lithic industry recurs in the Perigordian VI, which appears by the beginning of a subsequent cold and dry stage around 24,000 BP. But a much more complex situation reigns for three or four millennia during the intervening Perigordian V, which falls in the generally temperate Tursac oscillation and the more rigorous stage that precedes it. As Peyrony defined it at the classic rock shelter

of La Ferrassie, the Perigordian V consists of an essentially Gravettian industry within which the *fossile directeur* types of tanged Font-Robert points (stage Va); truncated elements, that is, backed blades squared off at one or both ends by abrupt retouch (stage Vb); and Noailles burins (stage Vc) succeed one another over time. But today this sequence looks over simplistic. Excavation over the last several decades has revealed that these special types can appear together, at least in small numbers, in one and the same level, and that a fourth type, the Raysse burin, also plays an important role—as we know from Solvieux. Moreover, the relative frequencies not only of these *fossiles* but of the Gravettian element itself can vary greatly from one assemblage to the next.

Most researchers agree that there is at least some chronological differentiation within this Perigordian V industrial mosaic. An earlier phase, Perigordian Va+b (essentially a merger of Peyrony's original Va and Vb), adds significant numbers of Font-Robert points and, occasionally, truncated elements to a Gravette component similar to that of the preceding Perigordian IV. The later Perigordian Vc phase is considerably more complicated. Here most industries are weak in Gravettes but numerically strong in either Noailles burins or Raysse burins—the latter largely replacing the former midway through the phase. It is, of course, these Raysse burin-rich industries of later Perigordian Vc times that we find it convenient to refer to as Raysse Perigordian or, simply, Rayssian. But Gravette-rich industries are believed to continue alongside them in the region, industries now presumably incorporating modest numbers of Noailles and Raysse burins rather than the Font-Robert points and truncated elements that characterize Perigordian Va+b. So far so good. But the picture remains confusing, both because the details are far from clear and because the terrain is contested by two competing schools of thought that place altogether different constructions on the culture-historical significance of the industries dating to Perigordian Vc times.

One school, which operates largely within the conventional frame of regional systematics, has been rigorously promoted by Jean-Philippe Rigaud and aided by the chronostratigraphic conclusions of

Henri Laville (Rigaud 1982a, 1982b:389–398, 1988; Laville and Rigaud 1973; Laville, Rigaud, and Sackett 1980:283–287). It holds that, despite their diversity, all industries falling in Perigordian Vc times are simply variants of one and the same polymorphic tradition. Whether Gravettes, Noailles burins, or Raysse burins happen to predominate in a given assemblage is due to techno-economic factors: the three types of assemblage respectively associated with them are industrial variants that represent three different sets of 'functional' activities in which any Perigordian group of the time might have engaged. This tripartite model of Perigordian V times is of course reminiscent of Lewis Binford's functional model of Mousterian times, and it is worth noting that Rigaud participated in the ethnoarchaeological fieldwork that originally prompted it (Binford 1978).

The second school has been defined by two American researchers, Nicholas David and Harvey Bricker (David 1985, 1995; David and Bricker 1987). They maintain that an altogether different culture-historical picture presents itself if one regards Perigordian V times in the light of the long and rich industrial succession at the rock shelter site of Abri Pataud. In brief, assemblages characterized by Noailles and Raysse burins respectively constitute distinct earlier and later stages of a separate Noaillian culture. This culture's extremely weak Gravettian element (among other things) indicates its distinctiveness both from the Perigordian IV and VI industries that bracket it in time as well as from contemporary Perigordian Vc assemblages that (like those of the earlier Perigordian Va+b) possess a substantial Gravettian element. That the latter contain small quantities of the Noailles and Raysse burins, just as Noaillian assemblages contain small quantities of Gravette points and micropoints, results from diffusion or acculturation between Perigordian groups, who are native to the region, and the Noaillians, who intruded into it from their homeland in Provence. According to this model then, significant differences in techno-economic practices need not have been involved. The differences among Perigordian Vc assemblages are essentially stylistic rather than functional: they are a matter of ethnicity and, within the Noaillian, of timing.

Although the arguments of both schools are logically coherent, neither is logically airtight nor are the two mutually exclusive. It is not unreasonable for Rigaud to argue that techno-economic factors may largely account for differences among assemblages regarded as being synchronous in time. Yet it remains true that similar functional reasons might equally well explain differences among industries that are temporally staged: diachronic industrial variation is no less amenable to functional explanation than is synchronic variation. On the other hand, even if the Pataud researchers demonstrated the industrial and chronological integrity of their Noaillian taxa beyond a doubt, it still would not follow that these must necessarily represent a culture distinct from the one responsible for those industries they relegate to the Perigordian. In short, the arguments put forth by both sides of the debate oversimplify and polarize the issues, and in doing so unreasonably limit the options open for discussion. One could, for example, embrace the frame and terms in which the Abri Pataud systematics partitions Perigordian V industrial variation and still reject the theory of the Noaillian itself. Or, one could adopt Rigaud's organization of these data and still harbor doubts that 'Perigordian' is anything more than a label for a highly polymorphous block of industrial variation whose culture-historical or ethnic significance remains obscure.

We will return to the debate at the end of this discussion (§ 11.3.5), but it is not our purpose to resolve it. Consideration of just the theoretical issues involved could expand into something in the nature of a treatise (Sackett 1990). Instead we intend to pursue the more prosaic journeyman task of examining in the light of Solvieux the nature of variation in Rayssian industries and, in turn, of providing a more solidly based definition than now exists of what can be termed the Rayssian taxon. But it was necessary to understand the terms of the debate first because they form the backdrop of our task. It is the protagonists in the debate who have been primarily responsible for describing the two key industries—those of Abri Pataud and Flageolet I—which, together with the Solvieux assemblages, make up our comparative body of data. And their disparate views have not failed to color the manner in which these data have been presented.

11.3.2 Comparative sample: Pataud, Flageolet I, and other sites

David's (1985) thorough review shows that Rayssian (in his terms Late Noaillian) sites are fewer in number and geographically far more restricted than those with industries referable to the earlier Noailles burin horizon (Early Noaillian). Most lie within a day or two's walk of Solvieux. The Rayssian industry has appeared to the southeast of the Neuvic sector in a half-dozen rock shelter sites in the Black Perigord, including the Abri Pataud and Flageolet I. A comparable number are known to the northeast near Brive, in the department of the Corrèze, including Abri du Raysse and Bassaler-Nord. The industry is known from a couple of open air sites, including Les Jambes, upstream from Solvieux at the provincial capital of Périgueux. Interestingly enough, the Gironde, which abounds in Magdalenian remains comparable to those of the Neuvic sector, has little Rayssian to offer (but see Lenoir 1983:228–232). Only the sites mentioned above by name have provided assemblages of sufficient integrity for purposes of comparison. Ambiguity clouds the rest, most of which, by modern standards, were poorly dug and poorly described.

Core to our frame of reference are two sites, Pataud and Flageolet I. Unlike the rest, their Rayssian assemblages are numerically large and were recovered by modern excavation within archaeologically rich blocks of stratigraphy referable to Perigordian times. In addition, these assemblages have been described in detail and with an eye toward the controverted questions of systematics surrounding Perigordian times. At this point our concern focuses simply upon their respective stratigraphies and industrial sequences.

The Abri Pataud, a large rock shelter on the Vézère River at Les Eyzies, was excavated between 1958 and 1964 under the direction of Hallam L. Movius, Jr. (1874, 1977; Bricker 1995). Table 11.3 summarizes the industries from the block of stratigraphy dating to Perigordian times, which is sandwiched between major Aurignacian and Protomagdalenian deposits. Level 5 is a composite of several archaeological lenses that in the ensemble provide the only substantial sample of the Perigordian IV industry recovered by modern excavation. Its makeup is fairly banal except for a very rich component

Table 11.3. Abri Pataud typological indices: Perigordian and Noaillian levels

	PERIGORDIAN IV	N O A I L L I A N [PERIGORDIAN Vc]			PERIGORDIAN VI
	Level 5	4: Lower	4: Middle	4: Upper	Level 3
IG	19.3	9.0	13.6	8.7	13.8
IB	21.0	65.0	59.2	55.7	31.4
IBd	12.0	16.4	18.6	12.4	7.3
IBt	4.8	46.0	30.9	27.6	18.5
IBn	0.0	37.7	9.1	2.4	0.2
IBr	0.0	0.1 (13.7)	8.2 (20.7)	12.5	0.0
IBs	20.8	27.1	39.0	38.3	31.2
IBdbbs	12.0	16.4	18.6	12.4	7.3
IBts	7.9	9.5 (15.4)	20.8 (16.4)	24.6	19.9
IBdbbs/ts	1.5	1.7 (1.2)	0.9 (0.8)	0.5	0.4
IC	1.7	1.6	1.1	2.9	2.4
IPB	3.0	1.2	1.2	1.9	1.8
IT	4.2	3.4	3.7	4.0	4.9
ILR	5.7	8.1	10.8	19.7	2.4
IPg	28.8	2.3	0.5	0.5	24.2
IPd	29.3	2.3	0.5	0.5	26.1
	N = 5640	N = 2307	N = 1193	N = 1718	N = 1309

Note: Typological indices are defined in figure 5.1. Indices indicated within parentheses are adjusted indices that result when several pieces are transferred from the standard burin class to the Raysse burin class, for reasons discussed in the text.

of Gravette and microgravette points. A similar industry almost equally strong in Gravettes recurs in level 3, which is assigned to Perigordian VI. In sharp contrast to both are the industries of intervening level 4, whose Gravettian component is numerically very weak and whose burin series are dominated by Noailles and Raysse burins—forms virtually absent in levels 3 and 5. It is these horizons, conventionally ascribed to the Perigordian Vc stage, that the Pataud researchers consign to the separate Noaillian tradition. Early Noaillian is represented by level 4: lower, where Noailles burins dominate. Late Noaillian is represented by level 4: upper where Raysse burins predominate. The tran-

sition between them comes rather abruptly within level 4: middle, whose global industry consequently represents a mixture of the two.

Flageolet I, some 10 km to the south, is the immediate neighbor of Flageolet II discussed in the preceding section (§ 11.2.1). It was excavated by Rigaud for over a decade beginning in the late 1960s (Rigaud 1969, 1982b). An important Aurignacian deposit underlies its Perigordian block of stratigraphy. Except for lacking an archaeological horizon attributable to Perigordian IV, this block covers the same archaeological span as the Pataud stratigraphy. But it involves a somewhat different succession of industries, as summarized in table 11.4. Levels 7

Table 11.4. Le Flageolet I typological indices: Perigordian V and VI levels

	PERIGORDIAN V Levels 7/6	PERIGORDIAN Vc Level 5	PERIGORDIAN Vc Level 4	PERIGORDIAN VI Levels 1-2-3
IG	18.9	8.1	8.6	11.5
IB	16.3	54.6	53.5	31.6
IBd	8.4	20.8	20.1	13.8
IBt	6.6	30.4	32.8	16.1
IBn	1.3	2.8	0.6	0.6
IBr	0.2	6.5 (14.8)	3.4 (17.2)	0.6
IBs	13.9	42.5	47.1	29.3
IBdbs	8.4	20.8	20.1	13.8
IBts	5.5	21.7 (13.4)	27.0 (12.6)	15.5
IBdbs/ts	1.5	1.0 (1.6)	0.7 (1.6)	0.9
IC	1.8	1.8	2.9	0.6
IPB	0.9	0.4	1.1	0.6
IT	5.4	6.1	5.2	9.8
ILR	7.1	9.1	12.6	14.4
IPg	16.0	2.4	3.5	5.2
IPd	29.9	9.9	6.9	15.5
	N = 1533	N = 619	N = 506	N = 174

Note: Typological indices are defined in figure 5.1. Indices indicated within parentheses are adjusted indices that result when several pieces are transferred from the standard burin class to the Raysse burin class, for reasons discussed in the text.

and 6 are contiguous couches whose assemblages are similar enough to be tabled as a single composite sample. They resemble the level 5 Perigordian IV industry at Pataud in most respects except for their minor admixtures of Font-Robert points (eight and three in levels 7 and 6, respectively) and truncated elements (seven and twenty-seven, respectively), which presumably date them later in time. In fact, the two levels also contain 10 Noailles burins each, and three Raysse burins appear in level 6. In Rigaud's view, level 7/6 represents the Gravette-rich variant of the functionally tripartite Perigordian Vc industry. To the Pataud researchers it would represent the continuing, if diminished, presence of Perigordian culture at a time when Noaillians dominated the region. The Noailles burin variant, that is, Rigaud's counterpart of the Early Noaillian of level 4: lower and lower level 4: middle at Pataud, does

not appear at Flageolet I. Instead, the next two levels in the sequence, 5 and 4, represent the Raysse burin variant of Perigordian Vc. They then equate with the Late Noaillian of Pataud 4: upper, or what at Solvieux is termed for convenience the Rayssian. Capping the stratigraphy at Flageolet I is the depositional ensemble made up of levels 1-2-3. Its global sample is unfortunately small (174 pieces), but its stratigraphic position, strong Gravettian element, and general lack of Noaillian features (excepting a single Noailles burin) justifies its being equated with level 3 at Pataud and designated a Perigordian VI industry.

How Abri Pataud and Flageolet I align chronostratigraphically is, like so much else, a subject of controversy. The correlation designed by Laville on the basis of rock shelter sedimentology places the two stratigraphies out of synchrony to an extent

that renders the Noaillian model untenable (1975: 228–229; Laville, Rigaud, and Sackett 1980: 378–379). The Pataud researchers, on the other hand, adopt the correlation of their sedimentologist, William Farrand, who aligns the Pataud and Flageolet I stratigraphies in a manner that makes them essentially congruent archaeologically (Farrand 1988, 1995; David and Bricker 1987:242–244). Solvieux, of course, casts no new light on the question. And current thinking in any event holds that detailed intersite sedimentological correlations are less reliable than was commonly believed a decade or so ago, due both to internal contradictions within the sedimentological evidence and to its apparent contradictions with other lines of chronostratigraphic evidence such as paleontology (for example, see Delpech 1993). Therefore, it would seem best to proceed on the working hypotheses of conventional archaeological systematics: in the absence of solid evidence to the contrary, industries that are more or less similar should be more or less synchronous in time. Needless to say, this does not require that all synchronous industries be similar themselves.

11.3.3 Comparative industrial analysis

We now turn to the core of our discussion, a detailed comparison of Solvieux's assemblages with those of other Rayssian industries in the Perigord. Key among the latter are the assemblages from Abri Pataud and Flageolet I, which the writer essentially knows only from written accounts.⁶ Nevertheless, the discussion should have particular value in that these assemblages have never been compared in detail with one another, let alone with the Solvieux assemblages. Their descriptions are not easily brought into line, partly because they were written by two of the main protagonists of the debate and partly because neither of these individuals at the time he wrote had detailed knowledge of the other's results. What follows therefore involves synthesis and interpretation rather than simply collation.

Abri Pataud

David's (1985, 1995) description of the Noaillian at Abri Pataud is one of the most thoroughgoing treatments of industrial variation in the Upper Paleolithic literature. A sound knowledge of it in his terms calls as much for an understanding of its attributal, or

subtypological, configuration as its makeup in more conventional typological terms. The methodological point is, of course, well taken (§ 5.6). Our two approaches were designed independently and in different fashions, however. His particular mix of attributes is quite unlike our own, and his system codifies areas of artifactual variation that are either different from those that preoccupy us or operate at a level of detail beyond which we have been able to work comfortably at Solvieux. For these reasons, what follows must be presented in our terms even though this means slighting several points that the Pataud researchers regard as important.

The type-assemblage for Pataud's Rayssian industry is the 1718-piece sample provided by level 4: upper. (The assemblage from the upper half of level 4: middle appears to be very similar, but it is ignored here because its tools are mixed together with those of the lower half in much of David's description.) The typological indices show the Rayssian industries at Pataud and Solvieux to be close in their overall quantitative structure (table 11.5), with Pataud more often than not falling within the range of variation described by the Solvieux assemblages. This basic similarity extends into areas of typological variation overlooked by the table 11.5 indices, such as the frequency at both sites of denticulated and notched pieces and the absence of Font-Robert points and truncated elements (with one exception in couche 2-III) (§ 9.2.10).

Pataud 4: upper is characterized by gracile blades, its laminar index being at least as high as that of the couche 6-M industry but involving supports that are thinner in section and apparently more regular in outline. As in 6-M, miscellaneous scrapers, which we have seen tend to be adapted to nonlaminar blanks, are absent altogether. Although not directly translatable into our Burin Profile set, David's attributal description indicates that standard burins are dominated by narrow closing angles and axially oriented biseaux. Pataud's contrast is therefore particularly great and fundamental to Solvieux 2-III, whose robust supports promote a substantial number of flake scrapers and where broad, lateral profiles (including transverse forms) are the norm among burins. Gracility appears to have been accompanied by higher craft standards at Pataud, whose artisans also seem to have been more often

Table 11.5. Comparison of Rayssian industries: Abri Pataud, Solvieux, and Flageolet I

	ABRI PATAUD 4:Upper	2-III	SOLVIEUX 6-M	4-B	FLAGEOLET I 5/4
IG	8.7	9.7	8.7	5.8	8.2
IB	55.7	66.8	60.1	78.4	54.3
IBd	12.4	12.5	11.7	11.1	20.6
IBt	27.6	48.8	42.7	61.6	31.0
IBn	2.4	0.9	0.2	2.3	2.2
IBr	12.5	26.2 (20.7)	21.2	34.2	5.7 (15.4)
IBs	38.3	35.5	34.6	37.9	43.5
IBdbs	12.4	12.5	11.7	11.1	20.6
IBts	24.6	21.7 (16.4)	21.2	25.3	23.1 (13.2)
IBdbs/ts	0.5	0.6 (0.8)	0.6	0.4	0.9 (1.6)
IC	2.9	3.7	4.5	2.1	2.1
IPB	1.9	2.4	2.8	0.6	0.6
IT	4.0	5.4	1.9	2.1	6.0
ILR	19.7	1.7	2.3	0.6	10.0
IPg	0.5	2.6	12.3	0.5	2.7
IPd	0.5	2.6	12.3	0.5	9.1
	N = 1718	N = 783	N = 471	N = 190	N = 680

Note: Typological indices are defined in figure 5.1. Indices indicated within parentheses are adjusted indices that result when several pieces are transferred from the standard burin class to the Raysse burin class, for reasons discussed in the text.

prone than those at Solvieux to discard tools rather than subject them to heavy use-wear or rejuvenation. This impression is born out not only by the excellent tool illustrations provided in David's monograph but also by the attribute systems he uses. These systems codify angles, spalling, and shapes of the working ends of tools in far greater detail than could practicably be applied to the Solvieux assemblages without running the risk of spurious accuracy.

Pataud also stands apart from the Solvieux assemblages in its marginal retouch, which appears in much higher frequencies and which modally assumes the scaled rather than the standard variety. Endscrapers, for example, are three times more likely to bear retouch at Pataud, and the incidence of marginally retouched pieces (ILR index) is tenfold that seen at Solvieux.

Burins account overall for more than half of the Rayssian industries at both Pataud and Solvieux, their somewhat lower proportion at the former being in part a reciprocal of its high ILR index.⁷ That Raysse burins (Br) are seemingly only half as common in 4: upper may be more apparent than real, and very likely stems from the different manner in which they have been inventoried in our two studies. As was detailed in § 9.5.3, a full third of the pieces David assigns to the conventional truncation burin classes are 'modified' specimens that we would have inventoried as Raysse burins. We would have done the same with a good portion of his 'burin-points,' which also are buried among conventional burin classes. Thus, the incidence of Raysse burins, at least as we define them here, should approximate the adjusted Br index indicated in parentheses in tables 11.3 and 11.5, which approaches the range seen at

Solvieux. Reciprocally, however, the adjusted index of standard truncation burins (IBts) is proportionally reduced, as is also indicated within parentheses, to a level only modestly exceeding that of dihedral burins (IBdbs) instead of doubling it as at Solvieux.

Pataud's Raysse burins apparently conform to the pattern of typological dynamics seen at Solvieux, where, apart from the execution of their tertiary modification, differences from one Raysse burin series to the next largely involve the degree and manner of polyhedral spalling—features that strongly correlate with the relative thickness of the support (§ 9.5.2). Those from Pataud 4: upper seem to reflect the pattern as it is expressed upon relatively thin supports. They tend toward a two-dimensional, rather than sculptured, appearance, and the modal specimen is burinated only once after having initially attained the true Raysse form. In all this they approach the Raysse burins of Solvieux 6-M rather than those of 2-III (or even 4-B), where modal specimens are reburinated twice. Yet, like the banal tools that accompany them, Raysse burins at Pataud are somewhat more elegantly made and/or less subject to heavy use and rejuvenation. Their tertiary modification usually comprises relatively delicate dihedral removals in contrast to the heavy and less systematic spalling seen on their 6-M counterparts.

Although proportionately modest ($B_n = 2.4$), Noailles burins constitute an integral part of the Pataud industry. This may not be the case at Solvieux, where in couche 2-III and, even more obviously in 4-B, they appear to be mostly the product of admixture with ancillary lenses that may be rich in Noailles burins but seemingly very poor in Raysse burins (lenses 2-IIIb and 4-Bb). It is perhaps significant in this regard that couche 6-M, which possesses only one atypical Noailles burin, has no such ancillary horizon. In any event, Solvieux agrees with the Abri Pataud in showing industries rich in Noailles burins stratigraphically segregated from, and temporally preceding, industries rich in Raysse burins. This Noailles horizon at Solvieux is much too poor to allow meaningful comparison with the Early Noaillian of level 4 at Pataud.

Gravettes and related backed pieces are rare and fragmentary in Pataud 4: upper. They are equally negligible in Solvieux's couche 4-B and appear in

only modest numbers (and equally fragmentary condition) in 2-III. In contrast, the relatively substantial Gravettian component of couche 6-M could appear to be something of an anomaly. Yet there is evidence in the mostly sterile *éboulis* 3/4 zone overlying level 4 at Abri Pataud of a terminal phase of the Late Noaillian in which a strong Gravette series appears in an industry that in most other respects closely resembles Pataud 4: upper. Especially important in this connection is the discontinuous archaeological level 4a, 30 of whose 148 pieces are backed. David is uncomfortable with this admixture of Noaillian and allegedly foreign Perigordian elements, undecided whether to attribute it to stratigraphic contamination or, perhaps more likely, to acculturation between members of the two traditions (1985:211). Yet little doubt surrounds the similar blend seen in 6-M, whose depositional integrity is the most apparent of any of Solvieux's couches. It encourages one to assume therefore that mechanical mixture was not responsible either for the appearance of Gravettes in Pataud level 4a. At both sites, it may be noted, a handful of Gravettes exhibits Vachons-style butt retouch, which the Pataud researchers consider to be a trait of later Perigordian times (David and Bricker 1987:246).

In sum, the Late Noaillian assemblage from Pataud 4: upper shares close industrial parallels with Solvieux's Rayssian assemblages. Their banal tool kits are especially similar in quantitative makeup apart from the major role played by marginal retouch at Pataud. Solvieux's greatest contrasts to 4: upper are offered by couche 6-M's strong Gravettian element and 2-III's particularly stocky blank morphology. Of course, these are precisely the greatest contrasts the two couches offer each other, and in this important respect the industrial differences within Solvieux itself are as great as those between it and Pataud. The higher relative frequencies of Raysse burins at Solvieux have no industrial significance because they mostly reflect the manner in which lines have been drawn between the burin types for inventory purposes. On the other hand, the weakness of Noailles burins at Solvieux may be significant, especially since the few found there may represent admixture with subjacent auxiliary Early Noaillian lenses.

Flageolet I

Our other key type-assemblage is provided by the Rayssian assemblages from levels 5 and 4 at Flageolet I described by Rigaud (1982b:294–398) (table 11.5). They can usually be treated as a single composite assemblage for purposes of comparison. They closely resemble one another typologically, and virtually all the differences between their indices seen in table 11.4 are minor and lie within the range of sampling error.

Rigaud's description and illustrations suggest that the Flageolet I industry is less regular in blank form than Pataud 4: upper, perhaps falling near the center of the range of variation defined by it and the three Solvieux industries. This seems to be born out, among other things, by what is indicated of its distribution of burin profiles. The ILR index is moderately high, and marginal retouch is decidedly more common throughout the banal assemblage than at Solvieux, though not as high as in Pataud 4: upper.

The low IPg indicated in table 11.5 for level 5/4 is deceptive, because the bulk of Gravettes in Flageolet I's Rayssian industry are fragmentary and were consequently inventoried as backed bladelets (Rigaud 1983b:345). (At Solvieux they would be inventoried as Gravette fragments [§ 6.12].) For this reason, IPd is the sounder index; its value is exceeded only by that for Solvieux 6-M. Little is known specifically about the style of Flageolet 5/4's Gravettes because of their fragmentary condition. Backed pieces from level 5, the lower of the two Rayssian couches, include three truncated elements, which seem to be missing altogether in the Rayssian industries at Pataud and, with one possible exception, Solvieux. All but one of the 15 Noailles burins in the 5/4 industry also derive from this level. The appearance of these special forms may have no particular chronological significance, however, being simply a function of level 5's much larger sample size. Font-Robert points are absent in the two Rayssian levels, as they are at both Pataud and Solvieux.

The burin indices recorded for Flageolet I 5/4 in tables 11.4 and 11.5 present a problem stemming from the fact that, even more than in the case in Pataud 4: upper, the incidence of Raysse burins at Flageolet I has in our view been seriously underreported. As discussed in § 9.5.3, nearly all the pieces Rigaud identifies as flat-faced truncation burins

(amounting to more than half of all truncation burins) are actually Raysse burins in our terms. Apart from being made clear in his tool illustrations, this is clearly indicated by the frequencies he reports among flat-faced truncation burins for left-handedness, axial biseau orientation, and porcelaneous flint—traits which are otherwise largely or wholly restricted to the assemblage's Raysse burins.

On the basis of the information provided concerning the incidence and combination patterns of these traits, we have taken the liberty of reassigning about three-fourths of the flat-faced specimens to the Raysse burin class. (It bears repeating that, while changing Rigaud's counts, this does not distort his picture of the typology involved, for the special treatment his text gives these forms reveals a clear appreciation of their obvious kinship with the ideally typical specimens he does inventory as Raysse burins.) The number of pieces involved is approximated by the adjusted figure indicated in parentheses for the IBr index in tables 11.4 and 11.5, which amounts to a threefold increase in the number of Raysse burins inventoried on Rigaud's type count. This number still falls short of the average for Solvieux and the probable incidence of Raysse burins in Pataud 4: upper, but it is substantial nonetheless. The specimens from Flageolet I appear to conform to the general pattern we have seen at Solvieux and Pataud, in this case—like their standard burin counterparts—consistent with modal supports that are neither particularly gracile nor particularly stocky.

Augmenting the Raysse burin count in this manner naturally entails a major complementary reduction in the incidence of standard truncation burins, whose IBts index is reduced from 23% to 13%. This, in turn, reverses the ratio between standard dihedral and truncation burins in favor of the former, producing relative frequencies that approach those seen in the earlier Perigordian IV at Pataud and Perigordian Va+b at Flageolet I while contrasting with those at Solvieux.

In sum, the assemblage from couche 5/4 at Flageolet I closely resembles its counterparts at Pataud and Solvieux and, in concert with them, helps confirm the existence of a distinct Rayssian industry in which Raysse burins do indeed constitute a major element. This industry is not monolithic, however. For Flageolet 5/4, like Solvieux 6-M, demonstrates

(in contradistinction to Solvieux 2-III and 4-B, and to Pataud 4: upper) that a substantial number of Gravettes can occur as an integral typological component of this industry. At the same time, like Pataud 4: upper and unlike all three Solvieux assemblages, it also shows that marginal retouch can be important, that Noailles burins can appear in significant if not substantial numbers, and that standard truncation burins do not always proportionately dominate standard dihedrals.

Other sites

Three more sites deserve mention: Abri du Raysse, Bassaler-Nord, and Les Jambes. They contribute no significant additional stratigraphic information, and the available descriptions of their assemblages are difficult to translate into the typological indices we have used hitherto. But they do confirm and help fill out our picture of the Rayssian industry.

Excavations in the 1950s at the Abri du Raysse in the Planchetorte Valley outside of Brive provided the tool sample from which the Raysse burin derives its name. Its level 4 assemblage, numbering somewhat over a thousand tools, has been described by the excavators (L. and J. H. Pradel 1966) and by David (1985:249–252). According to David, Gravettes account for less than 2% of the assemblage. The incidence of marginally retouched pieces is also low (2.9%), although heavy scaled retouch is supposedly fairly common. Burins make up 80% of the industry, with one-fifth of them being Raysse burins, which is equivalent to their popularity at Pataud 4: upper. David's reference to a separate and numerically strong component of modified truncation burins suggests that here, again, many more Raysse burins would have been inventoried had they been defined by the criteria used at Solvieux. Nonetheless, even as they are, David's figures show truncation burins being outnumbered by dihedral (and break) burins. Noailles burins account for 7% of the burin series, notably more common than in 4: upper, which he argues calls for a somewhat earlier temporal placement, closer to the transition from Earlier to Later Noaillian.

A similar industry is represented by the small assemblage of somewhat over a hundred pieces recovered in the 1950s from the nearby site of Bassaler-Nord (Couchard and de Sonnevill-Bordes

1960; David 1985:252). Backed tools are again rare, but marginal retouch seems to be somewhat more important than at Abri du Raysse. Truncation burins numerically dominate dihedral burins, and would still do so even if several of their members were to be reassigned as Raysse burins. Here again, David is inclined to believe that the significant Noailles burin component argues for a relatively early position in the Later Noaillian range.

Two Rayssian horizons were excavated in a limestone slope deposit at Les Jambes, which overlooks the Isle River on the western outskirts of Périgueux. Their assemblages are small, numbering 173 and 202, respectively, and are supposedly much alike. Although described in a fairly perfunctory and ambiguous fashion (Célérier 1967), they clearly have the overall statistical makeup of a Rayssian industry. About one-third of all truncation burins are Raysse burins; a few Noailles burins are reported for the upper of the two levels, although those illustrated do not look especially typical. Gravettes seem to be well represented, in the neighborhood of 10%. Tool supports are far from gracile, and many bear marginal retouch.

11.3.4 Defining the Rayssian taxon

It seems clear that a distinct industry exists in which Raysse burins play a dominant role (although they can occur in small numbers outside its confines). Drawing on both Pataud and Flageolet I, along with the three Solvieux assemblages, we are now in a position to define the taxon for this industry more solidly than was hitherto possible.

It may be defined as follows. In a Rayssian (or Raysse Périgordian) assemblage, Raysse burins—along with related forms bearing tertiary modification—attain appreciable numbers ($Br = 15$ to 30). Burins in the ensemble dominate the assemblage ($IB = 50$ to 75); standard burins alone are four times as common as scrapers, which are proportionately modest ($IG < 10$). Raysse burins roughly equal or somewhat exceed standard truncation burins in popularity, while dihedral burins numerically may either surpass or fall short of truncation burins. Apart from the last, the banal typology is mostly stable, with no patterned variation among typological groups such as composites, truncations, and perforators. Two features do, however, vary significantly.

One is the incidence of marginal retouch, which ranges from rare to fairly common (say, around one-fifth of all tools). The other is blank morphology. In one assemblage modal supports may consist of gracile blades, where in another they may entail robust, even flakey, supports. These differences can, of course, influence how the banal tool types are expressed, as in the case of standard burin profile distributions. Their specific expression can also be influenced by what might be considered a third aspect—differences in production standards and rejuvenation practices.

Font-Robert points are virtually absent from Rayssian assemblages and truncated elements appear only very sporadically. Noailles burins can be absent altogether or attain modest, but still significant, proportions. Perhaps most importantly, Gravettes can range from less than 1% of the assemblage to more than 10%, the latter proportion amounting to more than a third of the popularity they attain in the Perigordian IV and VI stages. There seems little reason to share David's doubts about whether, when they do appear, Gravettes are actually an integral part of the Rayssian industry.

To be sure, more specificity could be added to this picture if some of the seemingly random typological variation we have encountered was shown to involve time trends. While cautious about patterns of quantitative change within the Late Noailian, David argues—largely on the basis of Abri Pataud—that significant frequencies of Noailles burins characterize its earlier assemblages, that marginal retouch becomes more common with time, and that Gravettes achieve importance only in its terminal phase (1985:286–287). But we do not see this pattern confirmed by the behavior of these traits in the assemblages from other sites. For example, Flageolet 6/7 agrees with it to the extent that marginal retouch and Gravettes there share fairly elevated frequencies and that Noailles burins are largely restricted to the lower of the two levels. It fails to fit, however, in that these burins associate in the lower levels both with appreciable marginal retouch and with numerous Gravettes. While not contradicting the pattern, the traits segregate no more consistently at Solvieux. In couches 2-III and 4-B, for example, there are few, if any, Noailles burins and yet both Gravettes and marginal retouch are rare. Retouch

continues to be rare in Solvieux couche 6-M even though Noailles burins are virtually absent and Gravettes are relatively abundant. The Abri du Raysses and Bassaler-Nord agree somewhat better with the Pataud pattern in showing significant Noailles burin components accompanied neither by much marginal retouch (at least at the former site) nor by Gravettes. The latter two are both important, on the other hand, in the two levels at Les Jambes; yet a problem remains in that what may amount to several Noailles burins are also reported in the upper level of this site. In sum, it seems best to conclude that the jury remains out with respect to the question of time-dependent changes within the Rayssian industry.

Let us return to Solvieux. Its couches 2-III, 6-M, and 4-B are a major addition to the corpus of assemblages rich in Raysses burins, confirming the existence of a distinct Rayssian industry and considerably enriching and broadening our understanding of its typological norms. Interestingly, they do not consistently stand together as a group; instead, in many respects they individually resemble one another less closely than they do Rayssian assemblages from other sites. In its overall typological frequencies and weak Gravettian element, Solvieux 2-III is closer to Pataud 4; upper than to Solvieux 6-M; the latter, at least in respect to the same traits, more closely resembles Flageolet 6/7. The Solvieux assemblages are individually unique in certain respects, the most striking instance being the blank morphology of 2-III. Yet they share certain features that are so pervasive in their expression at Solvieux that we are surprised to find they are not universal among Rayssian assemblages. Included here are their low incidence of marginal retouch, rigidly consistent proportions of the standard burin classes wherein truncation burins strongly outnumber dihedral burins, relaxed standards of manufacture, and extent of rejuvenation of broken tools. (Neither of the latter two features are explicable in terms of the flint involved, which is virtually the same in kind and abundance in Solvieux's Rayssian couches as it is in the site's Magdalenian couches.) Perhaps these features are stylistic peculiarities of the Neuvic sector, or perhaps they suggest that the Solvieux assemblages, despite their heterogeneity in certain other respects, are as closely joined in time as they are in space.

11.3.5 Perigordian systematics revisited

What bearing does all this have on the debate over Perigordian systematics with which we began this discussion? The terms in which we have defined the Rayssian taxon in no way indicate whether it is simply one activity-specific functional expression of the generic culture of Perigordian Vc times, as Rigaud holds, or whether it constitutes a temporal phase within a parallel, but genetically distinct, Noaillian tradition, as the Pataud researchers argue. But we can provide some new perspectives.

The functional model

The tripartite model of Perigordian Vc times promoted by Rigaud and his collaborators encounters no significant difficulties in the light of our review and, in fact, takes on a couple of new twists. It is difficult to falsify functional models of interassemblage variability on industrial evidence alone because they tend to be inherently flexible. If differences in techno-economic activities are held to be responsible for differences in tools and tool frequencies, a considerable amount of variability is to be expected not only between the different assemblage types but within them individually. Indeed, industrial variation may be so fluid as to defy compartmentalization into neatly defined taxa. In any case, our generic definition of the Rayssian industry admits such variability. The diagnostic criteria shared by the assemblages making up our comparative sample are neither particularly specific nor particularly numerous, and it is not evident that they are accompanied by a body of discrete stylistic similarities that seemingly cross-cut functional considerations in such a manner as to suggest ethnically significant patterning. All this tends to support Rigaud's position.

It might appear, nonetheless, that his argument is seriously weakened by the additional stratigraphic evidence Solvieux provides for temporal staging of the Noailles and Raysse burin variants. But the issue is not all that simple. For one thing, Rigaud can accept the fact that Raysse burins replace Noailles burins over time, but he still might wish to accept Laville's sedimentological correlation that aligns relevant archaeological deposits in such a manner that the shift takes place at different moments in different sites—which leaves one free to regard the two

variants as at least partially synchronous. It is of greater interest that the more important functional contrast in Rigaud's model is, in any case, that offered by the Gravette-rich variant, which would remain even if it were shown that Raysse burins replaced Noailles burins at one and the same time everywhere. In the latter instance, the tripartite model would simply be replaced by a dualistic one, but this second version would remain fully congruent with the first in spirit so long as Noailles and Raysse burins were regarded as being more or less equivalent functionally. Ironically enough, David himself lays a foundation for such an argument by suggesting that Noailles burin design and the tertiary modification basic to Raysse burins are simply alternative means of achieving narrower biseaux among what can be regarded as functionally isomorphic tools (1985:141).

But the really significant chronostratigraphic issue concerns whether a Gravette-rich industry of this sort really exists contemporaneously with the Noailles-rich and Raysse-rich industries of later Perigordian V times. Its existence is a crucial tenet to both sides of the debate—in the case of Rigaud's model to represent the above functional variant, and in the case of the Pataud model to show a continuing Perigordian tradition coexisting alongside the ethnically distinct Noaillian. Perhaps the only trustworthy candidates for the role so far are the level 7 and 6 industries at Flageolet I. In any event, it is an issue to which we have nothing to contribute. Apart from a single Font-Robert point found near the surface at the Magdalenian site of Le Breuil, the Neuvic sector has nothing to offer in the Perigordian time range other than Solvieux's three Rayssian horizons.

The Noaillian model

The Noaillian model of David and Bricker raises rather different issues. In support of their thesis, Bricker and David have used information gleaned in exhaustive surveys of essentially all sites dating to Perigordian times throughout France and, indeed, beyond. But this evidence is mostly piecemeal and of indifferent quality, at least by modern standards. The model still pretty much stands or falls on the type-site whose remarkable stratigraphy and industries generated it, the Abri Pataud. Basic to their

argument is one elemental observation: the level 5 and 3 assemblages at Pataud, attributed to the Perigordian IV and V, respectively, share a fundamental continuity with each other that they do not share with the industrially discrete, and therefore seemingly intrusive, level 4 Noaillian assemblages that separate them. And it is these specific Perigordian and Noaillian assemblages at Pataud that in turn largely serve to define the industrial taxa of their scheme. Of course, this is how type-sites have always been used. But the practice begs the question of to what extent the salient contrasts from one level to the next of a type-site involve features that are peculiar to it rather than generic to the industries they supposedly typify.

Thanks to the large comparative body of data summarized above, we are in the position to attempt answering this question insofar as it concerns the Rayssian. As defined by David in more or less conventional terms of archaeological systematics, the distinguishing features of the Rayssian at Pataud are said to be its great numbers of Raysse burins, rarity of Gravettes (an observation accompanied by the suspicion that, when they do appear, it is only as the product of admixture with an altogether different tradition, the Perigordian), a relatively high incidence of marginal retouch, and the production of quite regular blades. Now, to what extent do these features characterize the Rayssian as we have defined it? We agree, of course, about the importance of Raysse burins, and in fact argue that David considerably underestimates their popularity in the industry. But Gravettes are by no means always rare, and their substantial numbers in well-documented couches like Solvieux 6-M and Flageolet 4 and 5 indicate that, when they do appear, it is as integral components of the Rayssian industry. Marginal research need not be at all common, as in the case of all three Solvieux assemblages. Further, perhaps few if any Rayssian industries are made on supports that rival those of Pataud 4: upper for gracility; and at least one, Solvieux 2-III, radically departs from its norm. In sum, the picture of variation within the Rayssian industry we have constructed on the basis of our comparative sample indicates that the suite of features that proponents of the Noaillian model attribute to it has no generic significance. It seems, in fact, to be specific to Pataud.

The relative frequencies of standard burins and their types also figure prominently in the definition of Pataud's Rayssian industry, but here again our review casts doubt on their generic significance. For one thing, the key Rayssian assemblages from Flageolet I depart from the Pataud and Solvieux pattern wherein truncation burins numerically dominate dihedral burins. For another, the issue raises the very interesting point of how one's impression of the relative degree of distinctiveness of the Perigordian and Noaillian industries at the site depends upon how typological groups are organized for purposes of comparison.

There is of course no single correct way of calculating and comparing typological indices. But how they are used affects, and possibly reflects, how one views the Noaillian question. David's practice of framing his comparisons in terms of the IB index, which includes all burins, and IBt, which groups Noailles and Raysse burins along with standard truncation burins, greatly accentuates the difference between the Noaillian and Perigordian, since the latter virtually lack the special burin forms altogether.⁸ The general burin index (IB) indicated for the Noaillian assemblages in table 11.3 is roughly twice that of the Perigordian assemblages, and at the same time their truncation burins (IBt index) are roughly twice as numerous as their dihedral burins (IBds). But a different effect is produced if one distinguishes between special and standard burin types, as we have done, and makes the same comparisons using the IBs, IBts, and IBdbbs indices.⁹ In this case we see that the five industries shown in the table differ far less with respect to their overall proportions of standard burins, with in fact the Perigordian V falling within the range of the Noaillian assemblages. At the same time, the relative frequencies of dihedral and truncation burins (the IBdbbs/IBts ratio) describe a progressive shift over time that, instead of distinguishing the two, seemingly unites the Perigordian and Noaillian levels into one and the same continuum.

That the Rayssian in particular, and probably the Noaillian in general, lose something of their individual specificity, along with perhaps something of their distinctiveness, cannot be regarded as favoring David and Bricker's model. But this is not to deny that there is something special about industries

dominated by Noailles and Raysse burins, and it in no sense diminishes the intriguing culture-historical problem posed by Abri Pataud's stratigraphy. David somewhere makes the interesting observation that much of the difference in thrust between his thinking and Rigaud's may stem from their having been preoccupied with the quite different industrial sequences for Perigordian times furnished by Pataud and Flageolet I. More to the point methodologically, a model that admits acculturation as an explanation for typological features when they happen to be shared can no more be falsified on industrial grounds alone than one that uses techno-economics to explain when they happen not to be shared.

Now, the Pataud researchers would argue that our approach to the question is, for reasons of methodology, somewhat beside the point. Issues of ethnicity like those that lie at the bottom of the Noaillian model are issues of style, they would say, and these do not reside primarily in the types and type frequencies of conventional systematics. Instead, they are best expressed at the subtypological level in terms of attributes that reflect culturally dictated manufacturing norms, that is, habitual ways of making things that are fostered within ethnic traditions and that cross-cut functional considerations of tool choice and design. It is not, they would argue, burin and scraper types themselves nor their relative frequencies that best convey the distinctiveness of Noaillian and Perigordian culture but rather the details of morphological variation within endscrapers (David 1985:17-32) and within burins (Bricker and David 1984:46-79). As has been noted, we find this argument congenial, at least in concept, and it partly follows a path of reasoning that we, too, have often followed (Sackett 1990). But the attribute systems used at Pataud are framed in terms different from our own and are employed in a different manner, and it is not altogether clear that they can be applied with equal success to industries from other sites. Their consideration must be deferred to some future date when they can be treated as part of a more comprehensive examination of the archaeological foundations and overall logic of inquiry of the Noaillian model in its entirety—a task that will carry us well beyond the bounds of the current enterprise.

Conclusion

Empirical concerns must remain paramount in any event. Much of the evidence brought forth by both sides of the debate is more circumstantial than solid, and major ambiguities still surround the industrial variation from which we generate our systematics for Perigordian times. Apart from those of Abri Pataud, we possess very few trustworthy assemblages that are attributable to the Perigordian IV and VI and that can either inform us as to what is typically Perigordian or provide a background against which industrial variation in Perigordian V times can be described and ordered. Apart from those of Flageolet I, assemblages from this last period that are rich in Gravettes are particularly rare. It may help keep things in perspective to bear in mind that, together, the principal Rayssian collections we have discussed from Solvieux, Abri Pataud, and Flageolet I may rival in number all the Gravettian assemblages from the entire span of Perigordian times that satisfactorily meet the requirements of modern analysis.¹⁰

11.4 Couche IV: Early Upper Paleolithic times

The Beauronnian presents a new problem for archaeological systematics. Our task here is primarily one of defining the nature of this problem, which will entail redefining one or two old ones as we go along. The discussion is short because, at least at this stage, reviewing the salient issues does not call for sifting a substantial body of new data and theory. Most of the background information the discussion calls upon is part of the stock in trade of workers in Upper Paleolithic archaeology. Its chronostratigraphic frame is provided by figure 11.1.

11.4.1 Preliminaries

Couche IV occupies deposits at the base of the Middle zone (§ 4.6). Above it lies couche D, whose evolved Aurignacian industry most likely postdates the beginning of the relatively mild Arcy climatic phase somewhat after 33,000 BP. Unfortunately, no archaeological horizon appears below couche IV to define its lower limit in time. But neither its

industry nor its stratigraphic context suggests that the Beauronnian is anything other than an Upper Paleolithic manifestation belonging to an early phase of the Recent Wurm.¹¹ It presumably falls therefore somewhere within the span of the first few millennia following the close of the Wurm Interstadial around 35,000 years ago. The return of glacial conditions initially involved a fairly rigorous period of climatic fluctuations, which was followed in the latter portion of this span by a major cold and dry phase (Laville, Rigaud, and Sackett 1980:266–269).

Two early Upper Paleolithic industries coexisted within this block of the chronostratigraphic record: the Chatelperronian (or Castelperronian) and the Aurignacian. Obviously, our principal task must be to determine the nature of their relationship, if any, to the Beauronnian.

11.4.2 Beauronnian and Aurignacian

The dominant industrial tradition during the time range of concern is the Aurignacian. Aurignacian assemblages are numerous, often artifactually rich, and—at any given stage—seemingly fairly uniform (Bordes 1984a:249–262). Its industry possesses the full Upper Paleolithic toolkit of banal types, which are mostly born by blades and which often carry heavy scaled Aurignacian marginal retouch. This toolkit is accompanied by a numerically very strong component of lithic *fossiles* shaped by lamellar spalling. These comprise polyhedral busked dihedral burins and block carinate scrapers whose fronts are either broad and round or narrow and muzzled. There also appear Dufour bladelets, whose support characteristically has a twisted longitudinal section and bears alternating dorsal and ventral retouch on its opposite margins (§ 6.13.3). Research at sites like Flageolet I (Rigaud 1982b) and Abri Pataud (Brooks 1995) shows that the Aurignacian's temporal industrial trends were overschematicized in traditional regional systematics. Nonetheless, it still seems reasonable to recognize earlier and later phases that equate more or less with the conventional Aurignacian stages I and II. The earlier is typified by the prevalence of Aurignacian retouch and round carinate scrapers and by the absence of busked burins; in the later phase marginal retouch greatly diminishes in importance, busked burins are common, and muzzled carinate scrapers outnumber rounded ones. The ear-

lier phase may be preceded by an initial one in which Aurignacian retouch is even more prevalent and burins of any kind are rare or absent altogether. The latter phase may in turn be succeeded by one that sees busked burins greatly diminished in importance.

Later Aurignacian industries first appear around the beginning of the Arcy phase and are replaced by the initial (stage IV) Perigordian in the subsequent mild Kesselt oscillation. The couche D Aurignacian that overlies the Beauronnian in locality 1 belongs to this later industry. The earlier Aurignacian mostly falls into the cold and dry period immediately preceding the Arcy, although radiocarbon dating, chronostratigraphic correlation, and two or three possible interstratifications with Chatelperronian industries indicate that it extends back considerably earlier. Traits reminiscent of the Quina Mousterian have been noted in the supposedly more primitive Castanet variant of the early Aurignacian (de Sonneville-Bordes 1960; Sackett 1965), but most researchers believe that the Aurignacian was intrusive into the Perigord at or shortly before the beginning of Recent Wurm times.

Overall, the differences between the Aurignacian and the Beauronnian seem quite fundamental. Truncations can be fairly common in the Aurignacian but they never form a numerous and typologically coherent group at all reminiscent of Solvieux truncations. The Beauronnian, in turn, lacks anything akin to the heavy scaled marginal retouch that characterizes earlier Aurignacian industries or the busked burins of evolved ones. Its relatively few, and mostly atypical, endscrapers also contrast with the abundant and quite typical ones the Aurignacian presents at every stage. Burins offer additional points of contrast. Their apparent paucity in very early Aurignacian assemblages is as unlike the Beauronnian as are the special buskoid forms that appear later. Moreover, although modern research is more likely to recover burins on various kinds of adopted edges than are to be found in the older collections (for example, Brooks 1995), the non-buskoid component of Aurignacian burins is still dominated by the standard dihedral, break, and truncation varieties of conventional systematics.

The only area in which the Aurignacian and Beauronnian industries may approach each other involves block scrapers and retouched bladelets. We

have argued that the four specimens which on morphological grounds warrant counting as carinate scrapers in the Beauronnian are likely simply part of a much larger group of small cores that provided the industry's retouched bladelets (§ 10.4). The finding that Dufour bladelets can be refitted to block scrapers has prompted the notion that rounded and muzzled carinates appearing in Aurignacian assemblages may also be bladelet cores (Rigaud 1993: 183). How far the argument should be taken is not clear. To say that these scrapers are no more than bladelet cores fails to account for the abundance in which they often appear, their often highly finished typological aspect (often far from that of an exhausted core), or their signs of heavy use-wear. Nor does it explain how they intergrade without a break in continuity with busked burins, whose spalls could only rarely have qualified as suitable supports for Dufour bladelets.¹² But the scrapers-as-cores notion does suggest a point of commonality between the two industrial traditions, as does the presence of retouched bladelets themselves. It is true that use-retouched bladelets are much more common in the Upper Paleolithic in general than assemblages recovered in former eras might suggest. Yet they are not ubiquitous to it. This is shown, for example, by their quasi-absence in Solvieux's Rayssian industries, including 6-M, which was the subject of particularly exacting recovery techniques both in the field and the laboratory.

None of this is to argue any specific industrial affiliation between the Beauronnian and Aurignacian. The carinate scrapers of the Beauronnian are few in number and elemental in form, and its use-retouched bladelets share only a generic resemblance to alternatively retouched Dufour bladelets. They simply point up an interesting aspect of variation, overlooked in the past, that bears keeping in mind when making industrial comparisons. In sum, the points of similarity between the Beauronnian and Aurignacian are few and not particularly strong, while the dissimilarities are great.

11.4.3 Beauronnian and Chatelperronian

Although it appears earlier elsewhere in France, the Chatelperronian of the Perigord is restricted to the early Recent Wurm—its older manifestations in the region apparently being eroded away in the wet and

temperate Les Cottés oscillation that ended the preceding Interstadial. At least in its characteristic form, it seems to disappear from the archaeological record before the Arcy oscillation. Chatelperronian assemblages are relatively few in number, usually small in size, and often of poor quality because of physical damage and industrial admixture (de Sonneville-Bordes 1960:151–167). These last are due to natural agencies, in particular cryoturbation, that disrupted their rock shelter deposits owing to the climatic instability that accompanied the return of glacial conditions. The adverse effects of physical damage and admixture are obvious, but small assemblage size can have equally grave consequences because it affords only a piecemeal view of typological variation (of which more later, § 11.4.5).

There seems to be general agreement about the industrial makeup of the Chatelperronian (Eschenlohr 1988; Harrold 1981, 1988). It is characterized by a more or less laminar, if crude and elemental, Upper Paleolithic banal toolkit of endscrapers, burins, and retouched and truncated pieces that is accompanied by a strong component of Mousterian, or ad hoc, flake tools in the form of sidescrapers, notches, and denticulations. To this mix is added a considerable number of the industry's one *fossile directeur*, the Chatelperron knife, whose steeply retouched (backed) margin typically possesses a characteristic curve. The recovery in recent decades of much richer, multilevel Chatelperronian deposits from sites beyond the Perigord, such as Quinçay (Lévêque and Miskovsky 1983; Eschenlohr 1988: 109–113) in the Centre of France and the Grotte du Renne, Arcy-sur-Cure (Farizy and Schmider 1985) in the Paris Basin, has largely confirmed this picture of a fairly stereotyped industry. Variability within it seems to be a matter of relatively modest differences in how these typological themes are proportionately represented.

On the face of it, the Beauronnian seems to have little more in common with the Chatelperronian than it has with the Aurignacian. It lacks nearly altogether the strong element of flake supports and ad hoc tool component usually seen in Chatelperronian assemblages, just as it lacks reasonably typical endscrapers (which in the Castelperronian can rival and even exceed Chatelperron knives

themselves [Harrold 1988:157]) and anything resembling the conventional marginal retouch occasionally carried on its pieces. On its side, the Chatelperronian possesses a burin group that is proportionately much smaller than that of the Beauronnian and, though crude, seems to be dominated by the standard varieties of dihedral, break, and truncation burins rather than the latter's suite of burin forms on adopted and adapted edges.

The comparison becomes more interesting, however, when we pass from the banal toolkit to *fos-sile* forms. A handful of Solvieux truncations exhibit truncations that continue down the lateral margin of the piece in a manner suggesting primitively backed knives or points (§ 10.2.3). For its part, the Chatelperronian incorporates an important component of truncations, some of which seem to invite comparison with Solvieux truncations and some of which suggest backed knives that are only partially retouched. All this might suggest a fundamental commonality between the two industries, one perhaps obscured by the different terms in which it has been approached—that is, the Beauronnian from the point of view of truncation morphology and the Chatelperronian from the perspective of backed knife morphology. The question is difficult to answer, in part because of the restricted number of Chatelperronian assemblages reported in the literature and in part because it is the one industry dealt with in this monograph which the writer does not know firsthand.

Yet it is surely significant that perhaps only one Solvieux truncation assumes the ideal form of a typical Chatelperron knife (plate 54a). The handful of Solvieux truncations that approach backed knives otherwise seem in every other respect to resemble, and intergrade with, nearly 250 truncated pieces that are not backed. Moreover, relatively few Solvieux truncations are as diminutive as Chatelperron knives, and in virtually none of them is the truncation carried on the right side (whereas at least half of all Chatelperrons seem to be backed on the right, judging from illustrations in the literature). Finally, no use-reduction sequence comparable to that of Solvieux truncations has been recognized among Chatelperronian knives or the truncations that accompany them in Chatelperronian assemblages. All this seems to point to the conclusion that the typological commonality between the two industries is

fairly superficial. We return to this question in § 11.4.5.

Now, the Chatelperronian is characterized above in the form it assumes in early Recent Warm times. But industrial comparisons need to take into account that it exhibits significant evolution over time in both earlier and later phases. Could, for example, the Beauronnian be an Interstadial Chatelperronian industry that, being deposited in the open air, escaped the erosion that apparently destroyed its rock shelter counterparts? Apparently not. For where it is known this earlier phase of the Chatelperronian retains much of the flavor of a Mousterian of Acheulian tradition (from which many researchers believe it emerged), including quite flakey supports, fewer burins, and an even stronger component of ad hoc tools like sidescrapers, denticulates, and notches. None of these traits characterize the Beauronnian, which typologically has little, if anything, of the Mousterian about it.

Some might still seek Mousterian roots for the Beauronnian to account for its seemingly opportunistic approach to burin design and the use-reduction sequence underlying Solvieux truncation dynamics—which have few, if any, parallels in Upper Paleolithic times. In fact, there is little about these that suggests the Mousterian either. The permutations entailed in Solvieux truncations as often as not involve different kinds of use-wear and rejuvenation whose successive active parts suggest a Paleolithic version of the Swiss Army knife, that is, a flexible and multipurpose instrument. Its design and use seem to have been along quite different lines from the rigid kind of reduction sequence that Dibble (1987) claims for some Mousterian scrapers, which simply involves employing a given scraper for essentially one and the same purpose until the task is completed or the tool is exhausted. In similar fashion, while in a sense opportunistic, the manufacture of Beauronnian burins entailed an altogether reasonable way of producing biseaux by means of spalling that accommodates the exigencies of blanks rather than of superimposing schematized design notions on them. It also bears noting that Beauronnian techno-economics seems to have called for burins in far greater numbers than Mousterian artisans (or those of the Chatelperronian and initial Aurignacian for that matter) ever had need for.

As for later times, some Chatelperronian industries appear to be more evolved than the one we have taken as our standard of comparison. A few assemblages still dating fairly early in the Recent Wurm, such as that from couche 8 at Roc de Combe (Bordes and Labrot 1967), look more advanced both in the quality of their backed forms and, among other things, decreasing numbers of Mousterian (ad hoc) tools. Two examples outside the Perigord, Les Cottés and Fontenieux in the Vienne (Bordes 1984: 231; Pradel 1952, 1959), carry these progressive tendencies even farther and consequently are suspected by some to be more recent.

Might then the Beauronnian constitute a more evolved, presumably later, form of the Chatelperronian? Couche 2-IV's stratigraphic position admits the possibility: the evolved Aurignacian that overlies it might date well after the beginning of the Arcy phase (and the Solvieux evidence, of course, does not rule out the possibility that the two industries might even interstratify regionally). But the Beauronnian's typological composition again denies it. Admittedly, a couple of the progressive quantitative trends that researchers attribute to the evolved Chatelperronian, such as greater numbers of burins and fewer ad hoc tools, bring its more evolved assemblages that much closer to the Beauronnian.

Three features attest to the fundamental dissimilarity of the two industries, however. One is that the differences we noted with respect to the bulk of the banal toolkit remain as strong as ever. The second is that the Chatelperronian's backed knives and points become more elegant and include new forms that approach Gravettian pieces—further separating them from Solvieux truncations, which essentially never approach them. And the third is that, at least as they are characterized in the literature, the progressive trends of the Chatelperronian are toward refinement (or at least away from crudity) and toward a banal toolkit whose typological and quantitative makeup are increasingly conventional in the sense this is defined by Bordesian type-lists and our notion of standard typological groups. The Beauronnian, on the other hand, is not progressive in either sense. It is a crude industry by almost any standards and, particularly important as we have

labored to show, its most distinctive features stem from notions of type design and tool use in burins and Solvieux truncations (which together account for over 80% of the assemblage) that are the very opposite of conventional.

11.4.4 Beauronnian and Perigordian

In denying the Beauronnian's status as an evolved Chatelperronian we remove it from contention as the long-sought transitional Middle Perigordian (Perigordian III) industry that Denis Peyrony (1933) postulated must connect the standard Chatelperronian (his 'Lower' Perigordian) and the ('Upper') Perigordian block of industries reviewed in § 11.1 (see this chapter, note 5). It conceivably falls close to the correct time slot (that is, more or less contemporary with the later Aurignacian), but it simply lacks the kinds and combinations of typological elements that this hypothetical industry would seem to call for (see Bordes 1964). The Chatelperronian aside, these same deficiencies would appear to eliminate the Beauronnian as an ancestor of the Perigordian.

Two intriguing typological issues bear pointing out in this connection, however. One is that the Solvieux truncation brings to mind the truncations seen in (Upper) Perigordian industries, especially the Perigordian VI some five or more millennia later. At least as they are presented in the literature, the truncations from the B levels at Laugerie-Haute, as described by D. and E. Peyrony (1938) and, later, Bordes (1958), as well as those from level 3 at the Abri Pataud as described by Bricker and David (1984), might easily fall into our Solvieux truncation group. (See, for example, Bricker and David's description of the 'truncation-borer' [1984: 80–81].) But it is a matter of piecemeal similarities only. The Laugerie and Pataud truncations seem to be much more restricted in their range of formal variation, typologically more clearly segregated from the rest of the assemblage, and, of course, numerically much rarer (Bricker 1995). Moreover, it is safe to assume that, given the skill of the researchers involved, the artifact assemblages from both sites are large enough numerically that a multidimensional group like that of the Solvieux truncation would have been recognized had it existed. We conclude that the

Perigordian VI in the Perigord has a strong element of conventional types of Upper Paleolithic truncations, but nothing more.

More intriguing is the very large sample of so-called *coutelas* (cutlasses) described by Andre Cheynier for the Perigordian VI recovered from the complex open air station at La Cirque de la Patrie far to the north of the Perigord in the Ile de France (1958, 1963). (The industry may recur in other sites nearby [Schmider 1971:29–42]). Cheynier's illustrations indicate clearly that, in contrast to the Perigordian truncations noted above, he is dealing with a multidimensional range of variation that equates very well with at least the more obvious permutations of Solvieux truncations. Yet his description contains major ambiguities and he makes no mention of breakage and rejuvenation like that involved in the Solvieux truncation's reduction sequence. Indeed, Cheynier views the *coutelas* as a tool destined only for light use, the margin being employed as a knife blade edge and the truncation serving simply as a place to rest one's finger (like the back of a penknife). To us, on the other hand, the use-wear on Solvieux truncations rarely suggests a tool that served as a kind of backed knife, but instead shows a more complicated pattern of often heavy usage that involved the truncation and apex far more than the opposite margin.

In any event, the remainder of the industry represented in the Cheynier collection seems to be quite unlike the Beauronnian. For one thing, there is a strong Gravettian element, which—it is important to note—Cheynier vigorously denies (as we would) has any typological connection with the *coutelas*. (The question is, of course, relevant to our discussion in § 11.4.3 about the Solvieux truncation's relationship, or lack thereof, to backed knives and points in the Chatelperronian.) For another, all the other typological groups seem consistent with the presence of some sort of evolved Perigordian. Given the nature of the deposits at La Cirque de la Patrie and the way in which they were excavated, it is altogether possible that Cheynier was working with mixed industries. But it is difficult to believe that an admixture rich enough to introduce the rich *coutelas* sample would not also produce major changes in other typological groups, especially burins, that would have been noticed by such an astute typolo-

gist. The resemblance between Solvieux truncations and the *coutelas* is intriguing but difficult to explain in phylogenetic terms. It may simply be the result of independent invention and typological convergence.

11.4.5 Discussion

What then is the Beauronnian? That it is an Upper Paleolithic industry is indicated by its virtual lack of Mousterian tools, its strongly laminar (if crude) supports, its incidence of combination pieces, its rich series of Solvieux truncation and burins, and its retouched bladelets. That it is also primitive might be suggested, among other things, by the use-reduction sequence of Solvieux truncations and the predominate role played among burins by forms spalled from different adopted and adapted edges. Yet their manufacture was not in any sense a haphazard business: despite its crudity, it entailed an altogether reasonable and consistent adaptation of design notions to the edges provided by the industry's rather special blanks, and it achieved a satisfactorily broad array of active parts. We can choose to view it as more primitive than subsequent Upper Paleolithic technological practices, but we can also view it as simply different—more a matter of kind than of quality.

The Beauronnian does offer one or two intriguing parallels to Perigordian industries that fall much later in time. But these are restricted to truncations and, as we have seen, are more likely the product of fortuity than phylogeny. Of more immediate importance is the Beauronnian's degree of separation from the industries with which it could be contemporary—it is quite unlike the Aurignacian and offers no truly compelling similarity with the Chatelperronian. It is also, by the way, as typologically diverse as either, especially if one takes into account the variety of distinctive active parts that were achieved by Solvieux truncations.¹³ Therefore, the likelihood that it was simply a specialized functional variant of the Chatelperronian or Aurignacian is no greater than the likelihood that they themselves were alternative functional variants of some broader industrial complex.

Why has the Beauronnian not been seen before? One possibility is that it is an industry unique to open air sites and consequently was never encountered until our excavations at Solvieux. But

another, perhaps more likely, explanation involves sampling. We have shown that it takes a considerable amount of work and a large artifact assemblage to recognize the typological integrity, the family air of Solvieux truncations. If one had a collection of only 20 or 30 of them, one would probably fail to see their commonality; and consequently they would be ordered into several different categories—truncations, perforators, endscrapers, crude backed knives, and so forth. That most if not all truncation burins were derived from them would be overlooked altogether, as might also the special typological themes that give coherence to the remainder of the burin sample. Burins, in other words, might simply seem crude and rather chaotically atypical. In a similar fashion, given the crudeness of their truncation retouch, one might easily mistake the numerous sizable fragments of broken Solvieux truncations for an important component of ad hoc tools such as denticulates and sidescrapers (as we ourselves once did). Finally, the only additional potentially diagnostic tool group—retouched bladelets—is neither particularly common nor particularly noticeable in the ground. (Even at Solvieux, most bladelets were discovered in the laboratory only after the debitage had been washed.) Similar bladelets do appear in small numbers in other industries, but apparently have no special phylogenetic significance. Given all this, it is possible to imagine that the Beauronnian has been seen before at other sites, but in assemblages too small or through typological prisms too conventional for its distinctive features to be recognized.

Now, reflection on this last point carries one's thoughts back to the Chatelperronian. Would its industry have been described and defined differently were it known from assemblages that were larger and of better quality than most at our disposal and, perhaps as well, were the Chatelperronian taxon itself defined in a less stereotyped, normative fashion? For example, it is not impossible that Chatelperron knives are actually part of a manifold typological group akin to Solvieux truncations whose commonality is obscured by the practice, fostered

by small sample size, of assigning its individual members to discrete classes. It may be that these knives constitute, along with 'standard' truncations and 'partially backed' truncations, intergrading (perhaps even more or less equally numerous) components of one and the same manifold group. Possibly many pieces assigned to other categories, such as scrapers, also belong to it, as do perhaps even some of the burins. It is intriguing to note in the latter connection that Chatelperron points sometimes carry a burin-like spall, perhaps in a fashion analogous to that of Beauronnian truncation burins (de Sonneville-Bordes 1960:153). Carrying the matter further, it is also noteworthy that a study of two of the handful of numerically large Chatelperronian assemblages, representing horizons from couche x at Arcy-sur-Cure in north-central France (Farizy and Schmider 1985), seems to hint at significant parallels to some of the patterns we identified in couche 2-IV burins. In other words, where sample size is large enough and typology not rigidly conventional, Chatelperronian burins may not present themselves simply as atypical renderings of the standard types but instead as the product of an equally systematic but alternative approach to type-design perhaps akin to that seen in the Beauronnian.

None of this is to say that the Beauronnian is a Chatelperronian industry. So long as the latter is defined narrowly in terms of Chatelperron points, usually accompanied, among other things, by an abundance of ad hoc tools and endscrapers, it is difficult to see Solvieux's couche 2-IV qualifying for membership. But the above considerations do compel us to ask whether the reverse might be the case: that some assemblages identified as Chatelperronian might not actually belong to the industry we designate as the Beauronnian. And they also suggest that, in any case, a broader and richer appreciation of the makeup of the Chatelperronian itself might be achieved if it were viewed in the light of Beauronnian typological dynamics. It is now perhaps the former, rather than the latter, about which we need to know more in order to understand industrial variation in early Upper Paleolithic times.

Notes

1. Hemingway's publication is an unrevised doctoral dissertation reporting an ambitious hands-on review of Badegoulian industries. This valuable effort of empirical research suffers from not having been reexamined and rewritten before publication.
2. In none of the excavation reports are full piece counts provided nor are the descriptions in every case based upon the total assemblages ultimately recovered. Our depictions of these industries as they are reported in the literature have been filled out by notes taken in December 1968, when the writer had the opportunity to examine the Laugerie-Haute Est collections thanks to the gracious permission of François Bordes.
3. As pointed out in § 5.3.5, the convention for determining the ratio of dihedral and truncation burins differs in Bordesian practice from the one used here, because the former (the IBd index) includes B5 break burins while the latter (the IBt index) excludes T7 transverse burins along with many bearing T6 semi-transverse profiles. (These transversal burins are tabulated separately in the IBtv.) Hence, when assessed in Bordesian terms, many earlier Badegoulian assemblages already show dihedral burins in the majority; when assessed in our terms (IBds and IBts), they never do. Moreover, it may only be in Late Badegoulian assemblages that the majority of dihedral burins are typical in the sense of carrying trigons purposefully burinated on either side.
4. The transition is further rendered awkward by sampling problems. Thus, Peyrony's type-assemblage for Magdalenian II appears to be contaminated significantly by tools deriving from the underlying Magdalenian I deposit, while Bordes was able to recover less than a hundred tools attributable to it in later excavations at Laugerie-Haute Est (couche 4).
5. The Gravettian sequence in the Perigord happens to begin with Perigordian stage IV because the three earlier stages postulated by Peyrony are no longer recognized. The Perigordian I became the Chatelperronian or Castelperronian (except to those who continue to believe that this initial Upper Paleolithic industry is ancestral to the much later main Perigordian block); the Perigordian II has long been regarded as an early Aurignacian industry; and the Perigordian III, due to subsequently uncovered stratigraphic evidence, had to be redefined as the Perigordian VI.
6. It may be of antiquarian interest to mention that he was foreman of the excavations at Abri Pataud in 1959 and 1960 when a good part of its Noaillian deposits was excavated. The exhaustive laboratory analyses that underlie David's (1985) monograph came much later, however.
7. It is important to note that the frequencies of Raysse and standard truncation burins indicated by the Br and IBst typological indices for Pataud in tables 11.3 and 11.5 result from our own calculations. They are obscured in David's basic inventory, which pools them together in the more general truncation burin categories of the old type-list (1985: table 2). A reasonably accurate count can, however, be calculated for these types by extrapolation from some of the numerous auxiliary data provided in his text. Thus, the number of Raysse burins in level 4: upper can be obtained by comparing the total tool counts for them provided in David's table 16 to summary statistics about their distribution over single, multiple, and composite pieces he provides in tables 27 and 28. One can then calculate the inventory for level 4: upper standard truncation burins either by a similar extrapolation from the tables or by subtracting the Raysse burin figures obtained above from the appropriate categories of his table 2 type-list count. Burins in level 4: middle pose a greater problem because they are not inventoried separately. A reasonably accurate inventory can be obtained, however, by analyzing David's table 26 in the light of the level 4: upper distribution extrapolated above. But because they are pooled in the table, the number of multiple

pieces to be counted as Raysse or standard truncation burin doubles must still be estimated (presumably in the light of their respective ratio in the 4: upper sample).

The adjusted IBr and IBTs indices in our tables 9.1 and 9.3, on the other hand, are only crude approximations. They are based on the estimation that—even after the specimens David regards as Raysse burins have been subtracted from it in the manner described above—essentially one-third of his truncation burin sample still consists of 'modified' specimens that would warrant attribution as Raysse burins by the standards used at Solvieux (§ 9.5.3). Accordingly, one-third of the membership of IBTs has been transferred to calculate the adjusted IBr and IBTs. The adjusted indices may still provide an overly conservative picture of Raysse burin proportions at Pataud.

8. David's rationale is of great interest nonetheless. It seems to be his view that Raysse (along with Noailles) burins assume the tasks usually performed by standard truncation burins, that is, they are functionally isomorphic with them. What distinguishes Raysse burins therefore are specialized techniques of manufacture that are best regarded as matters of technological style, not function, and that consequently do not translate easily into rigidly demarcated types. It is presumably for this reason that he sees no reason to inventory explicitly Raysse burins and related forms apart from standard truncation burins, either for making typological indices or even at the level of the type-list count.
9. Ideally, of course, this comparison would best be made using the IBds rather than the IBdb's, that is, excluding break burins. The more inclusive index is called for, however, because David's count sheets include break burins among the dihedrals.
10. For Perigordian IV only the level 5 ensemble of horizons at Pataud is fully useful and trustworthy. Equally valuable are levels 7 and 6 at Flageolet I for the Perigordian Vc range. Probably an earlier Perigordian Va+b date is represented by Ferrassie J/E1, D2, and D3, the Font-Robertian, which Delporte regards as a functional variant of a greater Perigordian V polymorphic industry along the lines of Rigaud's model (Delporte and Truffreau 1973). Peyrony's collections from La Ferrassie date to the pre-World War I era, however, and modern work has provided only small samples. Most Gravettian industries dated to Perigordian V times by David and Bricker, such as those from Les Vachons and Larau, were recovered by the standards of a former day. Using them apparently calls for considerable exegesis, and the evidence they provide is circumstantial at best. Malldier and Roc de Combe were dug relatively recently, but the former furnished only very small samples while the pertinent couches of the latter may have been contaminated by gullying in Pleistocene times. The Perigordian VI is well represented by Pataud, accompanied presumably by levels 1–2–3 at Flageolet I, as well as by several horizons at Laugerie-Haute; but Peyrony's collections from the last fall far short of modern standards, and Bordes' are numerically small. The industry represented by the very large collection from Corbiac is presumably related.

Following Bordes and de Sonneville-Bordes (1966), one might wish to recognize an additional phase, Perigordian VII, represented by the distinctive Protomagdalenian industry at Abri Pataud (level 2) and Laugerie-Haute. This taxon has the merit of tying up an otherwise loose end in regional systematics and of providing, for those who want to see one, an industrial root for the Middle Magdalenian distinct from the Badegoulian (Laville, Rigaud, and Sackett 1980:224–225). But it creates a Perigordian stage virtually devoid of true Gravette points and micropoints. Perhaps not surprisingly, those who wish to divorce the supposedly Gravette-poor Noailian industries from the Perigordian tradition reject the Protomagdalenian as well (David and Bricker 1987), whereas their opponents are happy to welcome it into the fold (Rigaud 1988).

11. It is tempting to speculate that the cryoturbation that contorts the main horizon of couche IV as it spills into the channel in trench A2 and locality 2 (§§ 3.21, 3.24) might serve as a specific stratigraphic indicator of its chronostratigraphic placement. For cryoturbation seems to characterize rock shelter deposits assigned to the unstable climatic phase that initiates the Recent Wurm (Laville, Rigaud, and Sackett 1980:268). Its appearance at Solvieux, however, is restricted to the area of the channel and may represent a local event that has no traceable counterparts elsewhere.
12. In short, while the scrapers may have produced the bladelets, this result was ancillary to their main role. In like fashion, the mud for the bricks used to build early ziggurats in Mesopotamia might have come from digging canals, but this does not mean that canals can satisfactorily be accounted for in terms of ziggurats.
13. Assessing typological diversity is admittedly a tricky business. See Harrold 1988:169-174, Sackett 1988:420-421.

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Coda

We end with a few comments regarding issues and prospects raised by the work at Solvieux. One point to emerge clearly is that Solvieux magnifies greatly the apparent heterogeneity exhibited by the Neuvic sites with respect to size, disposition, structural organization, and industrial makeup. Several different kinds of settlements and activities seems to be represented, all of which are by no means likely to be accommodated within any single model of Upper Paleolithic demographic and economic geography. In this they present a challenge to interpretation surpassing that posed by open air complexes elsewhere in Europe, whose members as often as not tend to exhibit an almost stereotypic organization and content by comparison.

This is not to say that, taken piecemeal, the Neuvic sites fail to provide interesting glimpses into Upper Paleolithic lifeways. For example, their positioning with respect to regional topography and to probable distributions of natural resources in the late Pleistocene is indeed suggestive (see Gaussen 1987; Texier 1989). And there is a kind of humanistic immediacy displayed by some of their features that cannot help but evoke pictures of habitation structures in the mind's eye. Surely, for example, the sharply defined pavage at Le Cerisier suggests the confines of a solid-walled structure or perhaps a pit dwelling. On the other hand, the stone cordon at Plateau Parrain I may have weighed down the flexible walls of some less substantial, even portable, shelter or tent outside of which—judging from the flint distribution—most of the activities conducted

at the site took place. These and related matters of interpretation are ones to which Gaussen has given much thought (for example, 1980, 1982, 1988), and his often provocative and always enlightening reconstructions of the Neuvic occupations can be read with profit by all students of spatial archaeology.

Specific site reconstruction made by those who do the fieldwork and actually see the substantive data as presented in the ground must always be taken seriously. Nonetheless, their primary function is not to write Stone Age history or even necessarily to generate specific models of site settlement and activity that call for immediate testing. Rather, it is to give our paleoethnological skills some exercise, to keep us mindful of the ultimate goals of our research, and to help guide us toward those kinds of sites and data that may ultimately carry us to those goals. The last is of greatest importance. In the present still-formative state of the enterprise, it is the immediate and more practical issues of method and theory raised by these sites and their empirical data, and not the cultures that lie behind them, that must command our energies. Some of the more salient issues deserve mention.

To begin with, investigation of the Neuvic sites is strongly colored by two major types of ambiguity. One stems from the lack of organic remains, such as charcoal and bone, whose presence would be so helpful in identifying specific kinds of structures like hearths and, more generally, in giving spatial definition to the activities around which human settlement revolved. It is this organic component, of

course, that lends such striking quality of life to the exposures at Pincevent and to the many splendid open stations of Central and Eastern Europe. The second type of ambiguity is caused, paradoxically enough, by the very wealth and diversity of the Neuvic sites. The ability to talk confidently about patterning in the spatial organization of occupation surfaces stems not only from the explicitness of the relevant data but also from their redundancy. In other words, one needs to deal with a familiar pattern that repeats itself and is seemingly not to be contradicted by other, potentially rival, patterns. This situation clearly does not exist in the Neuvic sites, whose complex and heterogeneous occupations span nearly the entire Upper Paleolithic, involve several different cultural traditions, and very likely reflect a variety of distinct kinds and aspects of late Stone Age lifeways.

It is therefore of particular importance that the Neuvic group is surrounded by the great bulk of the Perigord's shelter deposits. Neuvicois researchers need not restrict their vision to local resources of information alone, but can draw upon a much greater corpus of data relevant to regional Upper Paleolithic ecologies and demographics, economic strategies, and perhaps even ethnic boundaries of those who exploited them. A new pollen profile from Laugerie-Haute or new information about butchering practices or tool localizations at Le Flageolet I could prove to be more relevant at any given time to the analysis of a given occupation surface at Solvieux than the discovery of a contemporary archaeological horizon only a kilometer away. In short, when pursuing paleoethnology in the Perigord, open air and rock shelter research must be regarded as fully complementary and interpenetrating lines of investigation.

Equating the Neuvic occupations with their shelter counterparts is not a simple business, however, especially because it has become evident that lithic variation is a subtler and more complex phenomenon when viewed from the perspective of the open air. We have seen that some industries which quantitatively dominate the shelter sequence, such as the Final Magdalenian, do not appear at all in the Neuvic sector. And, although it is true that the established shelter industries often find close counterparts in the open air, this is by no means always the

case. Some open air industries exhibit an atypicality (for example, the pseudo-Levallois technology at La Croix de Fer) that is not mirrored in the seemingly more stereotyped shelter assemblages. And others, such as Le Cerisier and Le Breuil, may possess altogether typical artifacts but still display such idiosyncratic quantitative makeups that their assignment to the conventional industrial types is tentative indeed. Even more important, there are three industries in the Neuvic group—those of Lacaud, Le Chatenet, and, most importantly, the Beauronnian at Solvieux—that have no analogs at all in the shelters.

The significance of all this is underlined when one recalls that barely a score of reasonably well-defined assemblages have yet been recovered from the Neuvic sites, whereas well over a thousand have been brought to light in the Perigord's shelters. It may well be then that the *mentalité de grotte* has created as much restriction of thought about the nature of Upper Paleolithic industrial variation as it has about the nature of Upper Paleolithic habitation. The special kinds of variation seen in open sites may bear witness to kinds of groups and kinds of activities that are simply not represented in the shelters.

Much remains to be learned about the extent and nature of spatial patterning within the surface exposures we already possess. Some of the answers will come from new techniques of laboratory analysis similar to those being developed by spatial archaeologists working on related problems elsewhere. For example, flint tools and debitage, as well as broken rocks and their chips, are being reconstituted both to better understand how artifacts are vertically dispersed within and between archaeological horizons, and on the horizontal plain, to define the nature of variability in the spatial contexts in which artifacts were manufactured, used, and discarded. Renewed attention must be given to use-wear among tools; the finer kinds of use polish seem to have been lost (Helle Juel-Jensen, personal communication), but interesting preliminary results have been obtained by wear patterns observable at low magnification (Seitzer 1978). The notion of "tool" itself must of course be extended beyond the conventional retouched forms to those ad hoc implements that bear the signs of use, as well as to the rock-tool inventory. And considerable energy is being expended to clarify the patterning that lies

behind the conventional morphological typologies used in defining stone tool industries. This enterprise calls for, among other things, re-examination of the theoretical distinction between style and function that so often plagues lithic archaeologists (for example, Sackett 1982, 1990). It also calls for the design of new approaches to codifying and analyzing formal variation among flint artifacts in order to illuminate the dynamic interaction among tool form, blank production, and reduction strategies. The basic methods have long been available, but their useful application has had to wait upon the appearance of a clearly defined theoretical need and large, well-segregated artifact assemblages. The Solvieux project has provided both.

A couple of points deserve mention with respect to the analytic approach employed here. One is that, despite its emphasis upon a quantitative format, it is in no sense a computer-driven enterprise. It is designed to be inexpensive, practicable, and, indeed, artisanal. Consistent with the spirit behind its design is the fact that, while access to a desk-top computer and the skills to use it would certainly lighten the workload, it is entirely feasible to apply the approach to very large data sets using a pocket calculator. Virtually all of the analyses reported in this monograph were, in fact, originally done by hand at a cost in materiel that came to considerably less than dinner in a French cafe.

The second point concerns the nature of the results obtained by this approach. Virtually nothing has been said concerning the design notions held by those who manufactured the tools we have analyzed. Some researchers seem to encounter little difficulty in divining the cultural conceptions or artisanal intentions that lie behind stone-tool variation. The matter may not appear so simple, however, when viewed from the perspective of our analyses. In short, our statistical results do indeed seem to reflect true causal relationships, but how to translate them into cultural terms is by no means self-evident. What we see repeatedly in the interaction patterns is one or another kind of linkage between some aspect of the active part of tools and the morphology of the blanks that carry them, a linkage that is grounded in mechanical and geometric contingencies. Statistics in and of themselves fails to indicate, however, where the intentions of the artisan enter the picture.

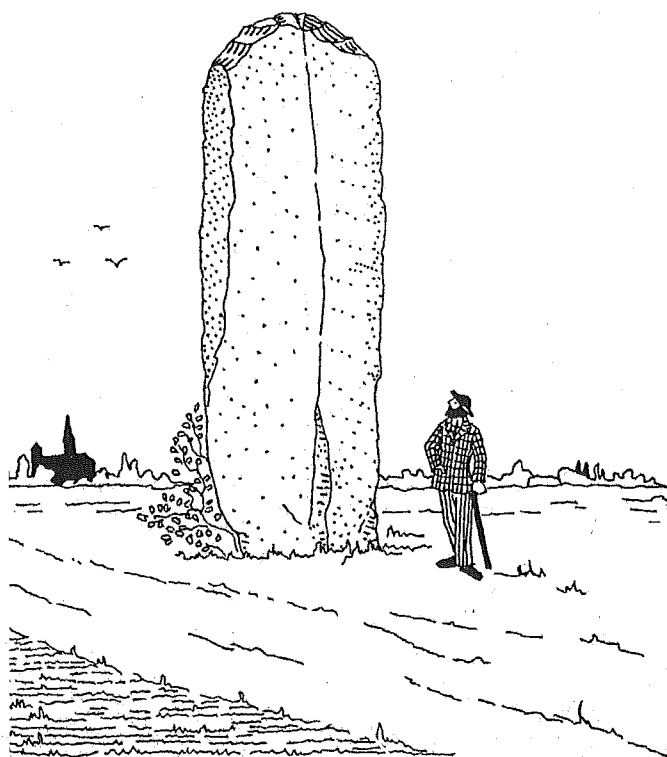
They alone cannot tell us when and to what degree knappers were passively affected by these contingencies while making, say, a burin, or on the contrary, when and to what degree they systematically took advantage of them to achieve some desired effect. To note an almost too obvious example: Do transverse burins fortuitously result from accommodating truncation burin manufacture to stocky flakes, or were such blanks intentionally made with that particular typological end in mind?

The point bears stressing: simply because a given typological pattern involves a mechanical or geometric contingency between the support and active part is not grounds for arguing that its use was any less subject to culturally dictated typological norms. Some typologists find it convenient to relegate consideration of the support to the 'technological' stage of tool production and to reserve typology, or at least 'type-design,' to the shaping of the active part itself. Some such distinction may have value in the realm of ceramics, where decoration might be viewed as an aspect of artisanal behavior distinct from that of forming the vessel itself. But it does not hold in the realm of stone tools. The knappers who fashioned dihedral and truncation trigons in the industries we have studied also made the blanks that carry them, and it seems implausible indeed that they were not fully aware of the consequences of their actions from beginning to end. Thus, burin design notions did not necessarily come into play only when the time actually came to shape the trigon. Perhaps specific blanks, or at least specific arrays of blanks, were destined from the start to accommodate the specific kinds of spalling that would be required to achieve specific trigons. Burins, so to speak, were conceived long before they actually saw the light of day. And presumably the timing involved may have varied among different kinds of burins, as well as from one industry to another. In any event, the task of determining the points along a given reduction sequence where design notions played an active rather than a passive role is a matter for investigation that requires going beyond defining the dynamics of the sequence itself. Here we have approached stone tools in terms of the engineering that underlies their architecture and, by necessity, largely ignored the reasoning behind their design.

Be that as it may, it is data, not method, that remains the highest priority. It was the prospect of new kinds of data that occasioned the Solvieux project, whose results—both successes and failures—point up the need for more data. In particular, we must have more occupation surface—which means more sites and more people to dig them. Good open sites may well be ubiquitous in the Perigord, but open air research calls for new kinds of knowledge and new skills. Few excavators are qualified to wrestle with its special stratigraphic and taphonomic problems. Simply to identify an open site and successfully determine the nature and extent of its archaeological horizons calls for dealing with couches that may extend over a hectare and occupy soils whose depositional history is totally masked by leaching. These soils may be profoundly modified by such agencies as cryoturbation, solifluction, and loss of fine fraction through washing. Even when accessible to probing directly through the plow zone, rich horizons can still be difficult to define because—if they are highly structured horizontally—they consist largely of empty space. The problem is further compounded when one has to

grapple with voluminous deposits like those at Solvieux. Sondaging in this case calls for deep stratigraphic trenching, which is an altogether different business from surface probing both in magnitude and in that the amount of artifactual material one encounters in passing through archaeological couches vertically is but a minute fraction of what would appear were they tested from above over a broad area.

Obviously the work at Solvieux should be resumed, at the very least an effort made to recover more of the Beauronnian. At the same time new sites must be found, both elemental sites and ones comparable to Solvieux in volume and complexity. That we know of no other sites like Solvieux does not necessarily mean they do not exist. More likely, it reflects the fact that prehistorians are not sufficiently aware of the kinds of deposits they should be looking for or, more frankly, do not recognize them when they see them. This artisanal domain of research strategy is crucial and in need of continual refinement. We hope that the pursuit of horizontal archaeology will end in paleoethnology. But necessity dictates that it begin with stratigraphy and taphonomy.



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Typological Plates

Jean Gaussen

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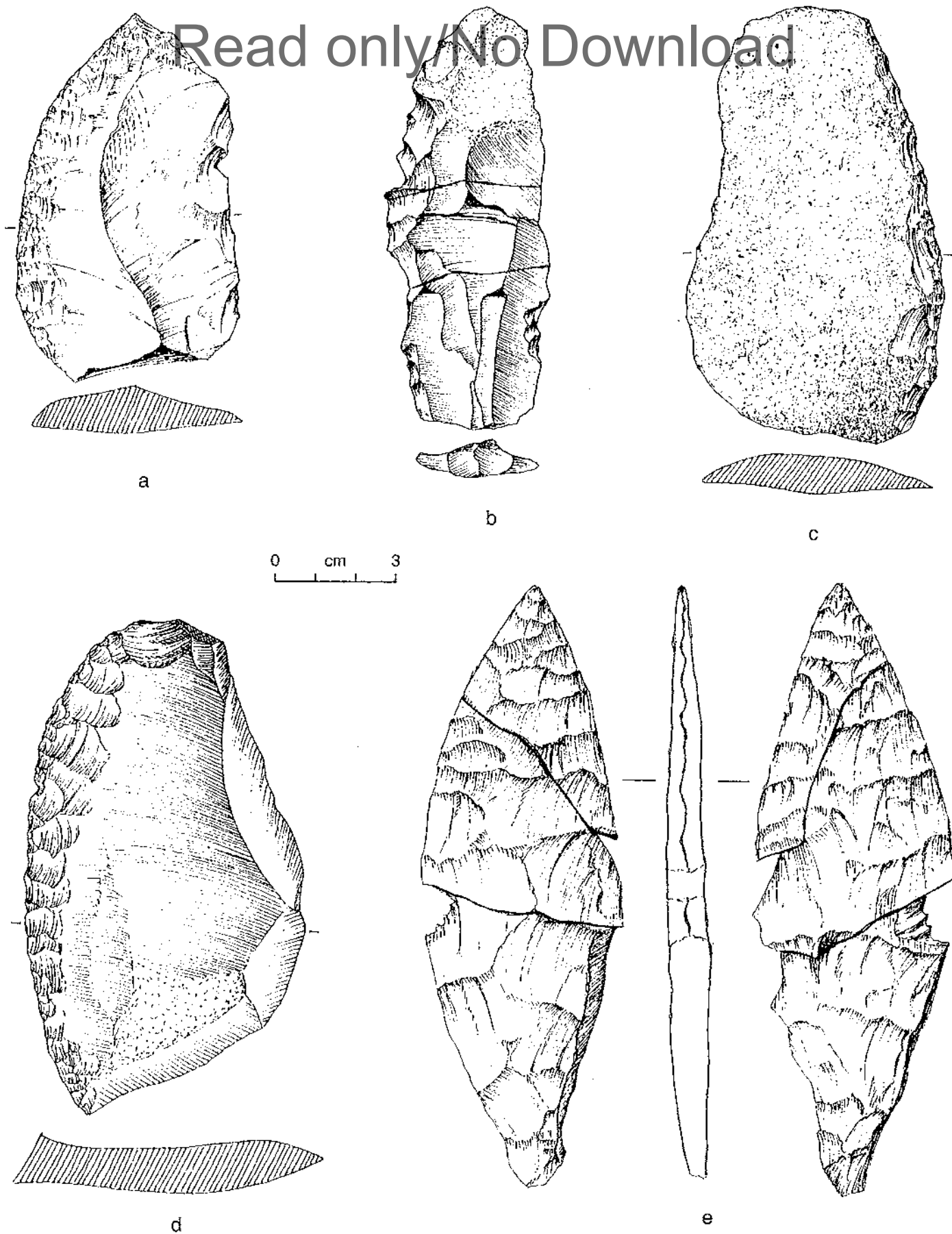


Plate 1. Couche M: Mousterian (a-d) and couche S: Solutrean (e) tools

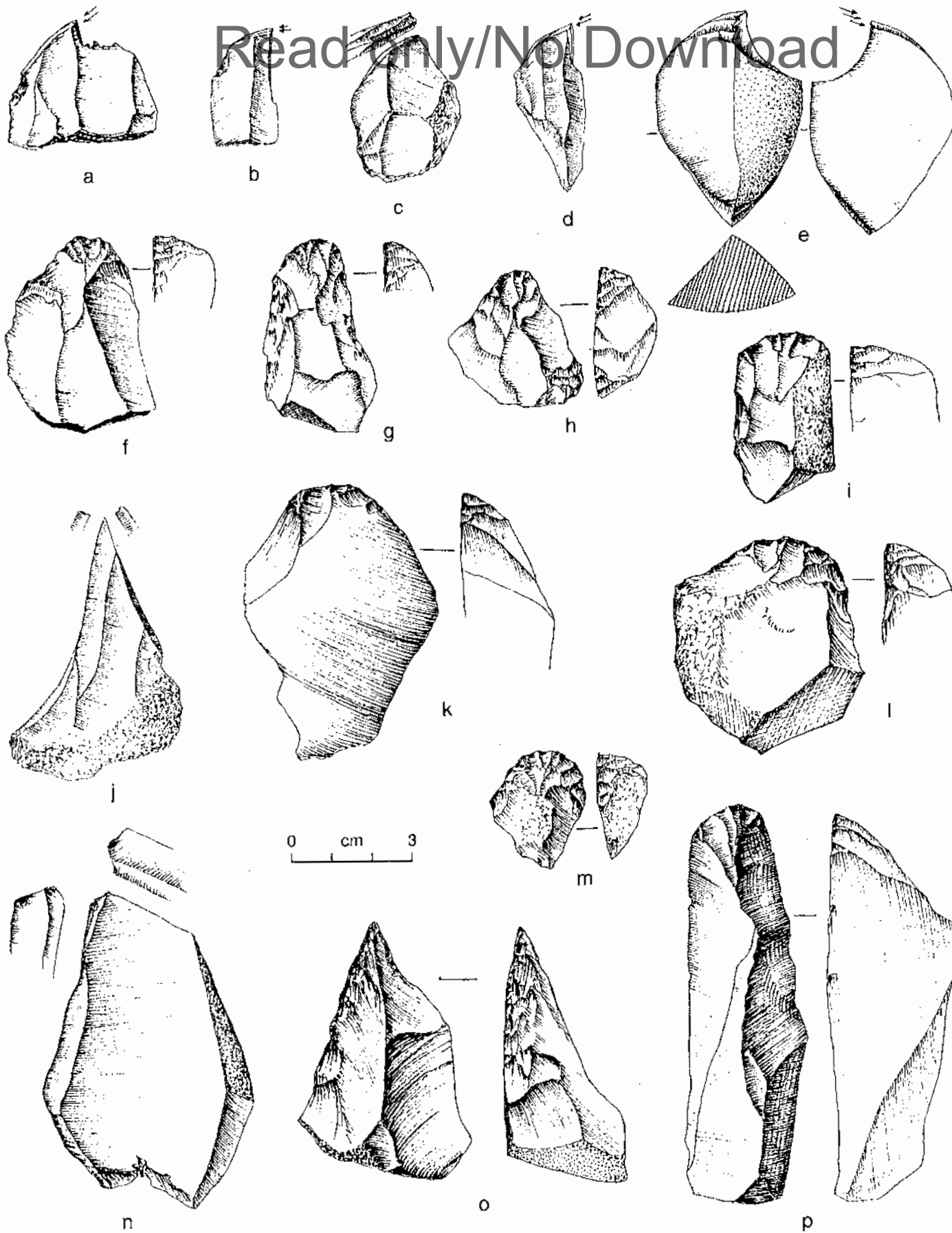


Plate 2. Couche D: the Aurignacian industry

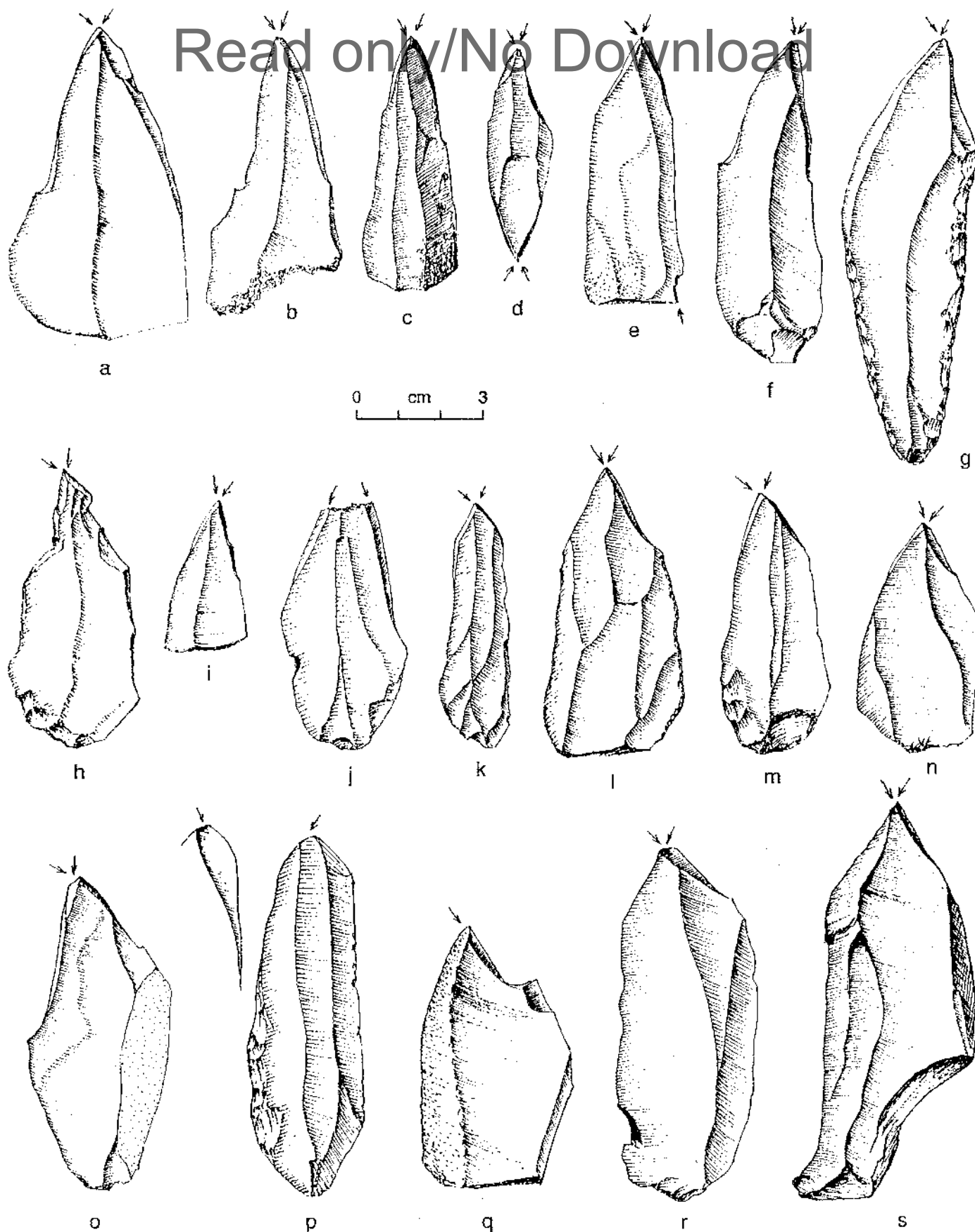


Plate 3. Couche 3-A (Early Magdalenian): dihedral burins

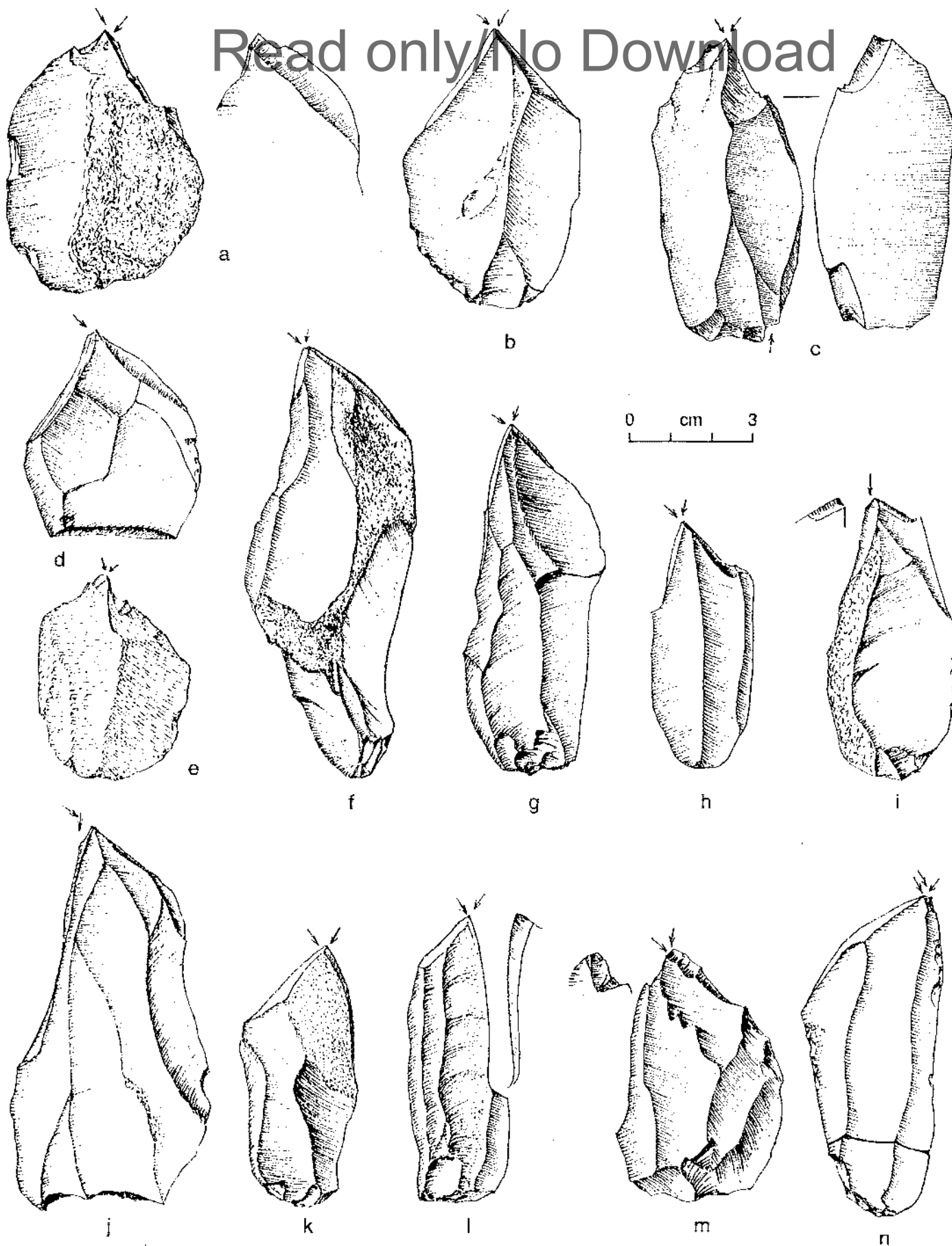


Plate 4. Couche 3-A (Early Magdalenian): dihedral burins

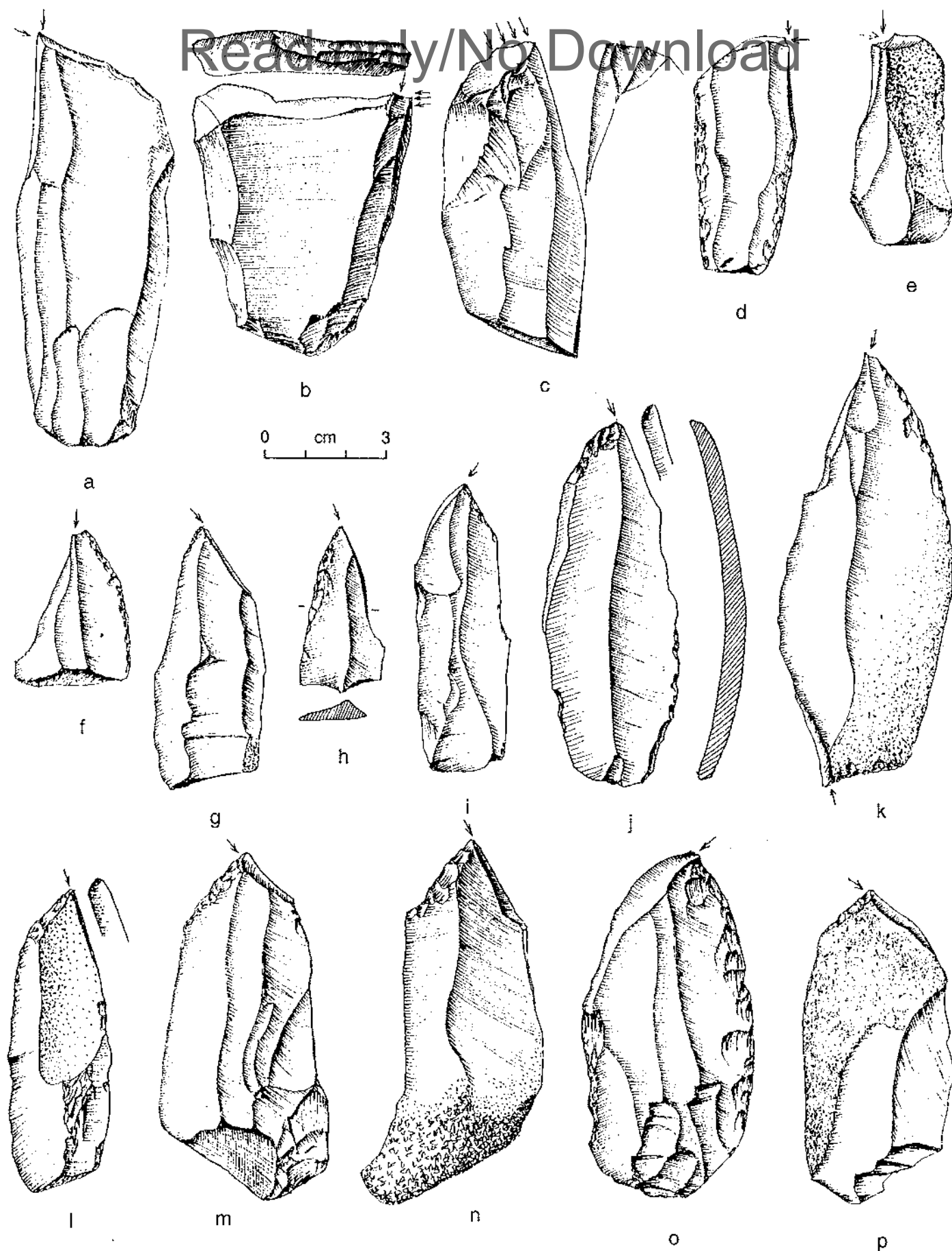


Plate 5. Couche 3-A (Early Magdalenian): dihedral (a–e) and truncation (f–p) burins

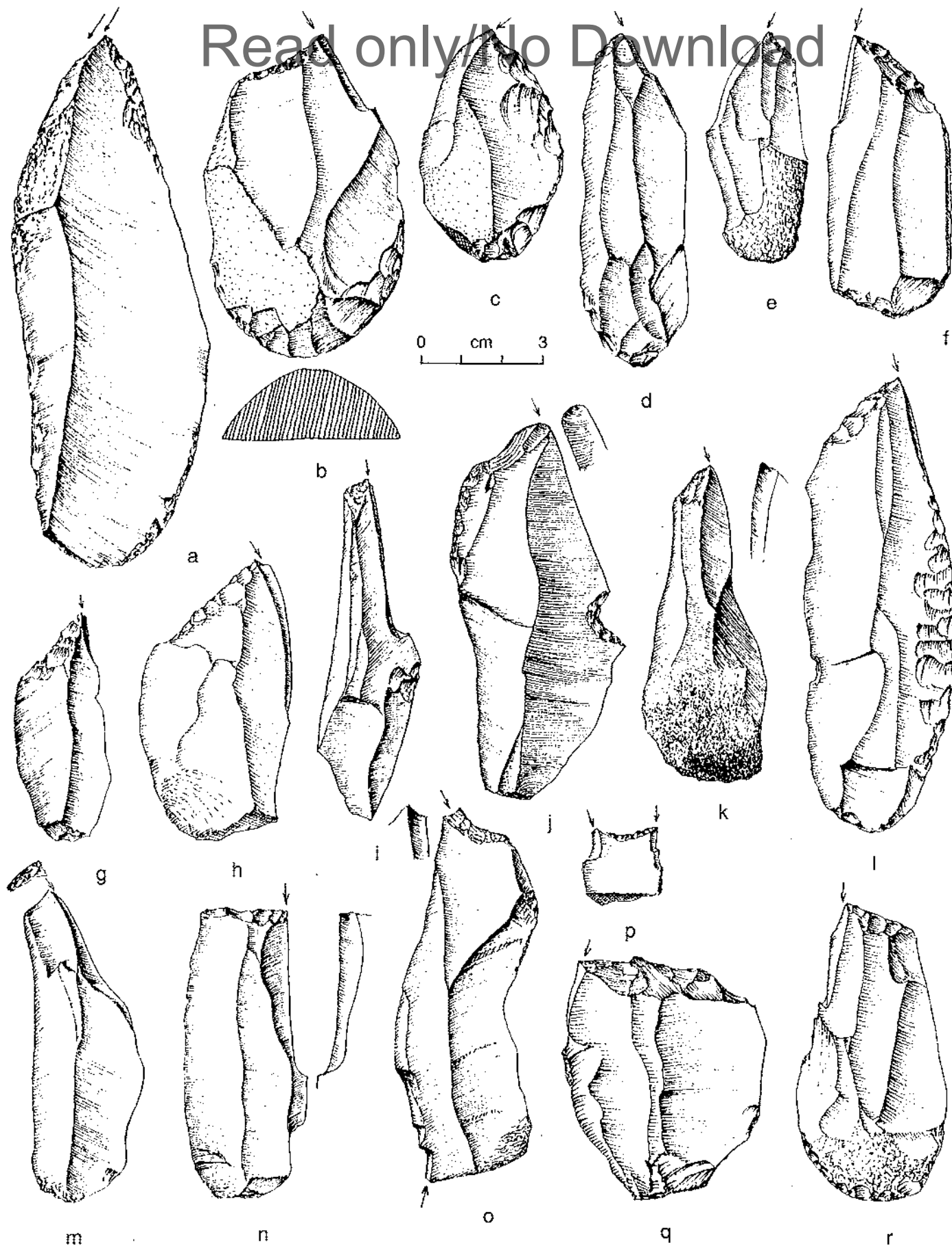


Plate 6. Couche 3-A (Early Magdalenian): truncation burins

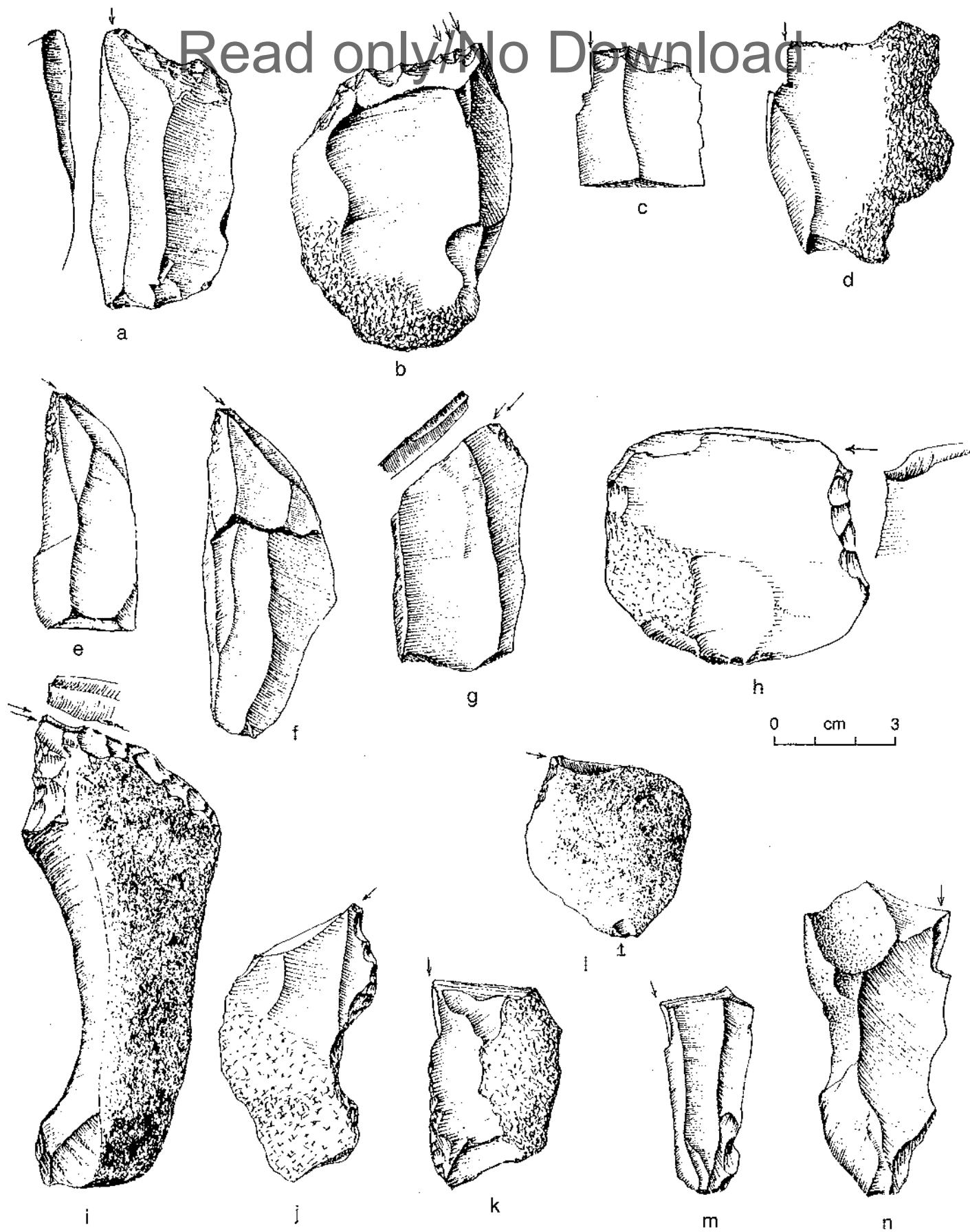


Plate 7. Couche 3-A (Early Magdalenian): truncation (a-j) and break (k-n) burins

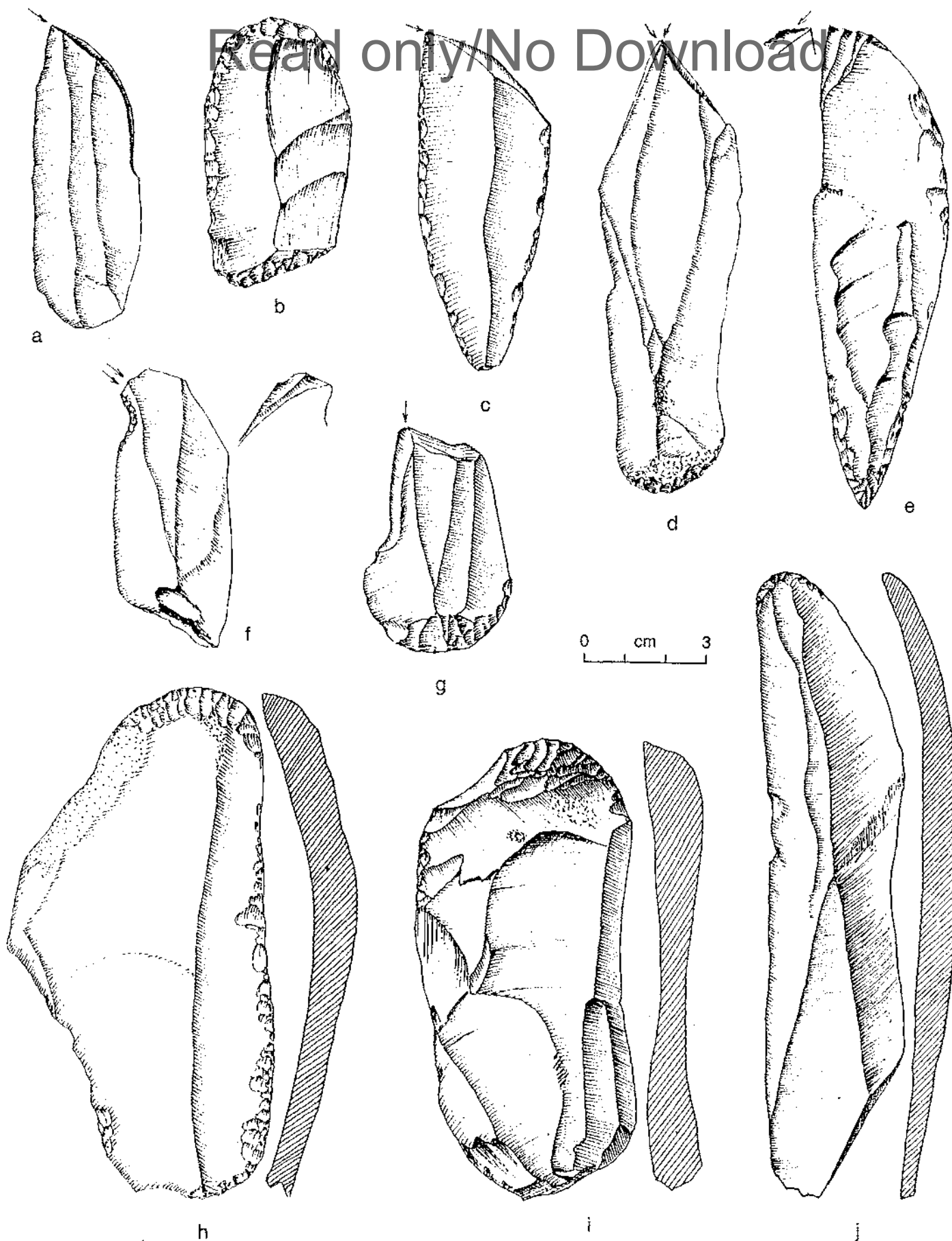


Plate 8. Couche 3-A (Early Magdalenian): composite pieces (a-g) and endscrapers (h-j)

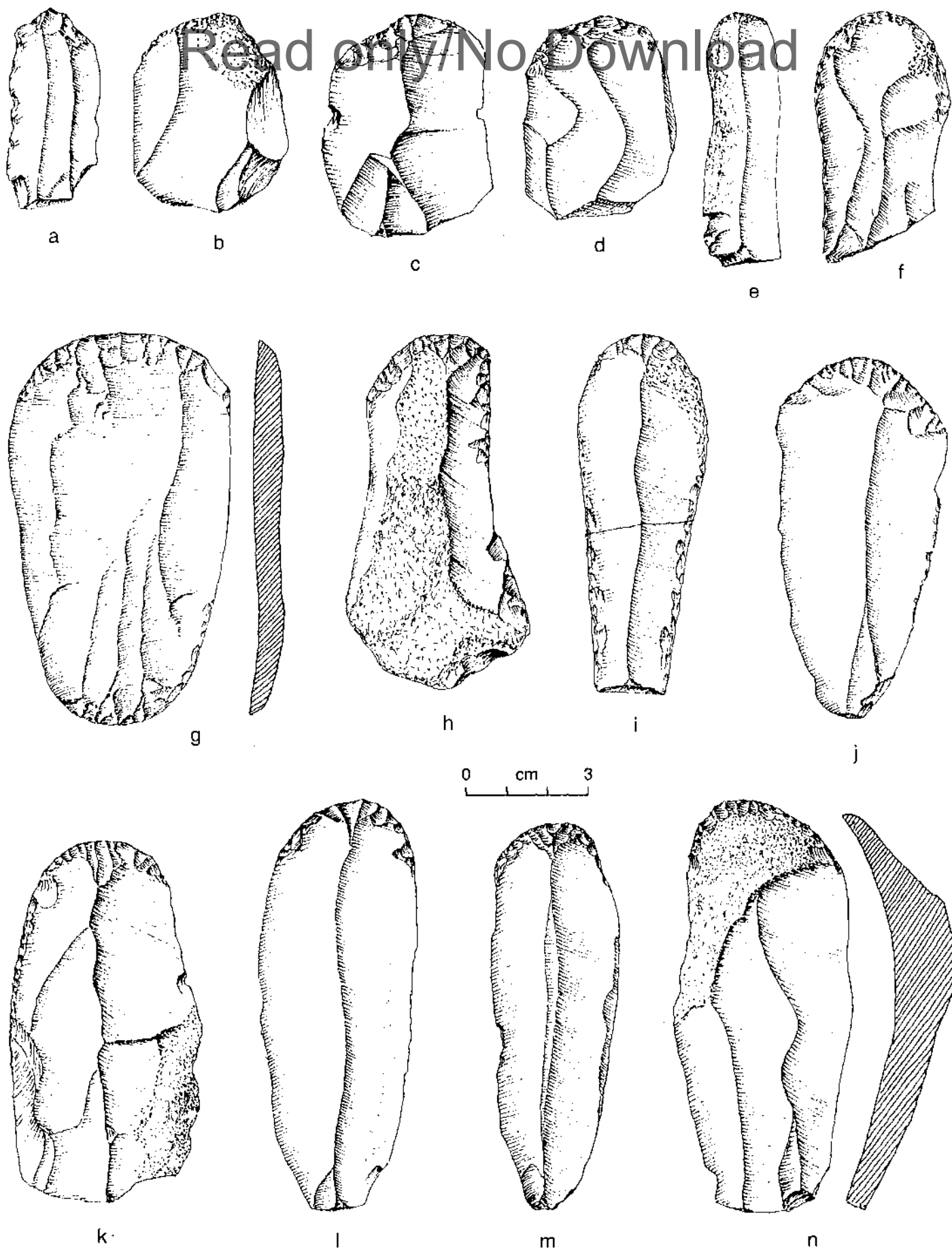


Plate 9. Couche 3-A (Early Magdalenian): endscrapers

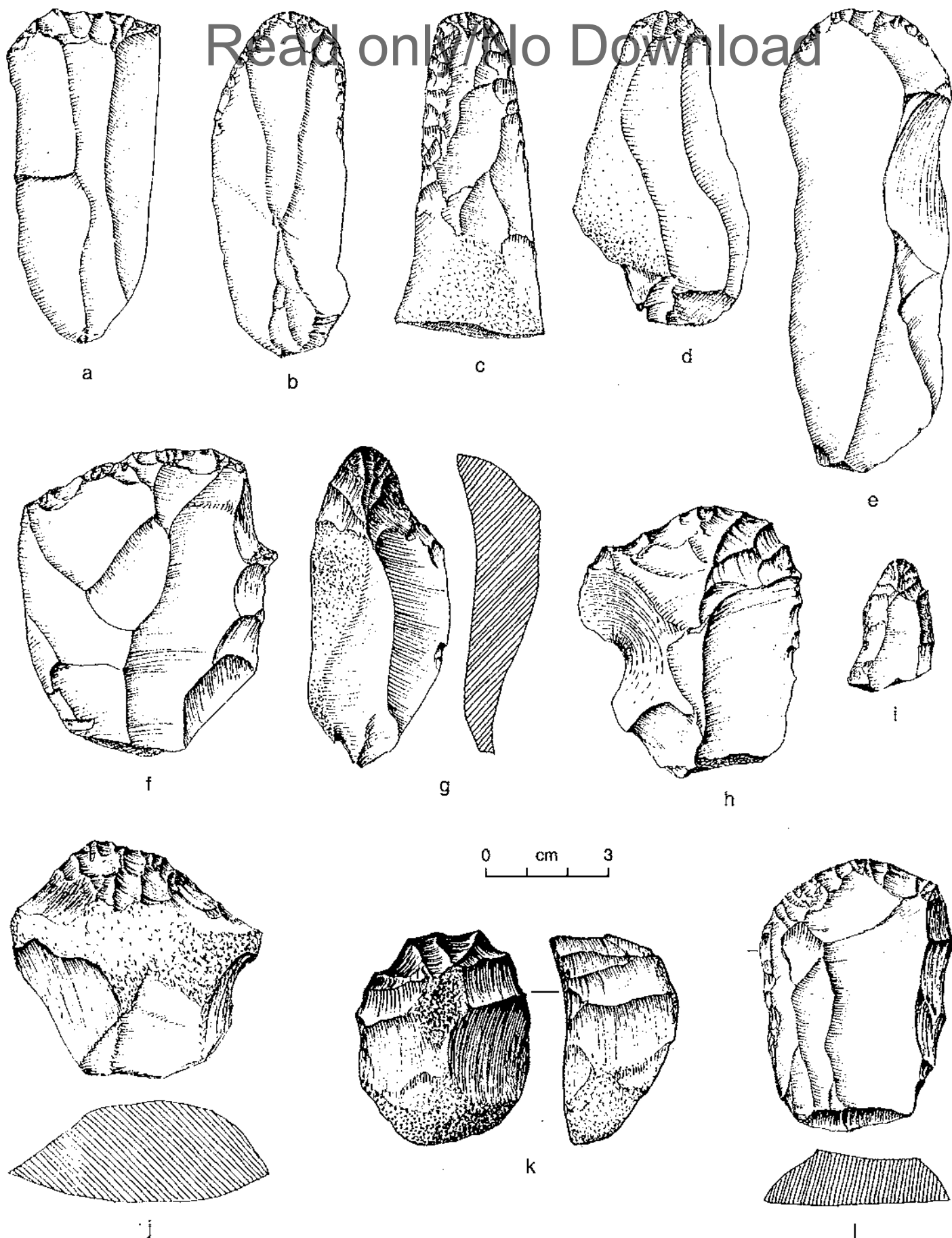


Plate 10. Couche 3-A (Early Magdalenian): endscrapers (a-e) and miscellaneous scrapers (f-l)

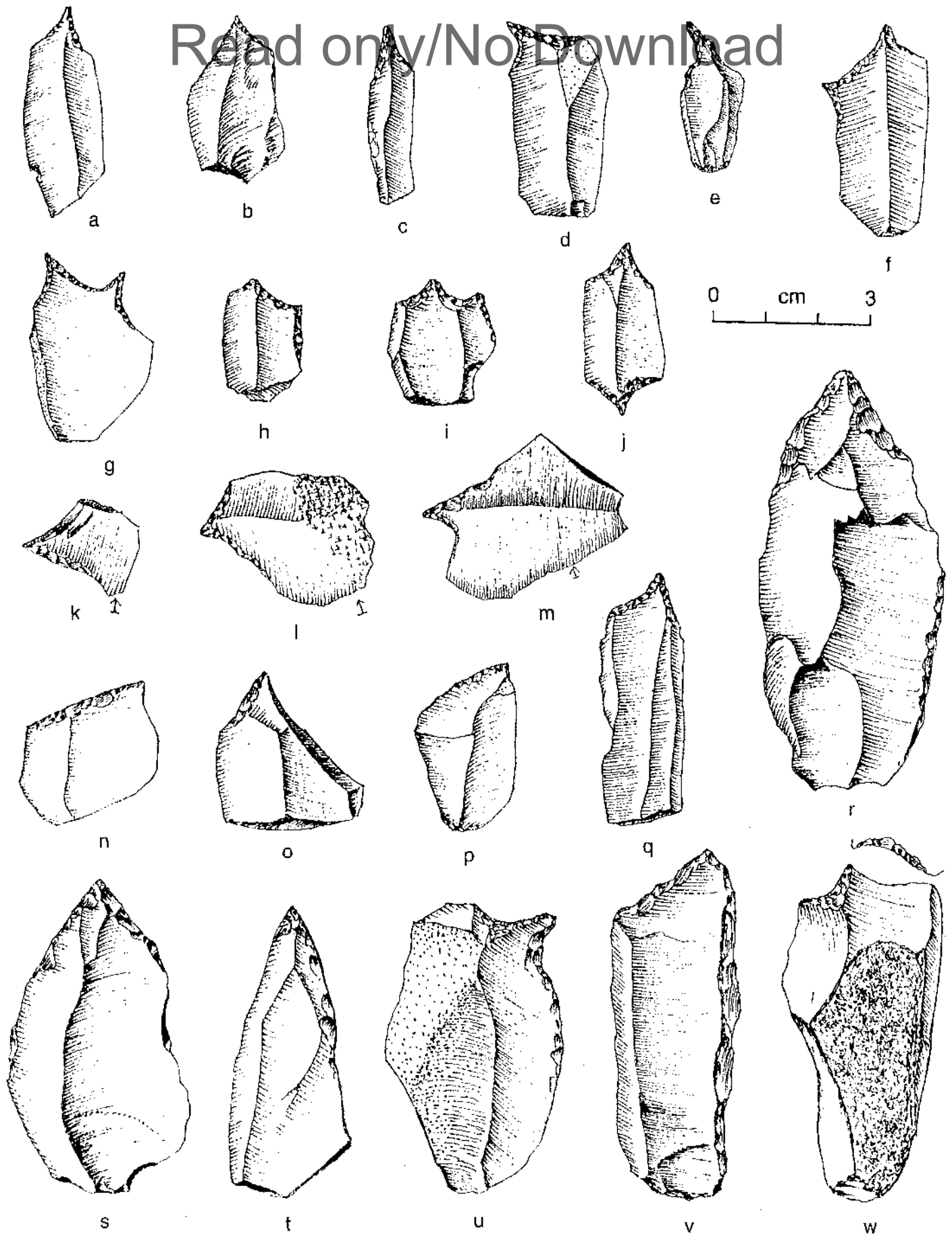


Plate 11. Couche 3-A (Early Magdalenian): microperforators (a-q) and perforators (r-w)

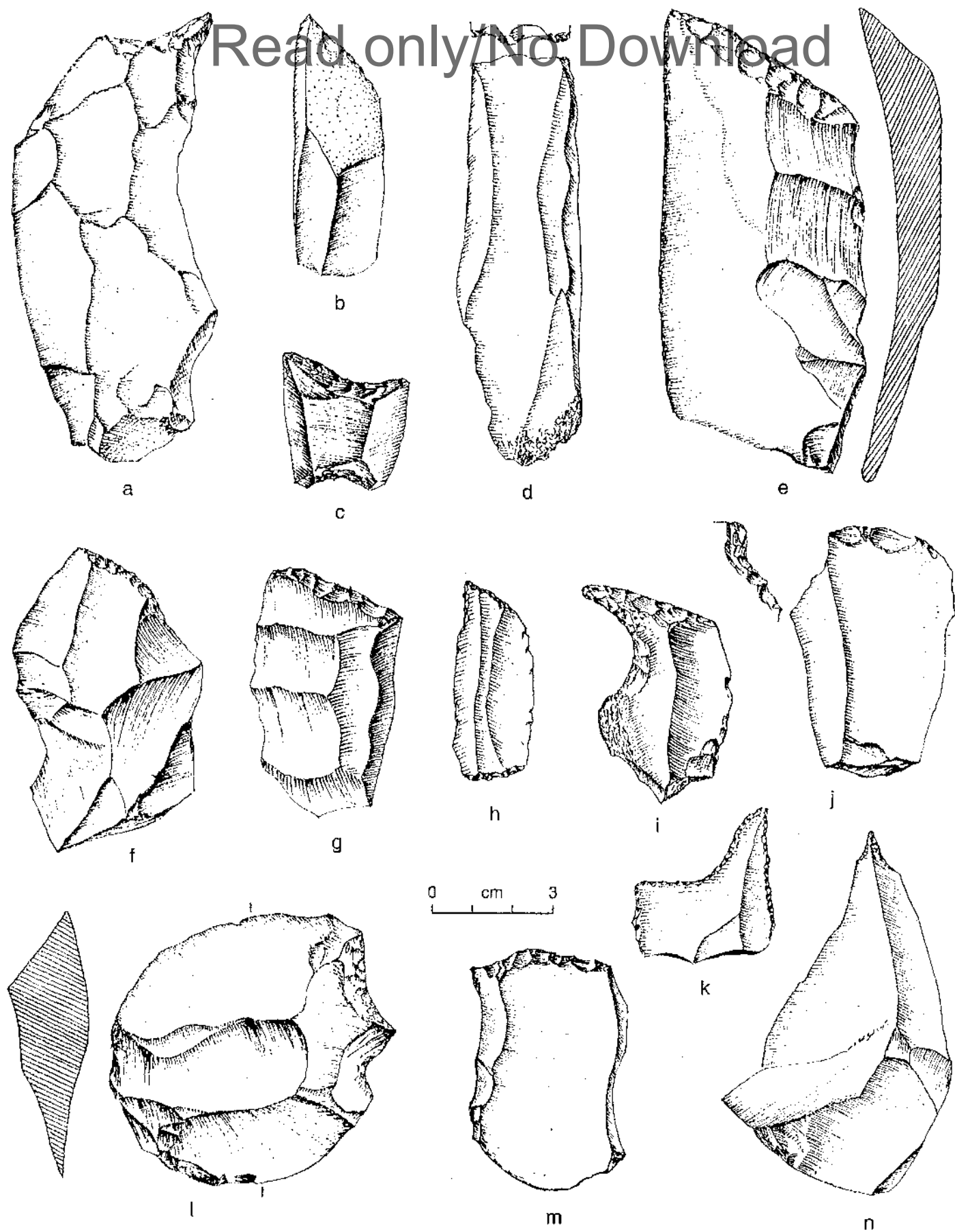


Plate 12. Couche 3-A (Early Magdalenian): perforators (a, i, k-n) and truncations (b-g, j)

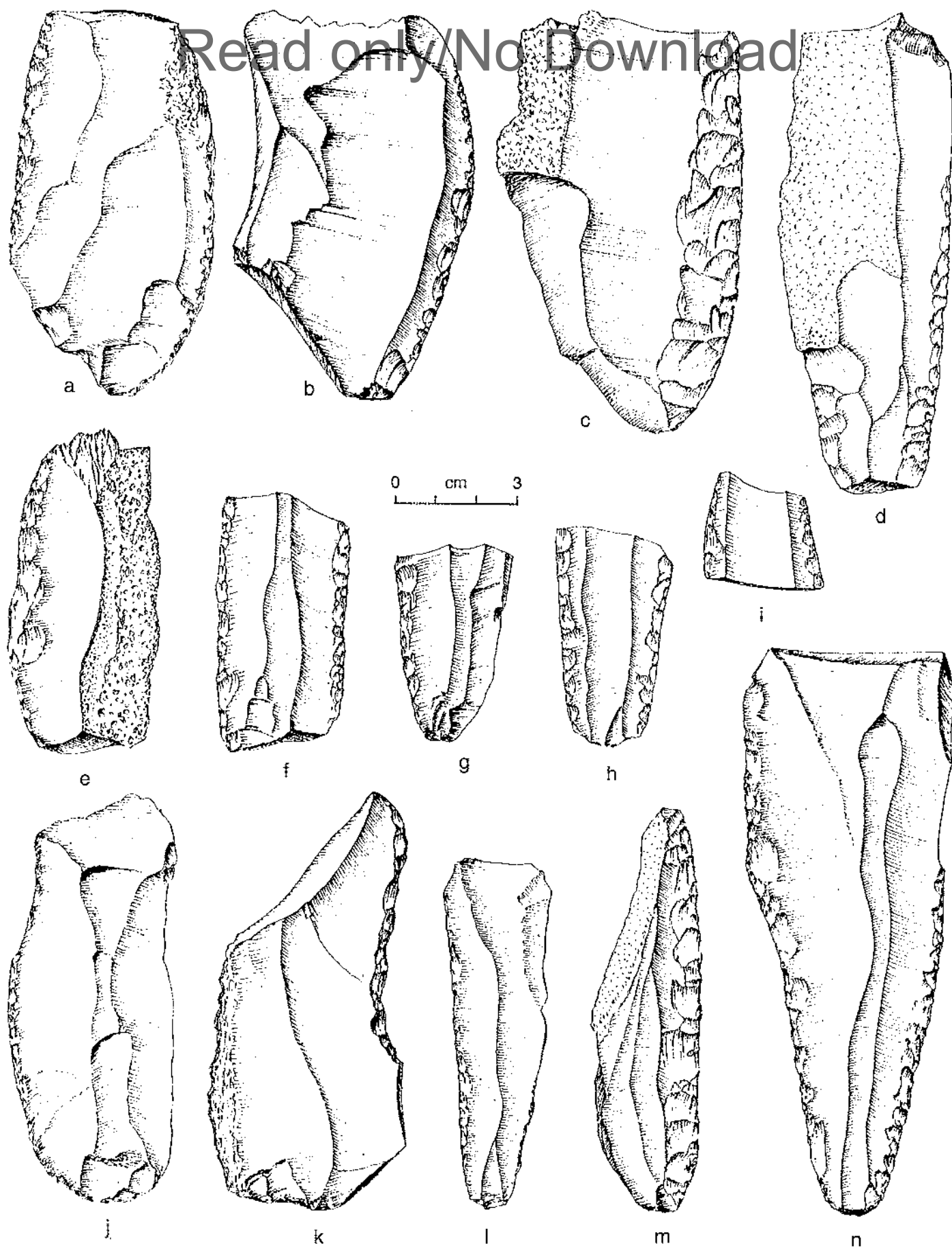


Plate 13. Couche 3-A (Early Magdalenian): marginally retouched pieces

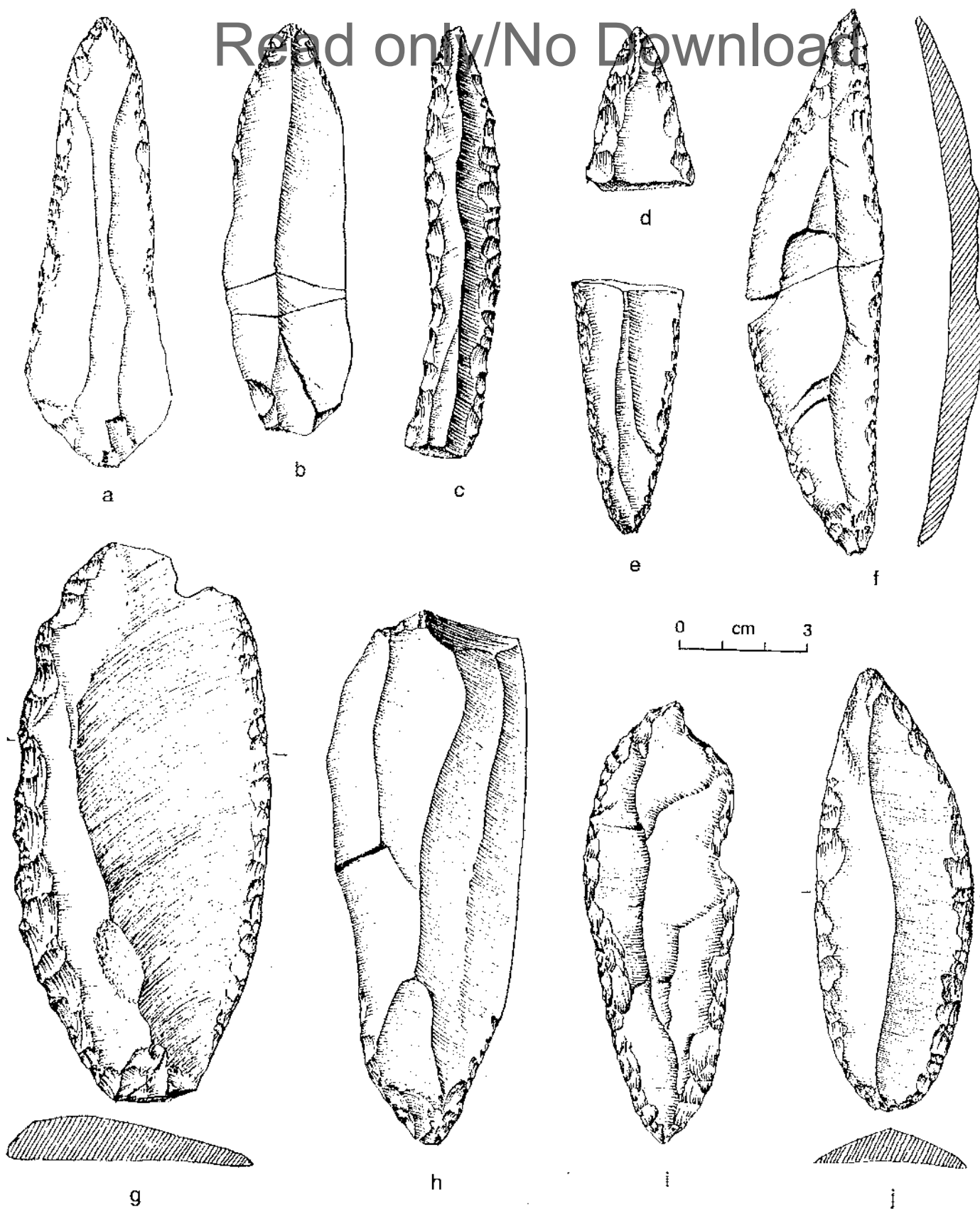


Plate 14. Couche 3-A (Early Magdalenian): retouched points and arced piece (g)

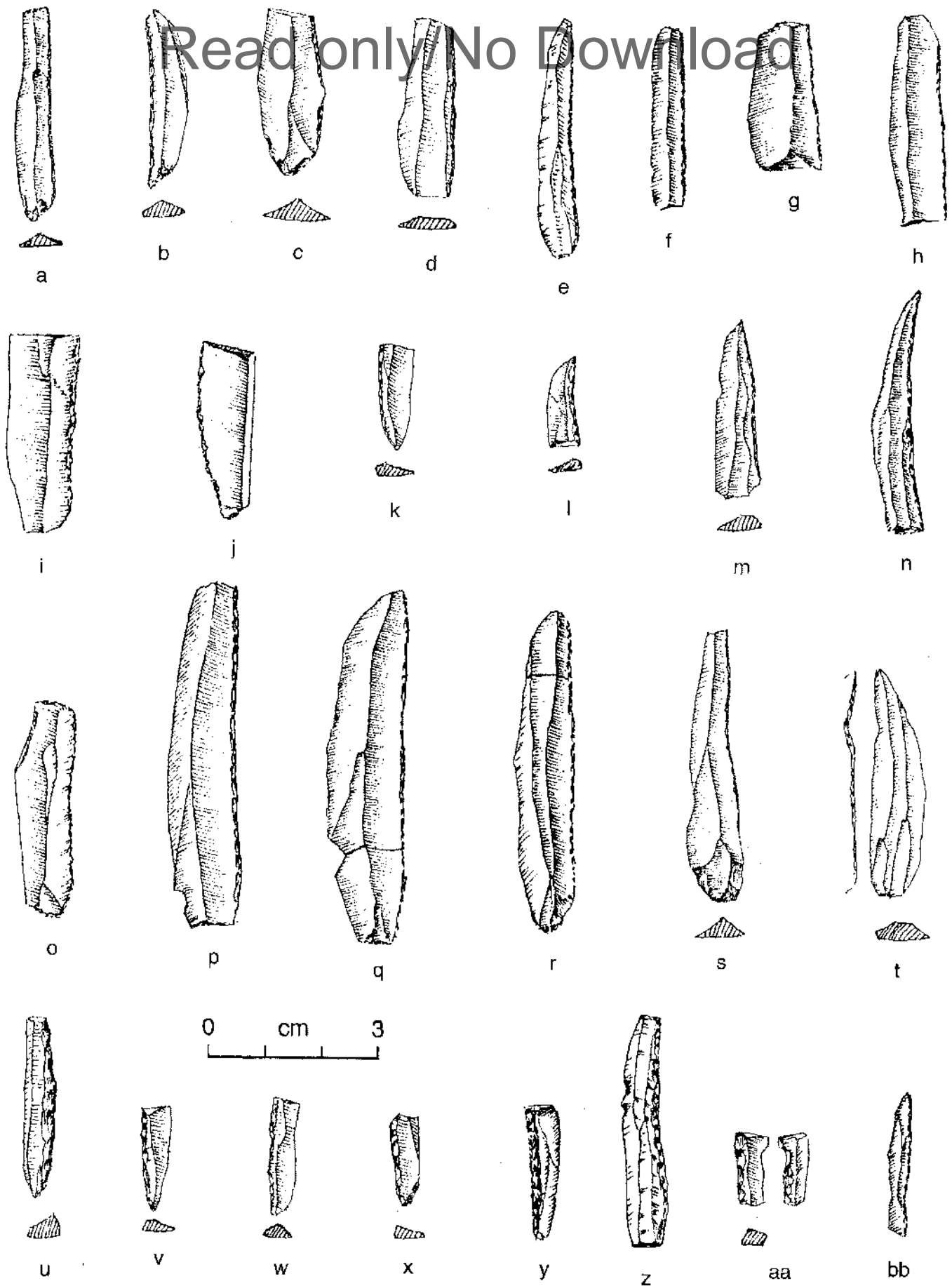


Plate 15. Couche 3-A (Early Magdalenian): retouched bladelets

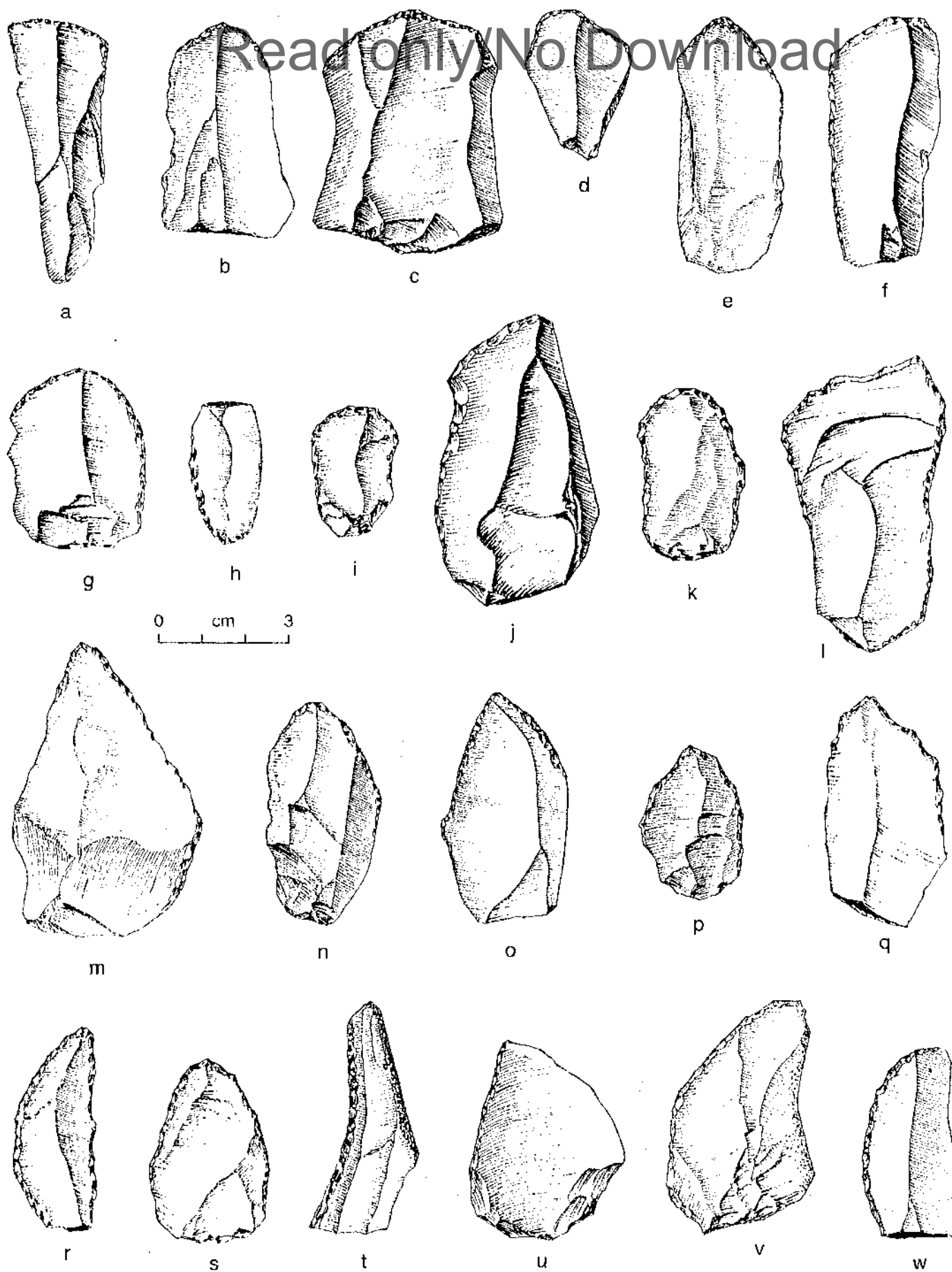


Plate 16. Couche 3-A (Early Magdalenian): long raciettes

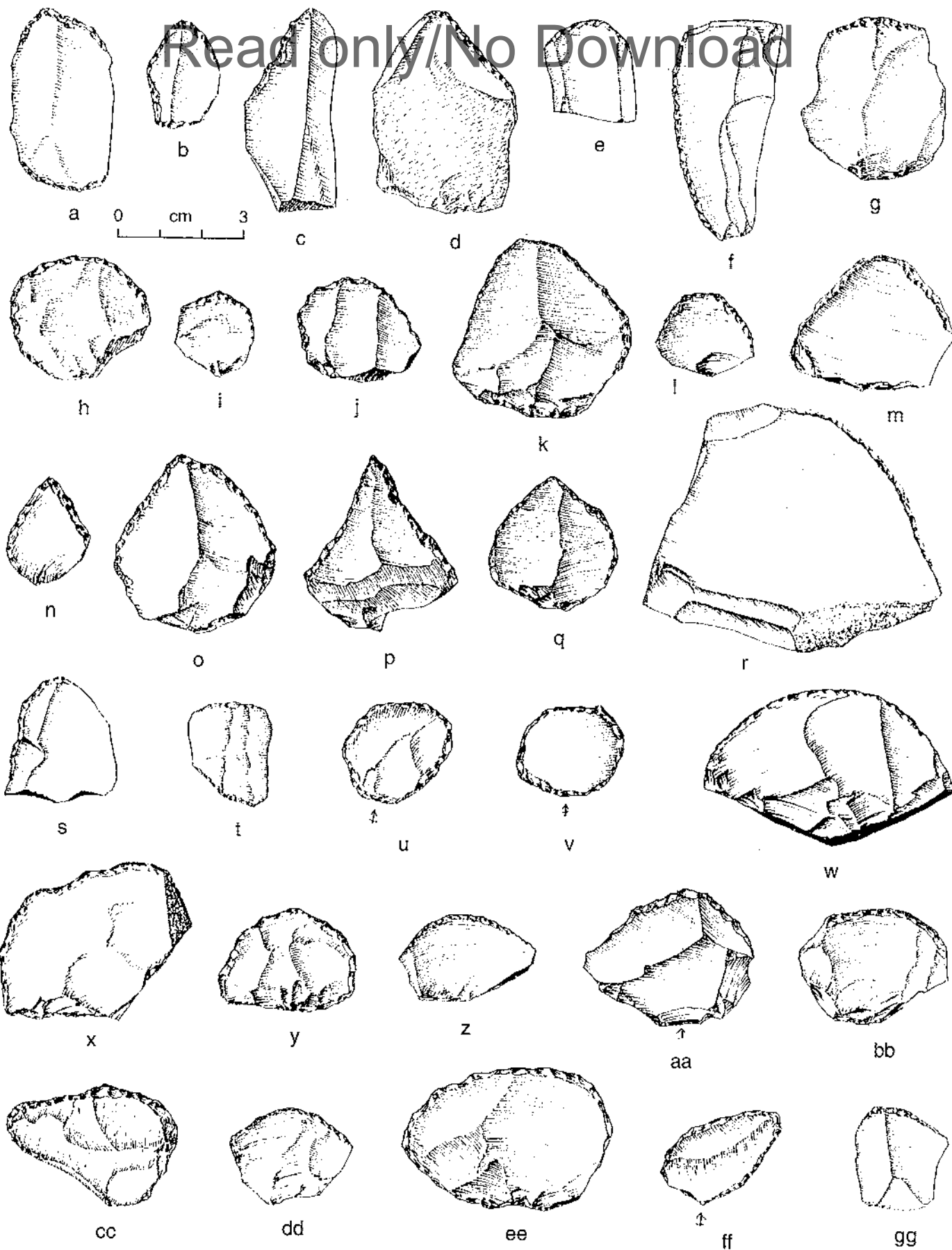


Plate 17. Couche 3-A (Early Magdalenian): long (a-g), short (h-v), and side (w-gg) raciettes

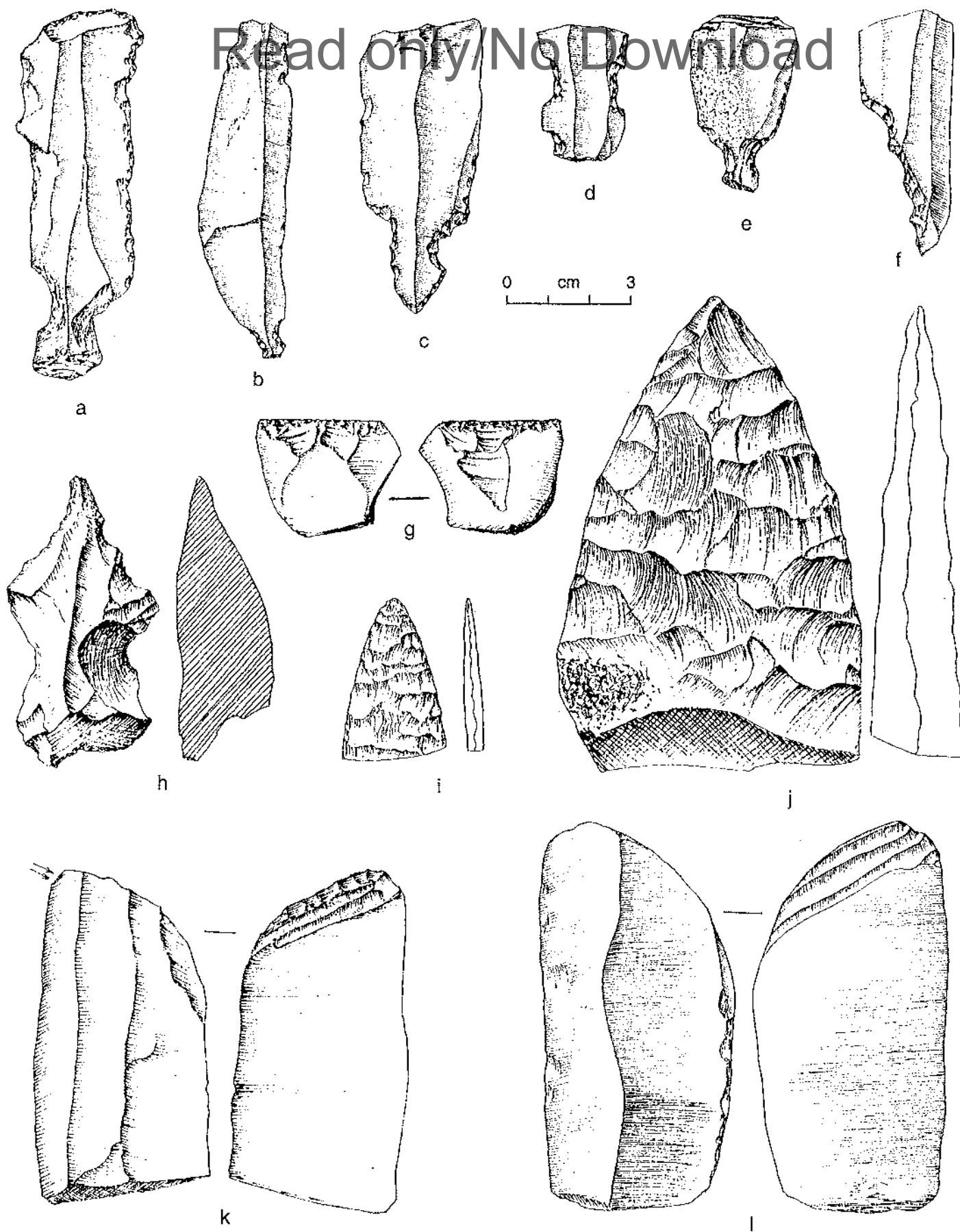


Plate 18. Couche 3-A (Early Magdalenian): diverse and miscellaneous pieces

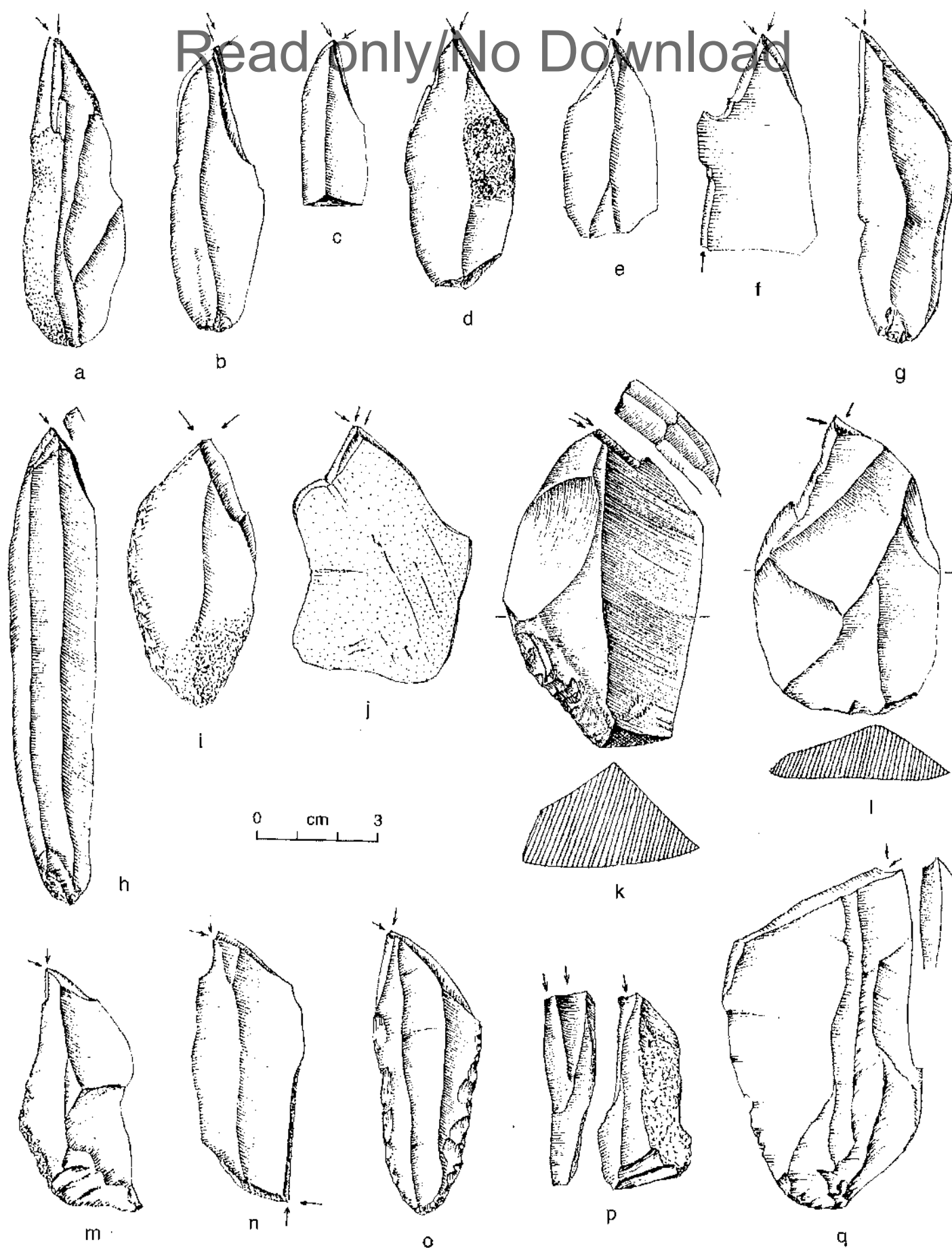


Plate 19. Couche I/II (Middle Magdalenian): dihedral burins

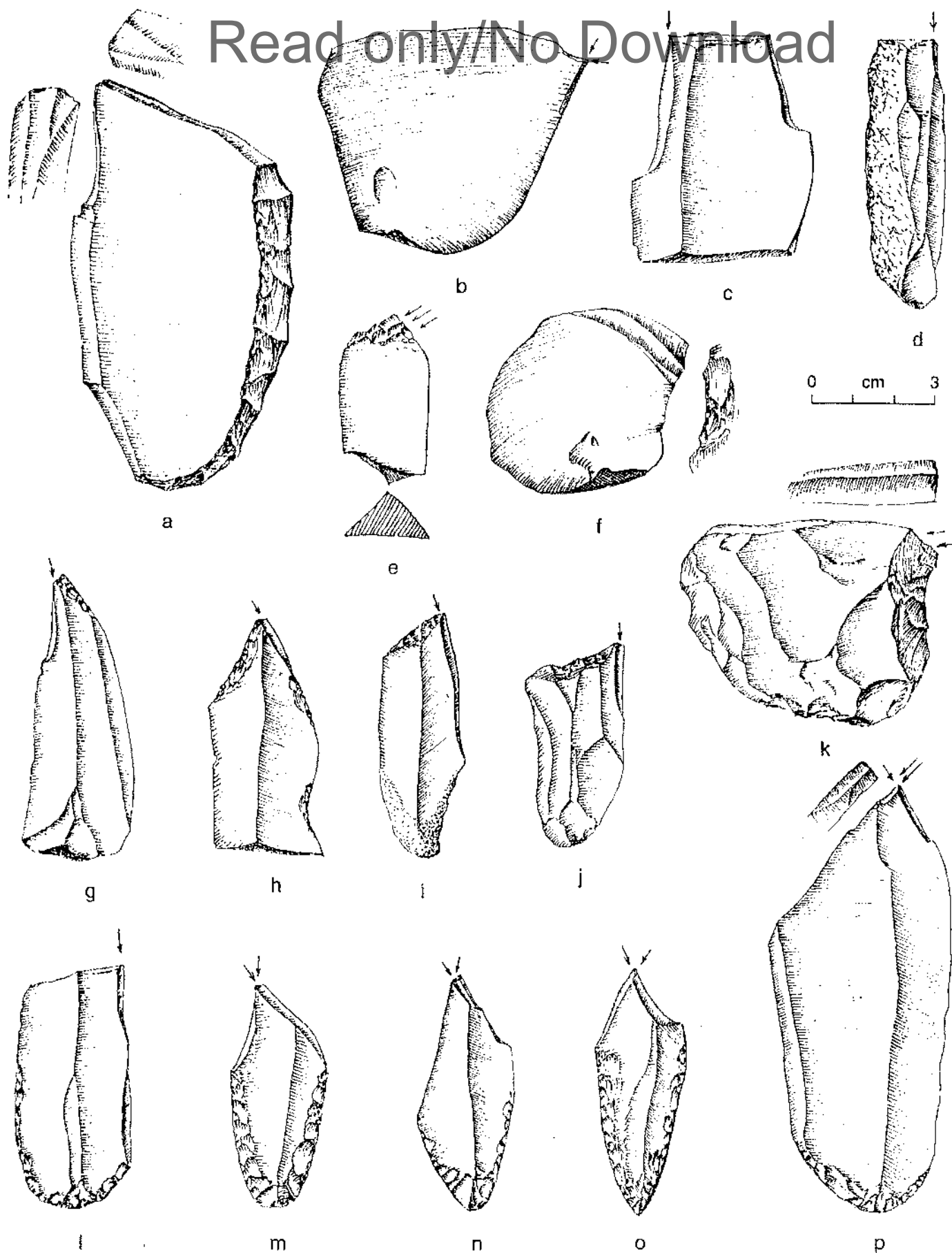


Plate 20. Couche I/II (Middle Magdalenian): burins (a-k) and composite (l-p) pieces

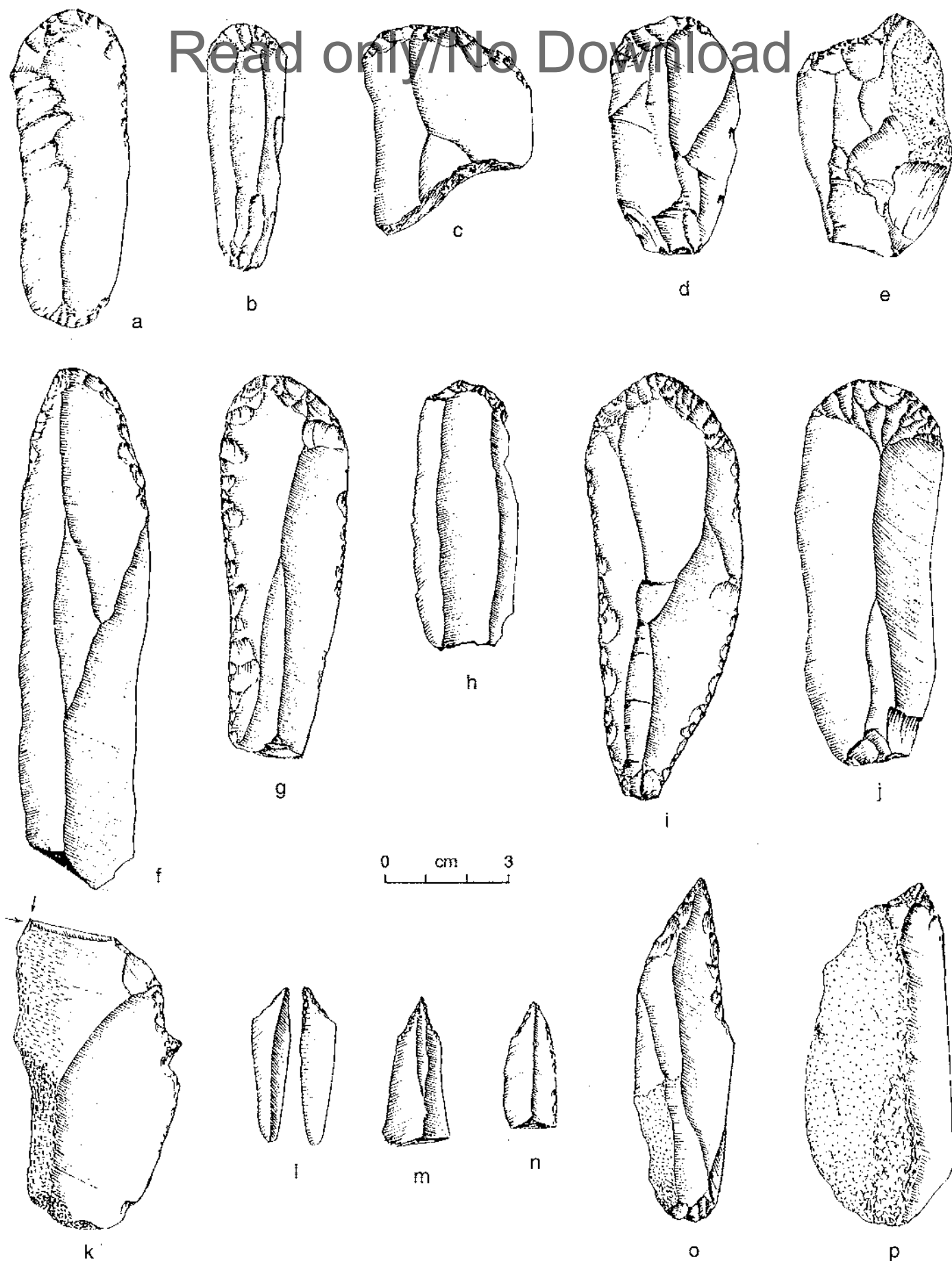


Plate 21. Couche I/II (Middle Magdalenian): scrapers (a–j) and perforators (k–p)

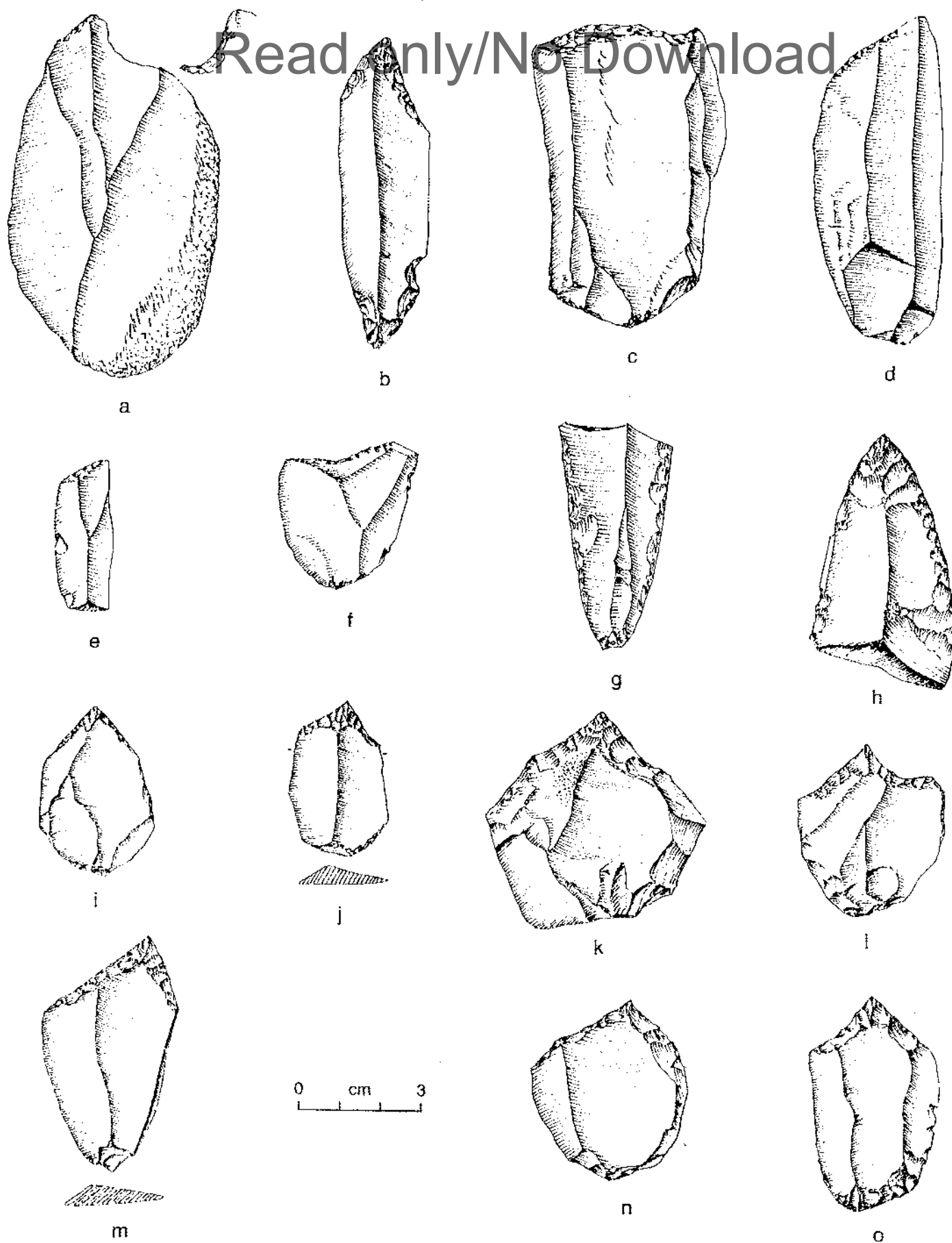


Plate 22. Couche I/II (Middle Magdalenian): truncations (a-f), marginally retouched piece (g), and points (h-o)

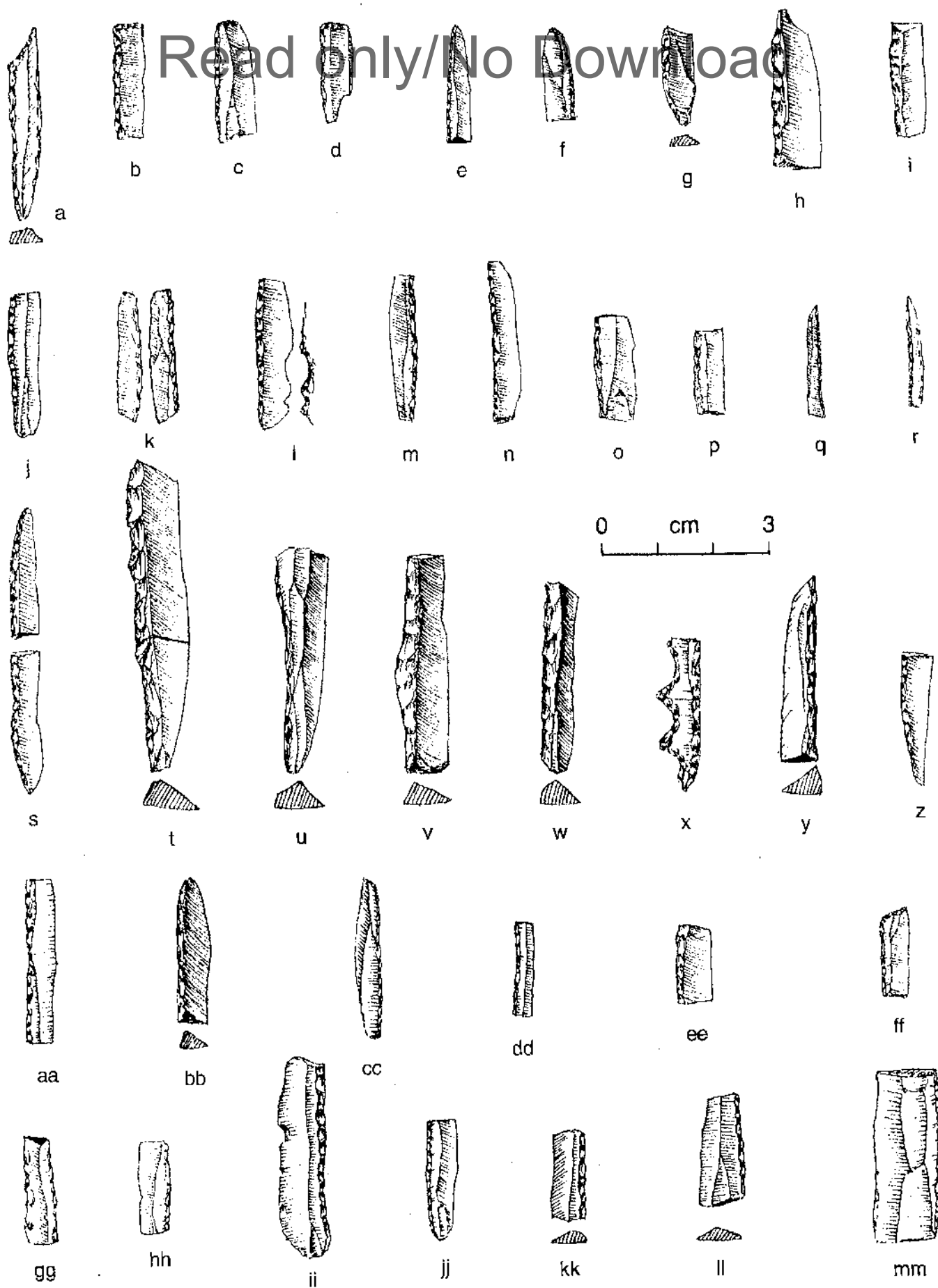


Plate 23. Couche I/II (Middle Magdalenian): backed (a–cc) and retouched (dd–mm) bladelets

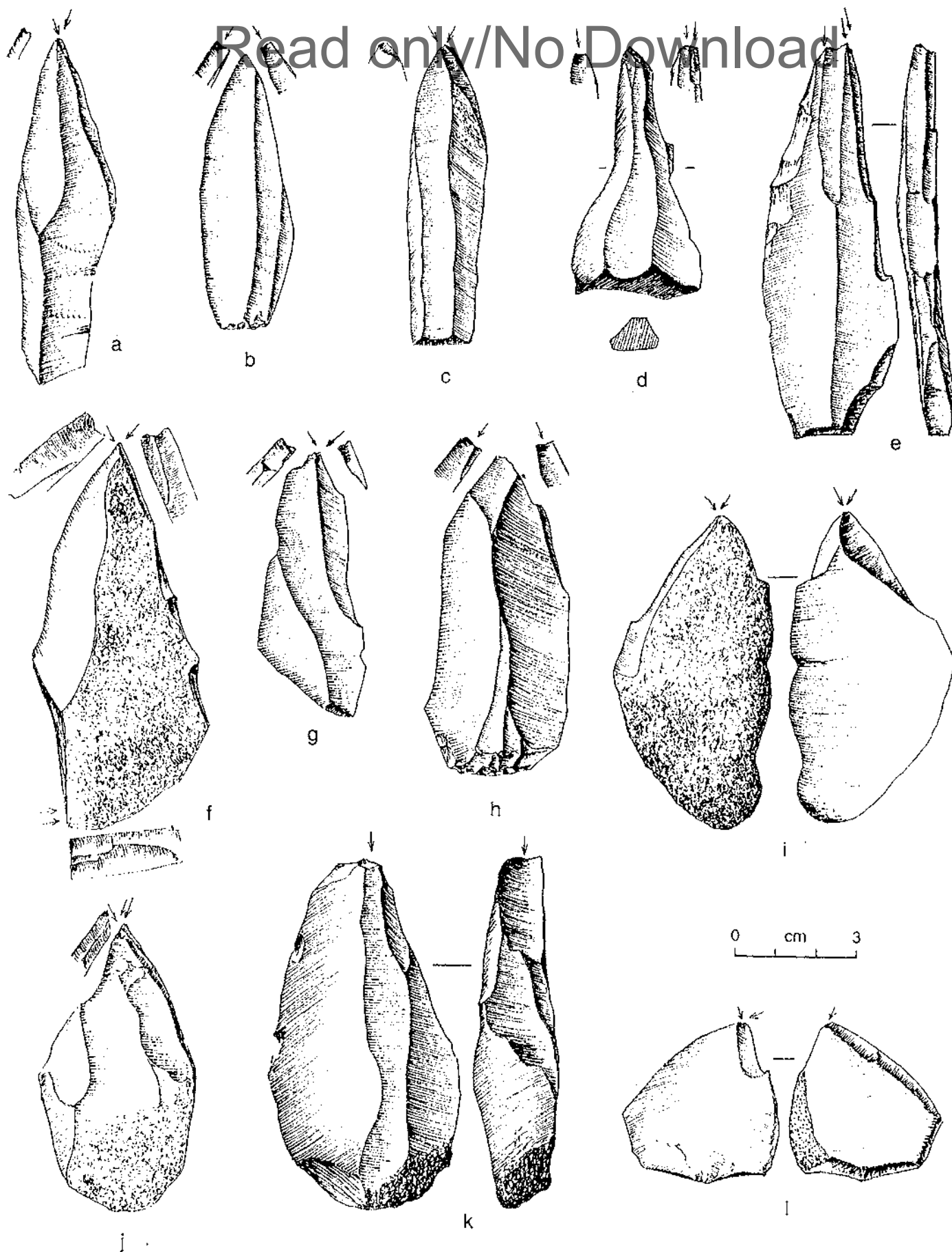


Plate 24. Couche 2-III (Raysse Perigordian): dihedral burins

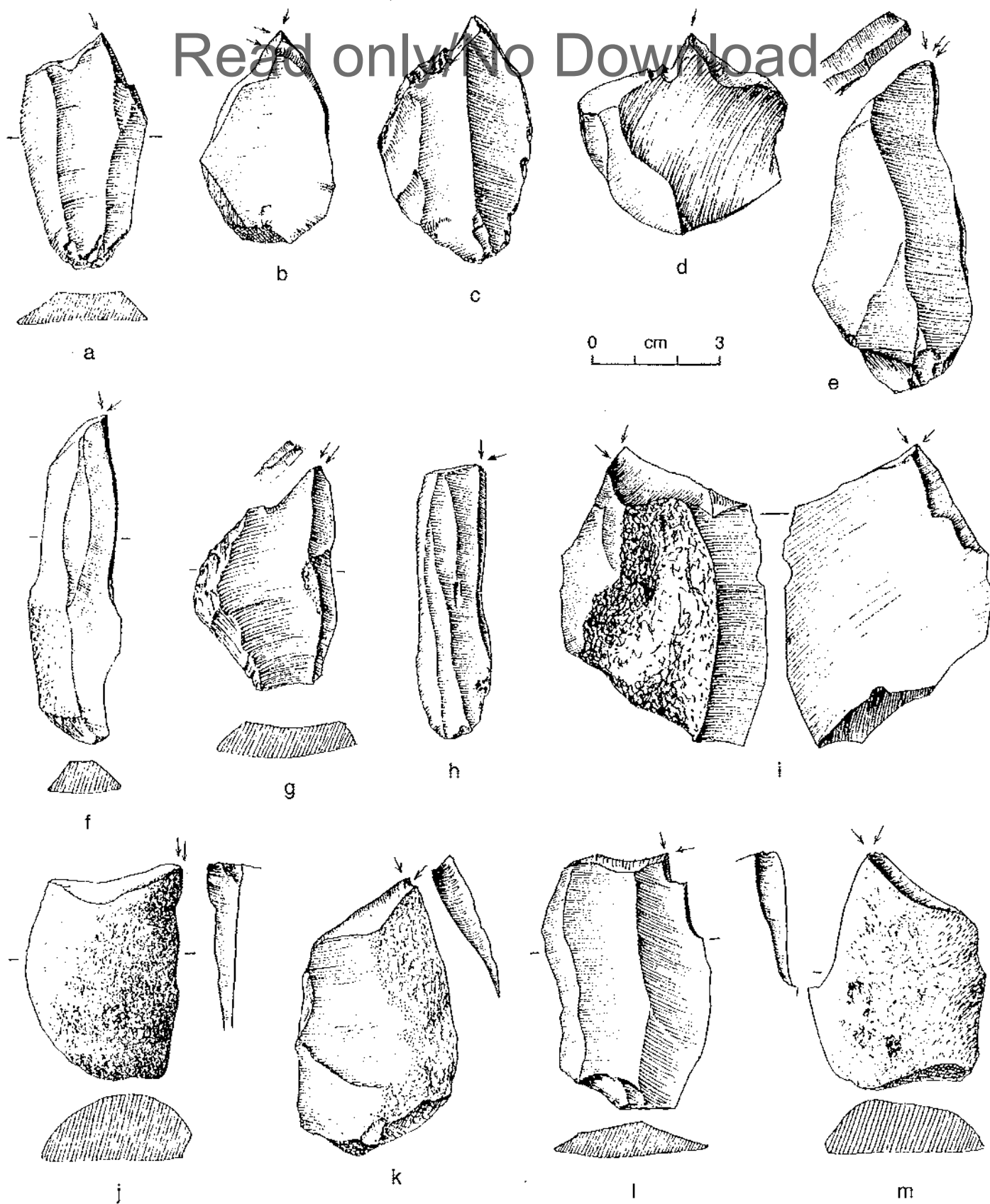


Plate 25. Couche 2-III (Raysse Perigordian): dihedral burins

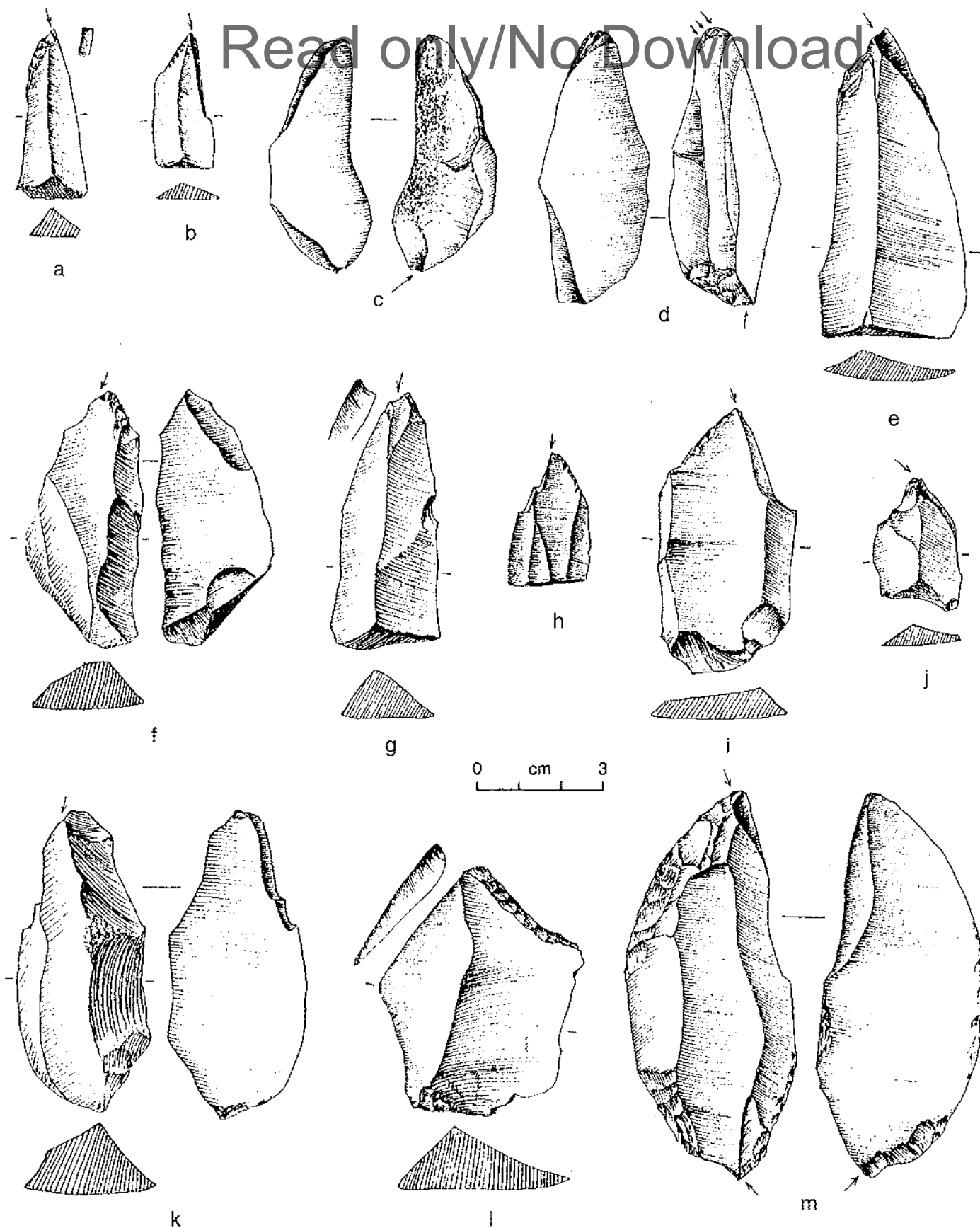


Plate 26. Couche 2-III (Raysse Perigordian): truncation burins

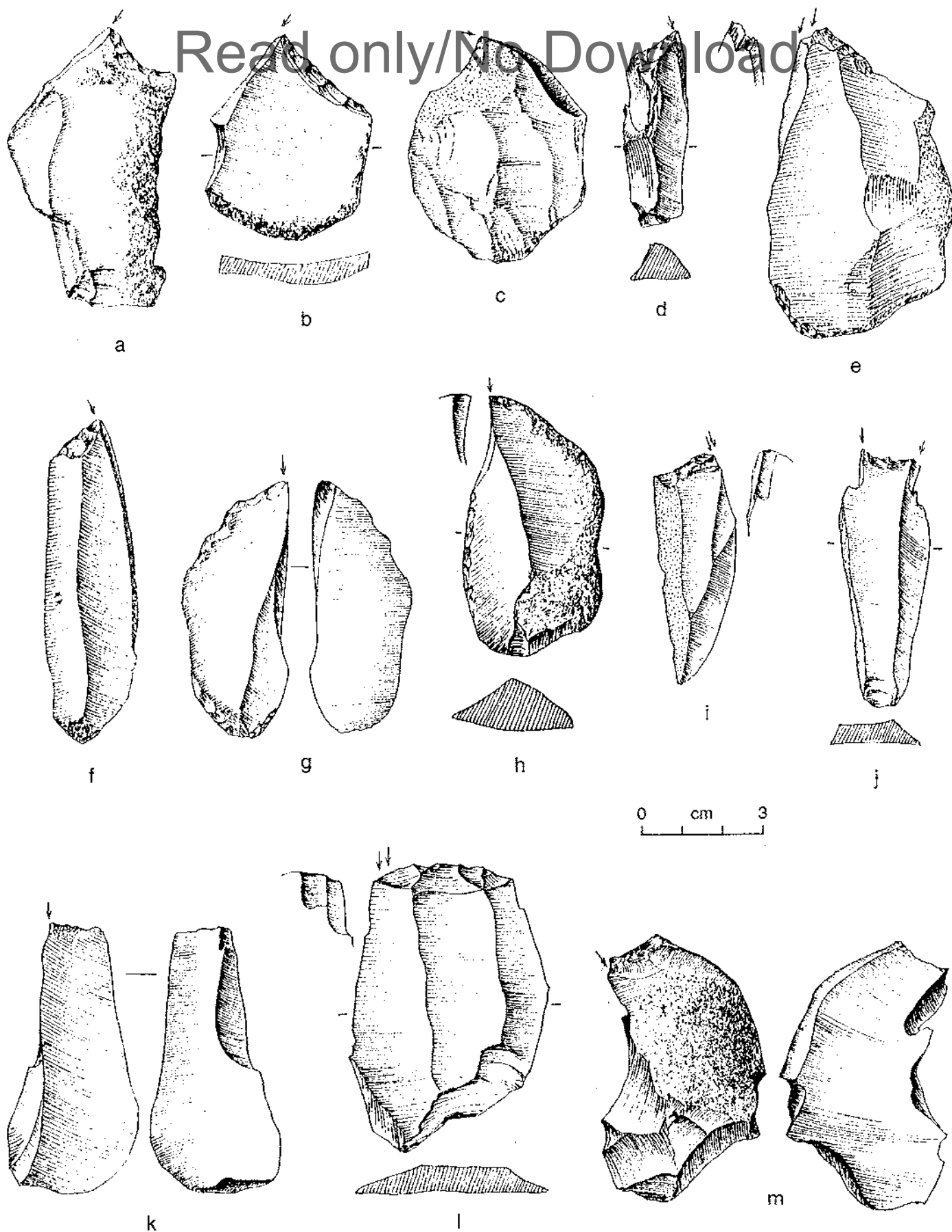


Plate 27. Couche 2-III (Raysse Perigordian): truncation burins

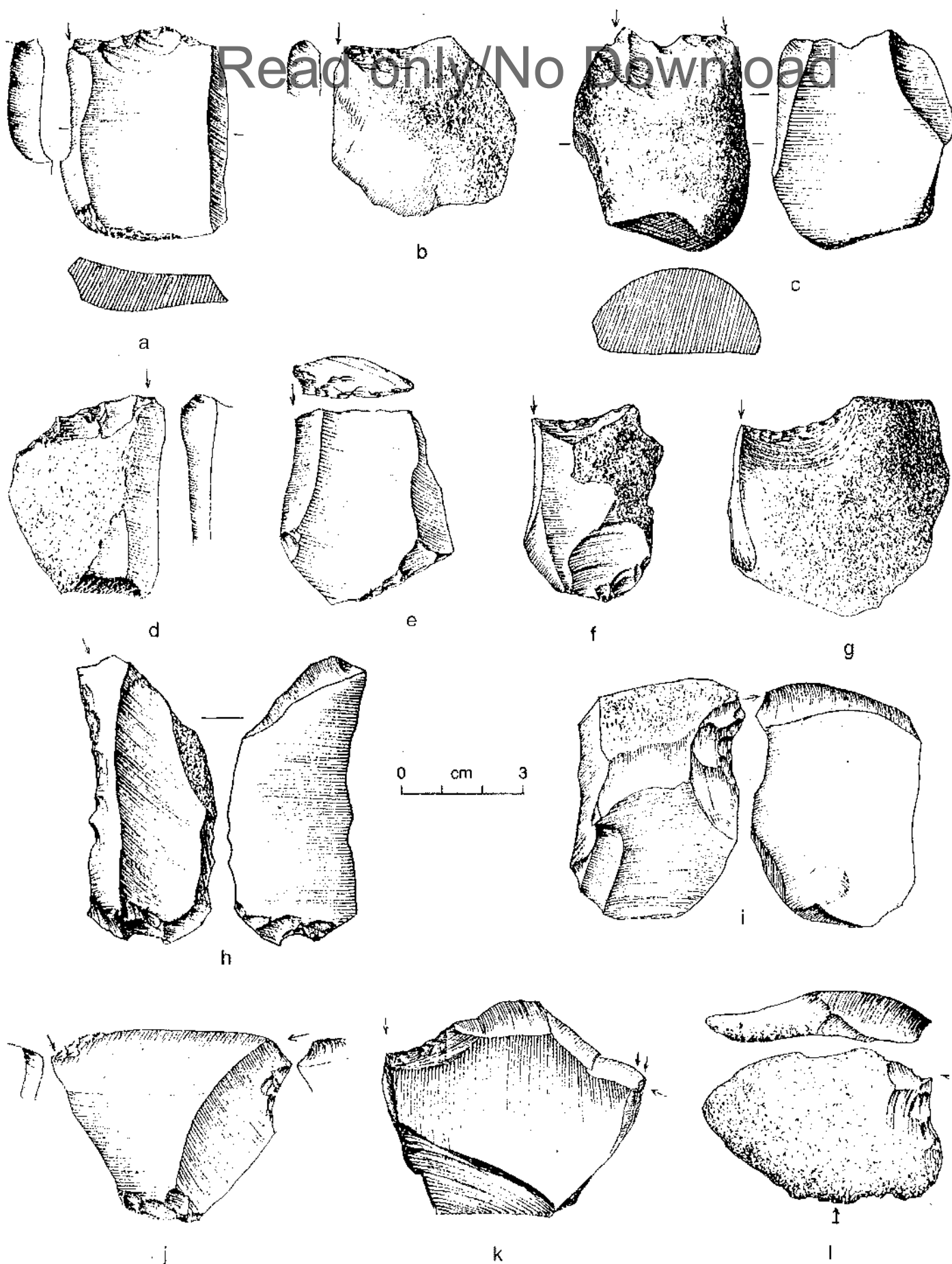


Plate 28. Couche 2-III (Raysse Perigordian): truncation burins

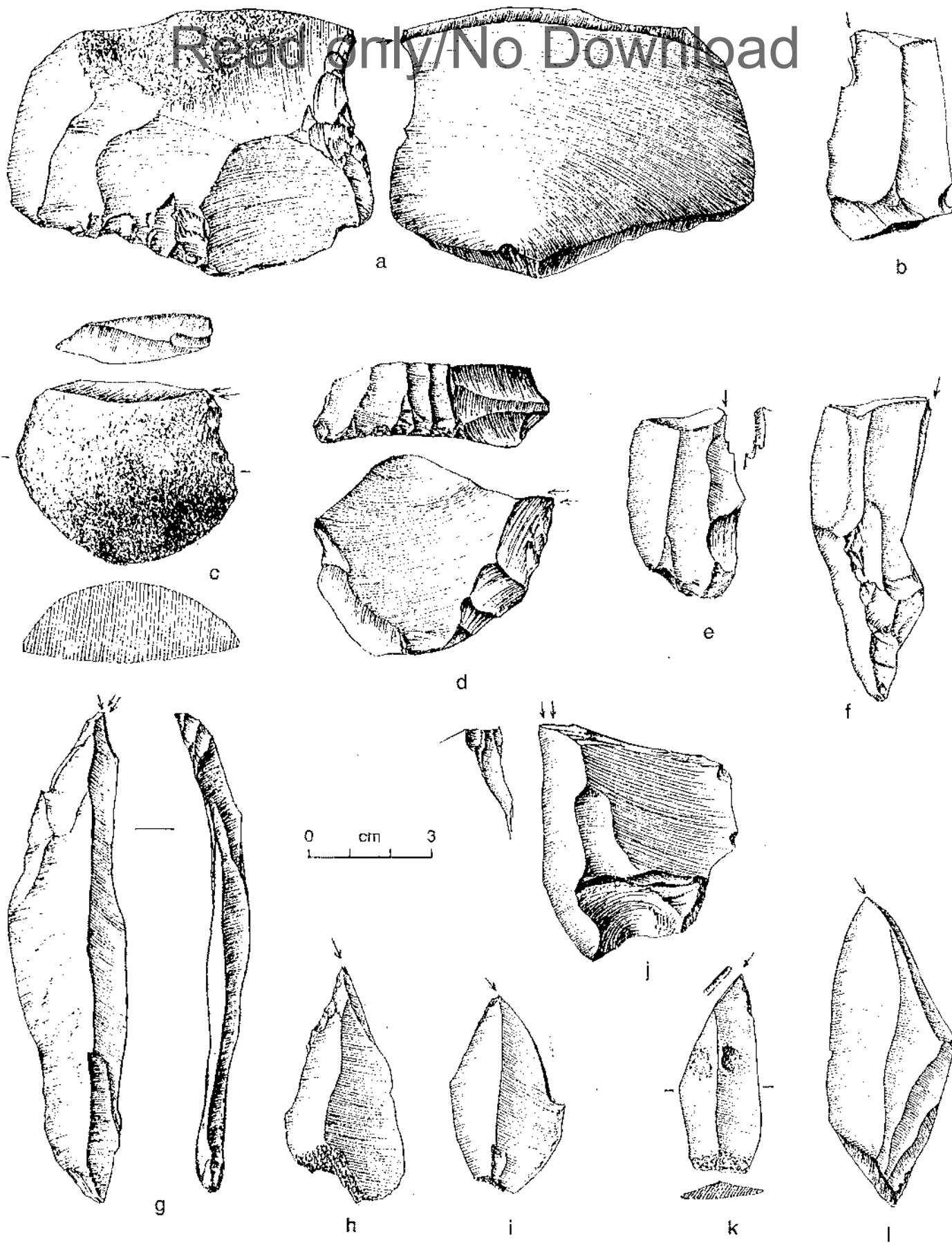


Plate 29. Couche 2-III (Raysse Perigordian): miscellaneous burins

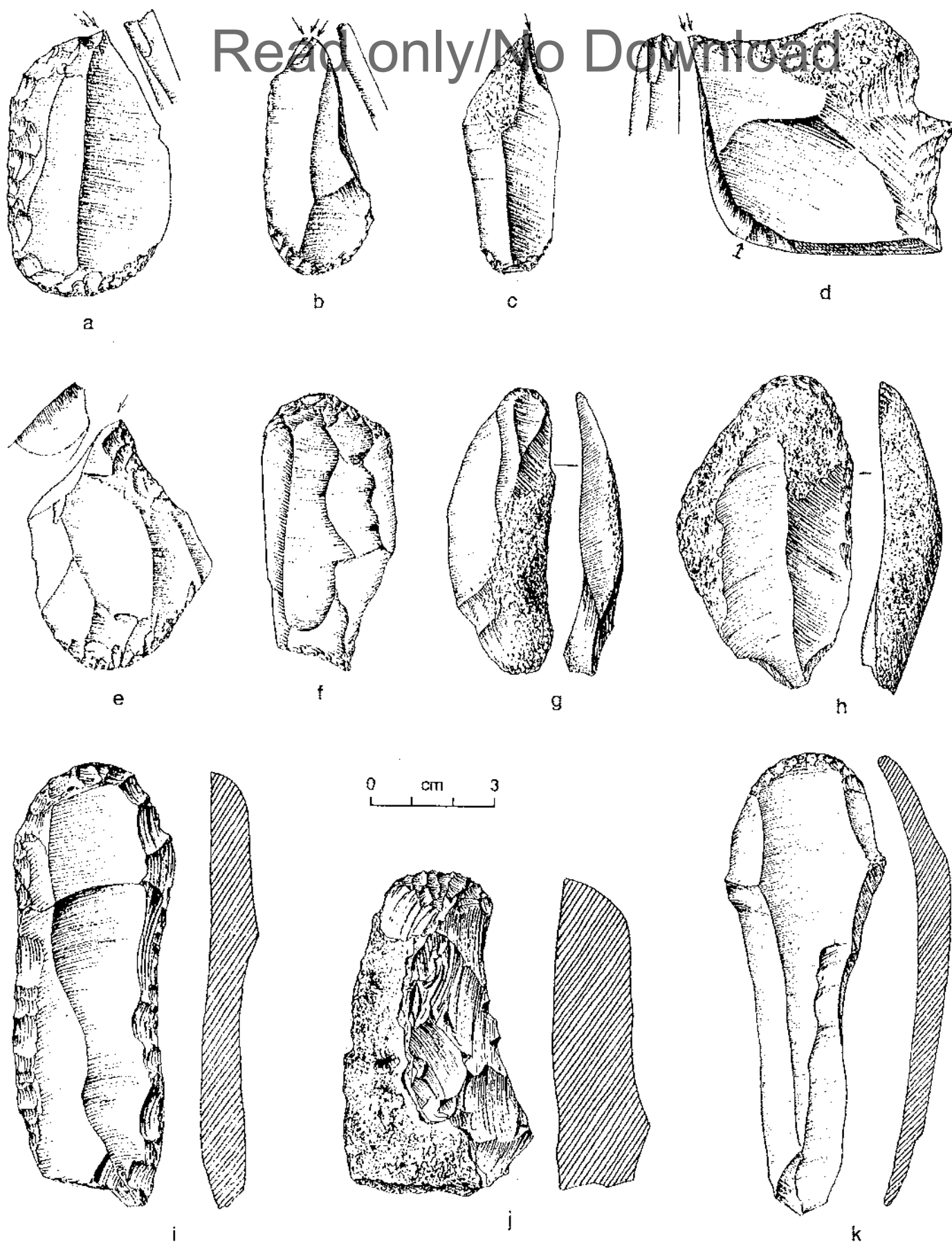


Plate 30. Couche 2-III (Raysses Perigordian): composite pieces (a-f) and scrapers (g-k)

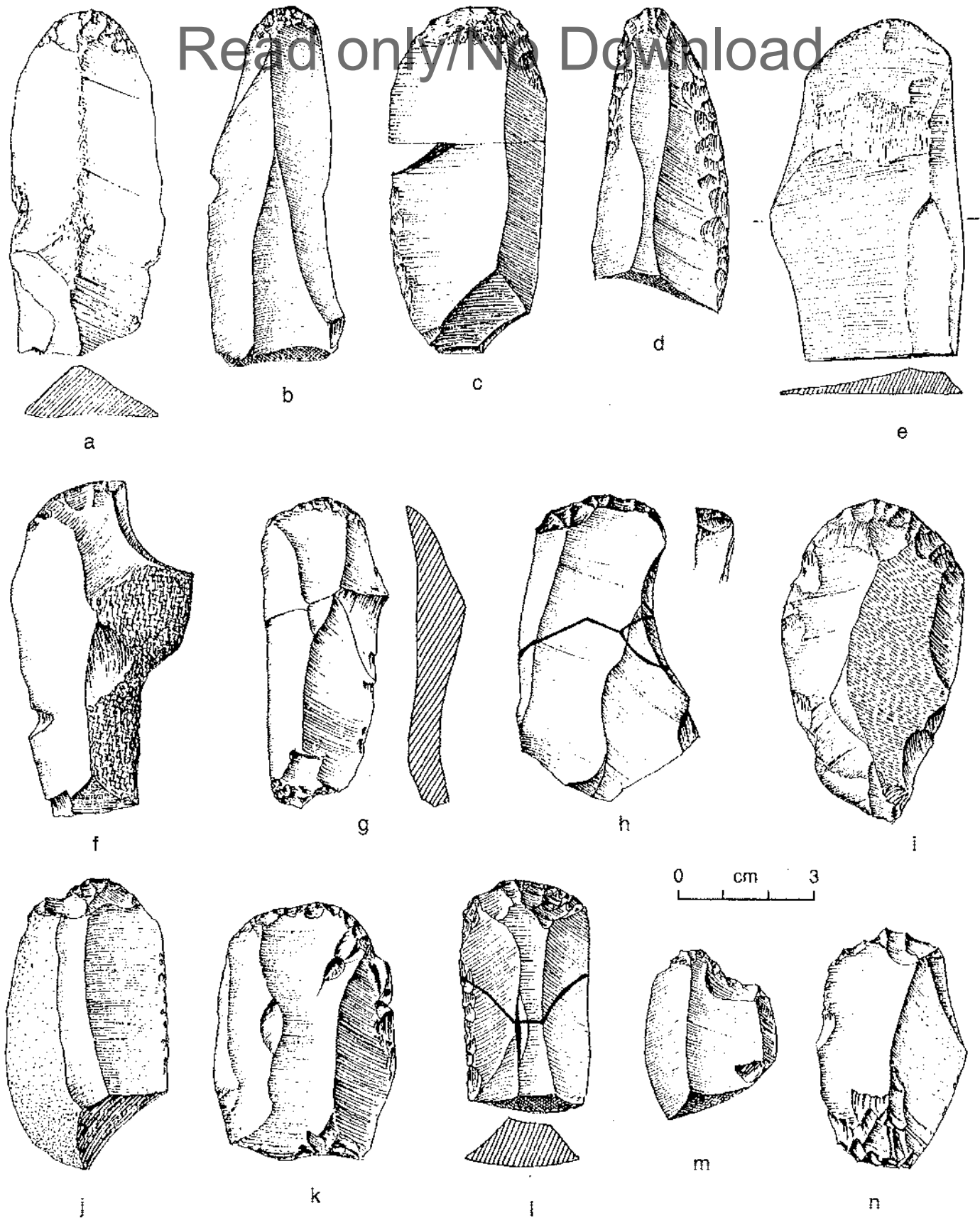


Plate 31. Couche 2-III (Raysse Perigordian): endscrapers

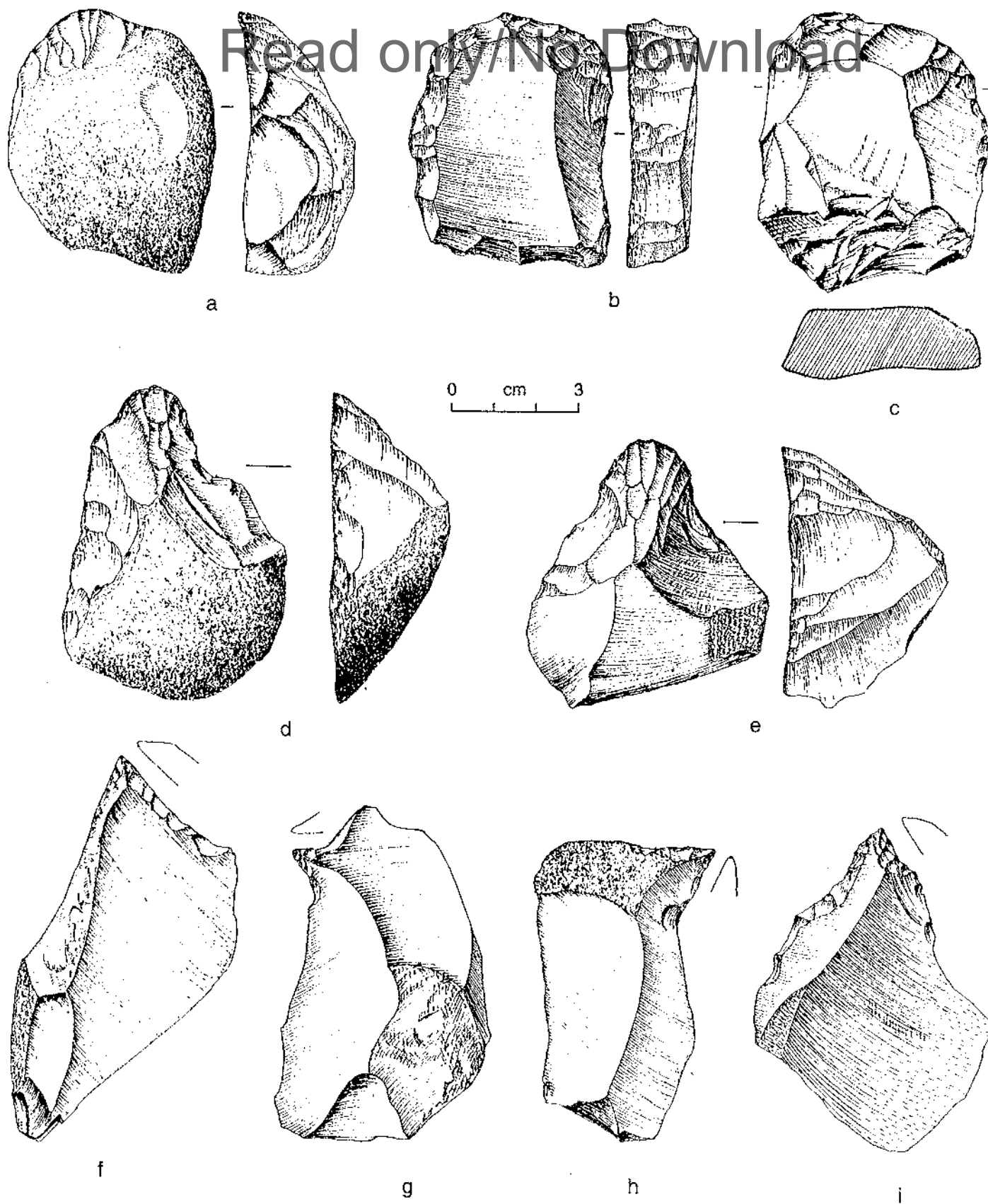


Plate 32. Couche 2-III (Raysses Perigordian): scrapers (a-e) and perforators (f-i)

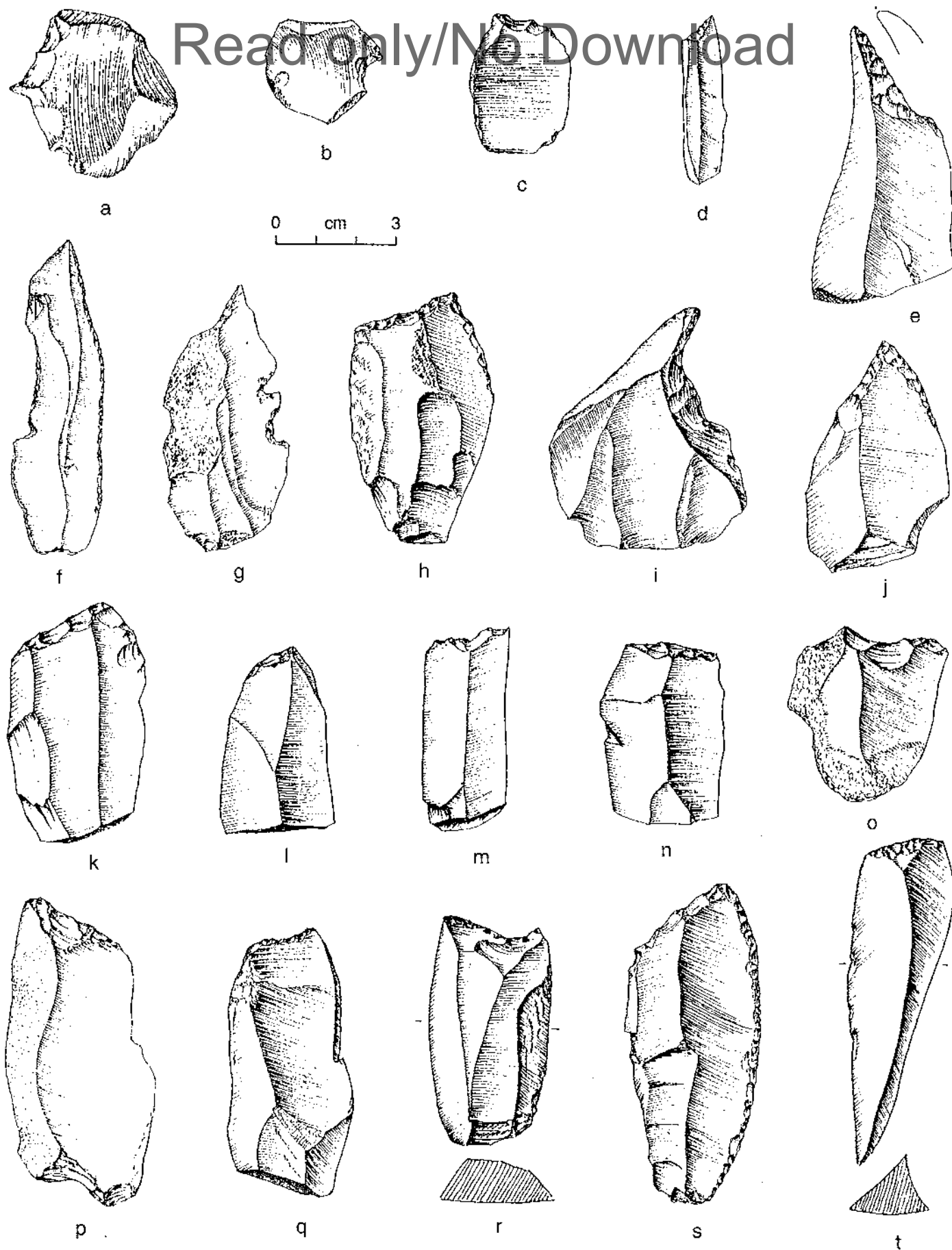


Plate 33. Couche 2-III (Raysses Perigordian): perforators (a-j) and truncations (k-t)

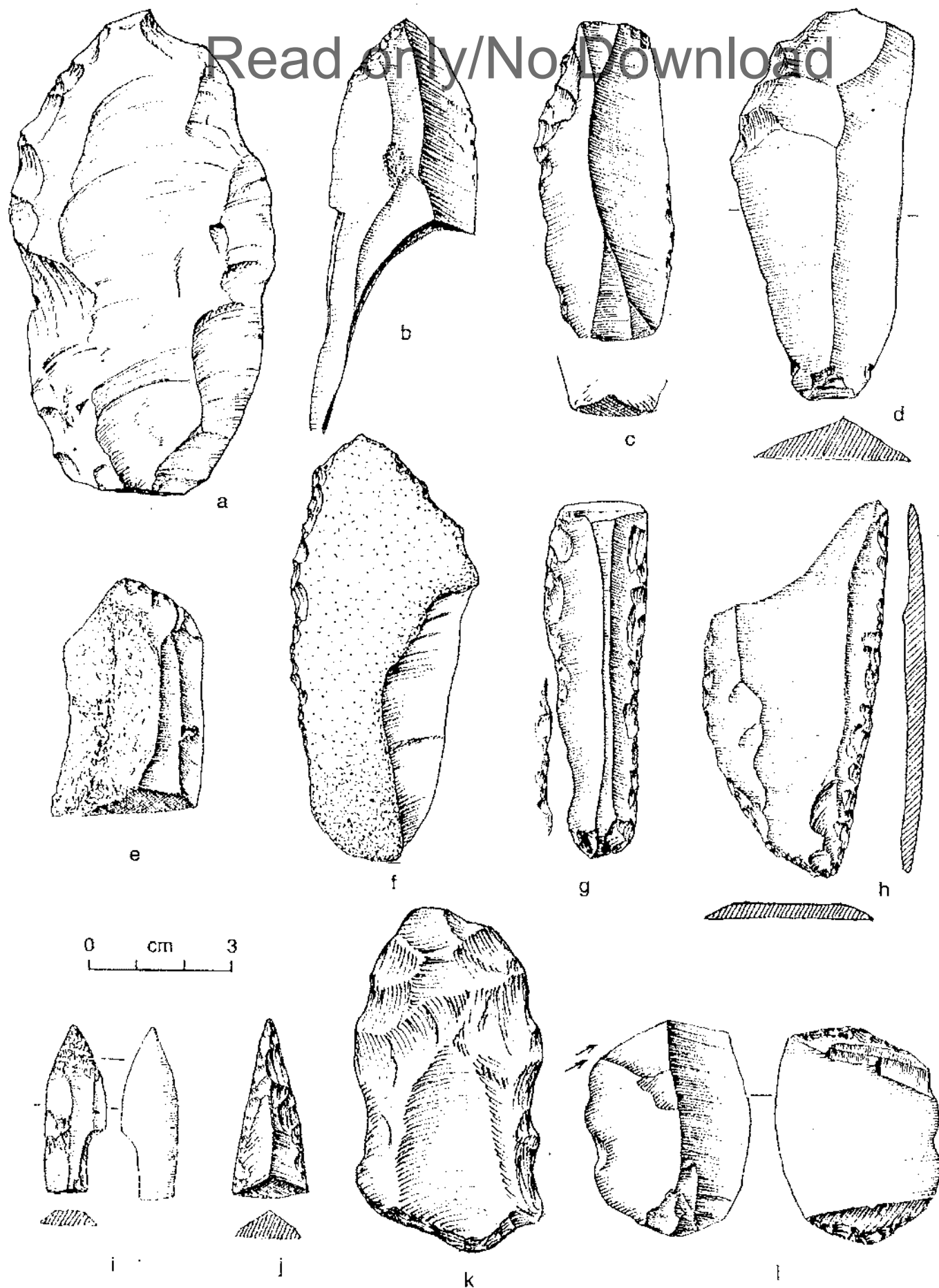


Plate 34. Couche 2-III (Raysse Perigordian): varied pieces

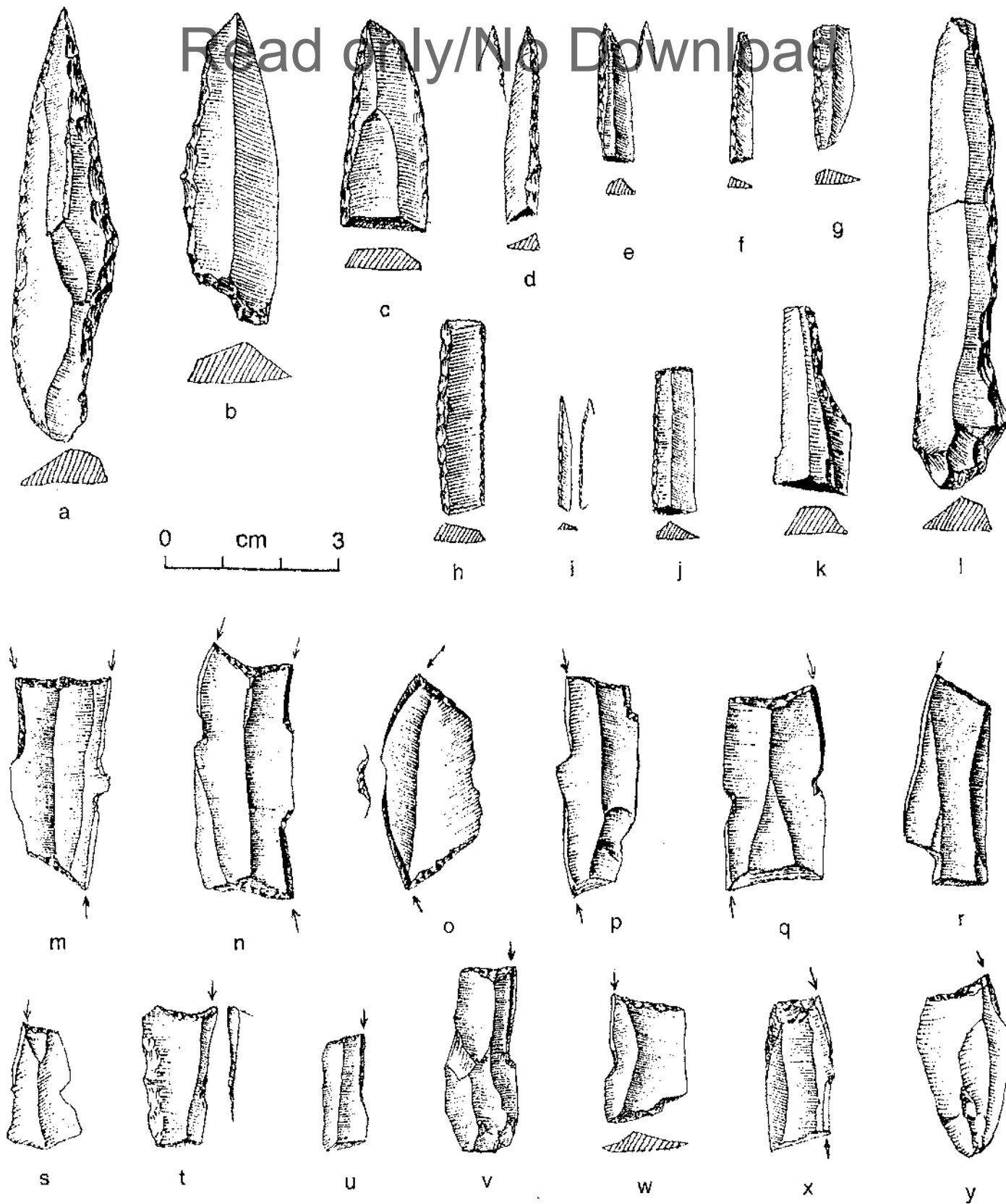


Plate 35. Couche 2-III (Raysse Perigordian): Gravettes (a-l) and Noailles burins (m-y)

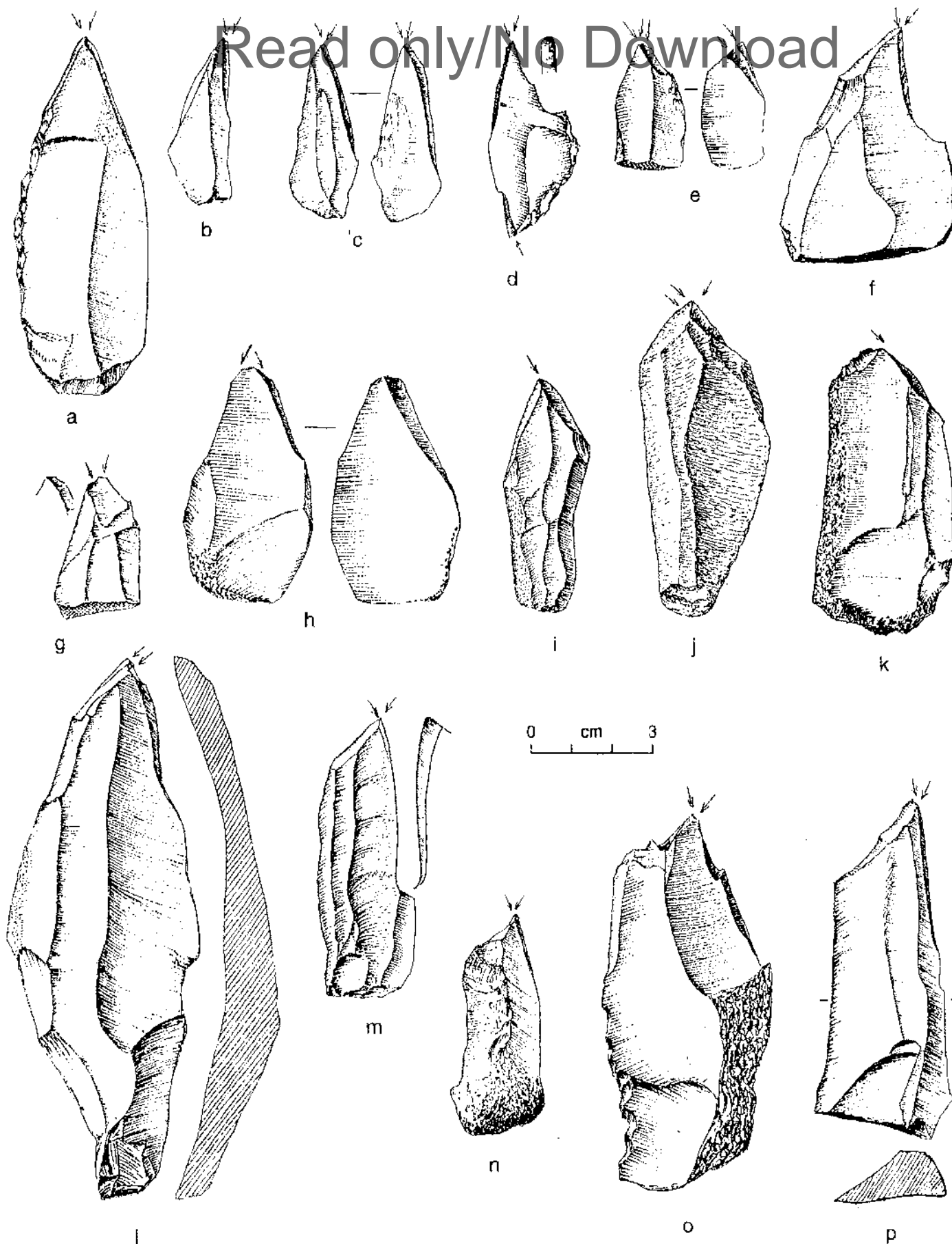


Plate 36. Couche 6-M (Raysse Perigordian): dihedral burins

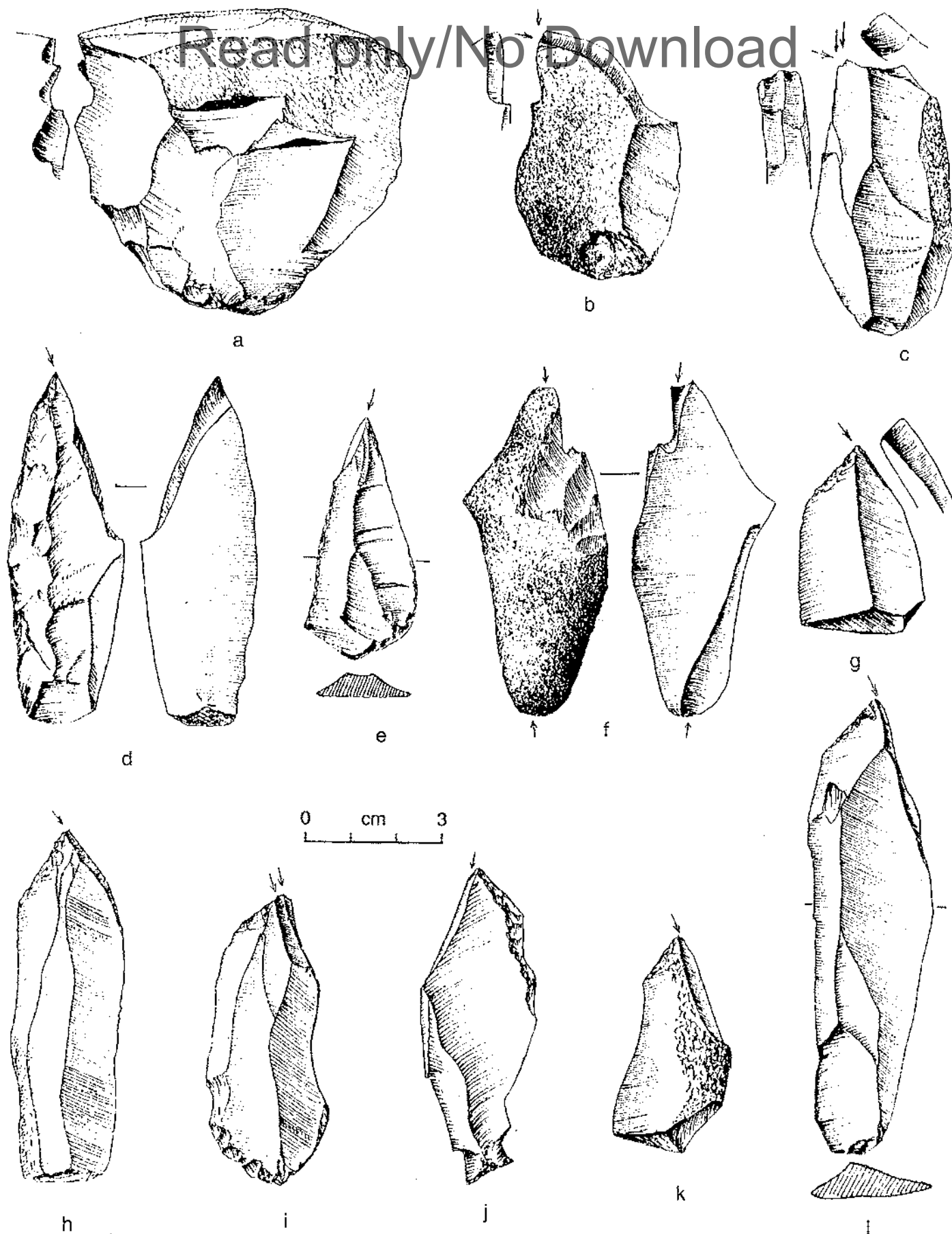


Plate 37. Couche 6-M (Raysse Perigordian): dihedral (a-f) and truncation (g-l) burins

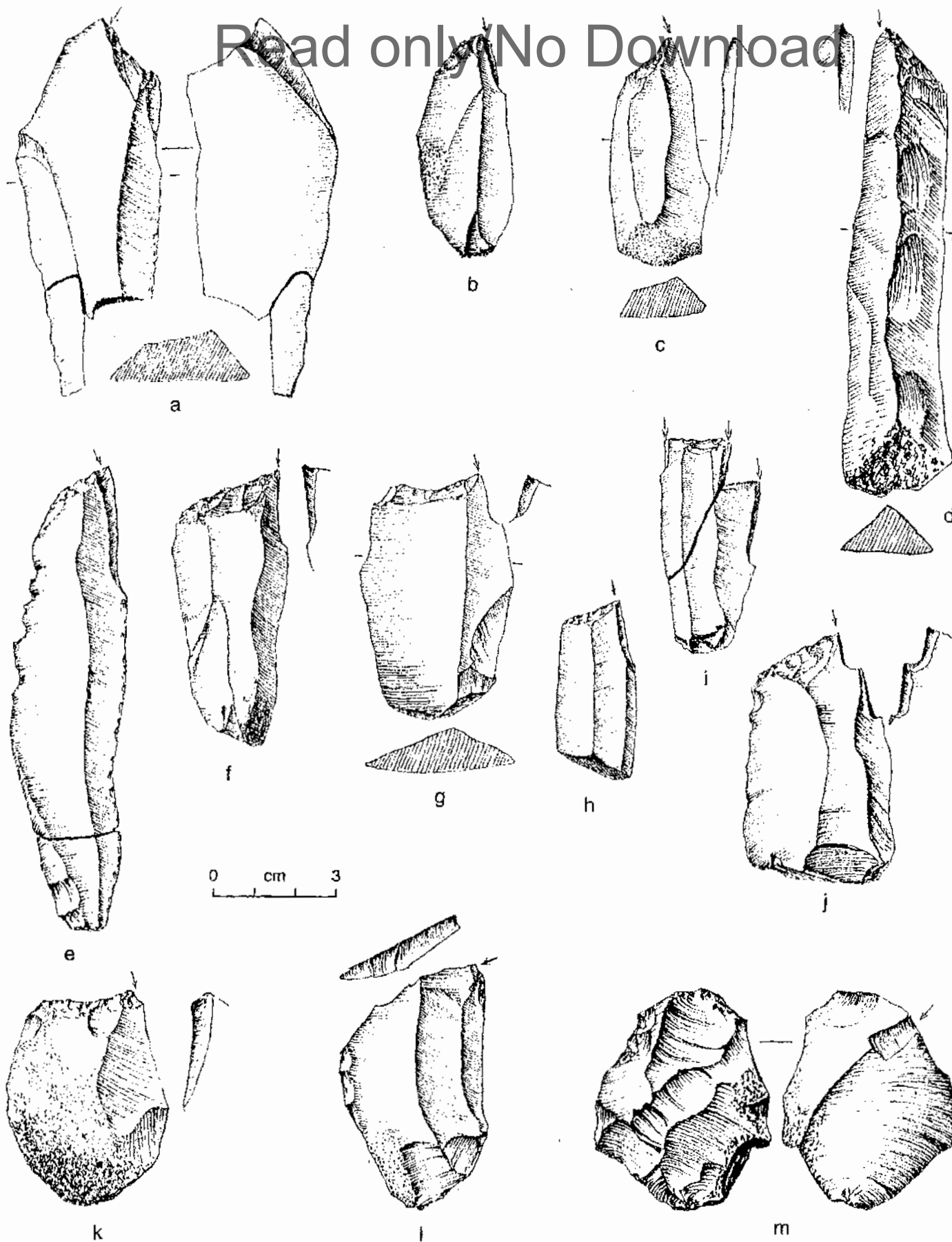


Plate 38. Couche 6-M (Rayssse Perigordian): truncation burins

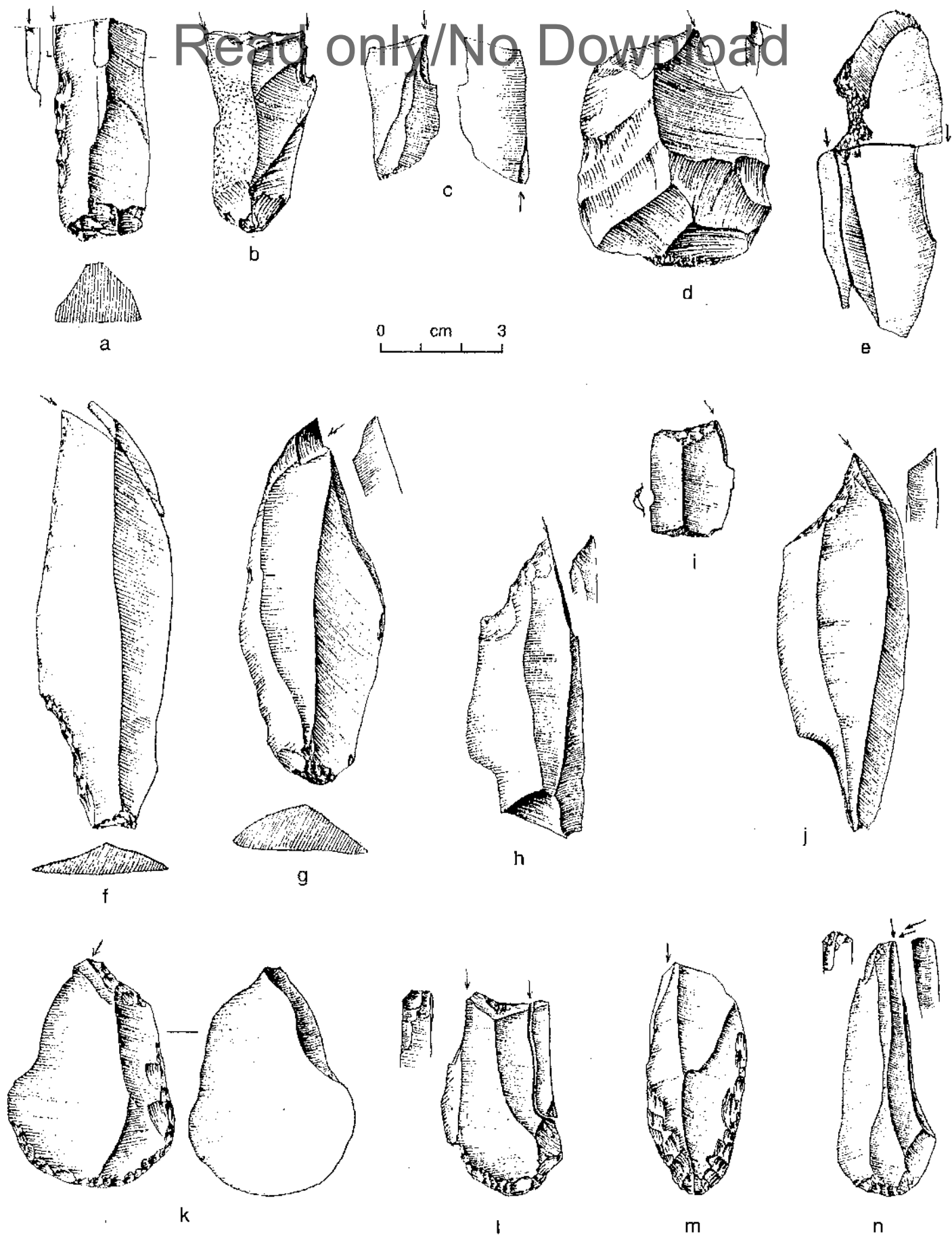


Plate 39. Couche 6-M (Raysse Perigordian): burins (a-j) and composite pieces (k-n)

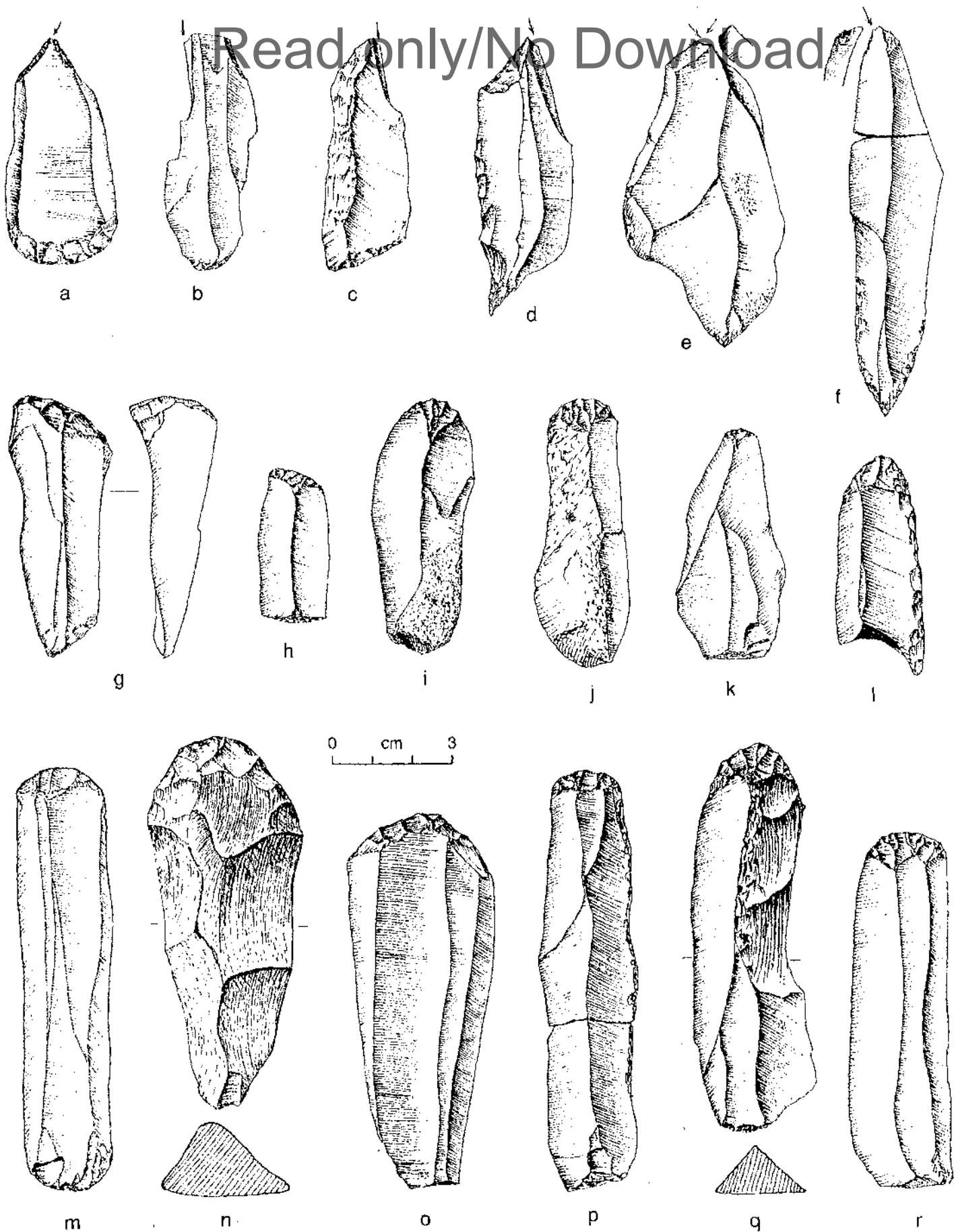


Plate 40. Couche 6-M (Raysses Perigordian): composite pieces (a-g) and endscrapers (h-r)

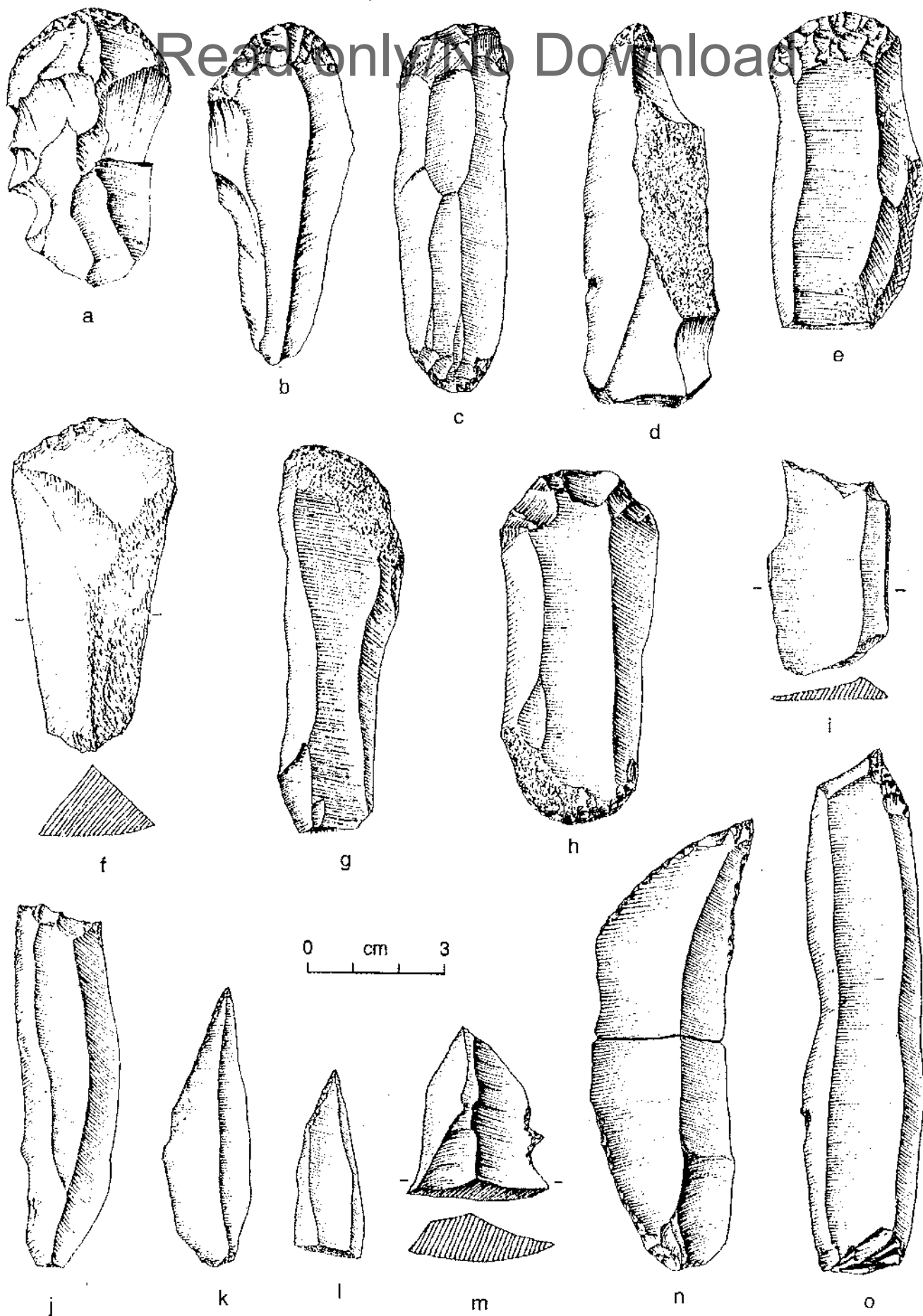


Plate 41. Couche 6-M (Rayssse Perigordian): endscrapers (a-h) and perforators (i-o)

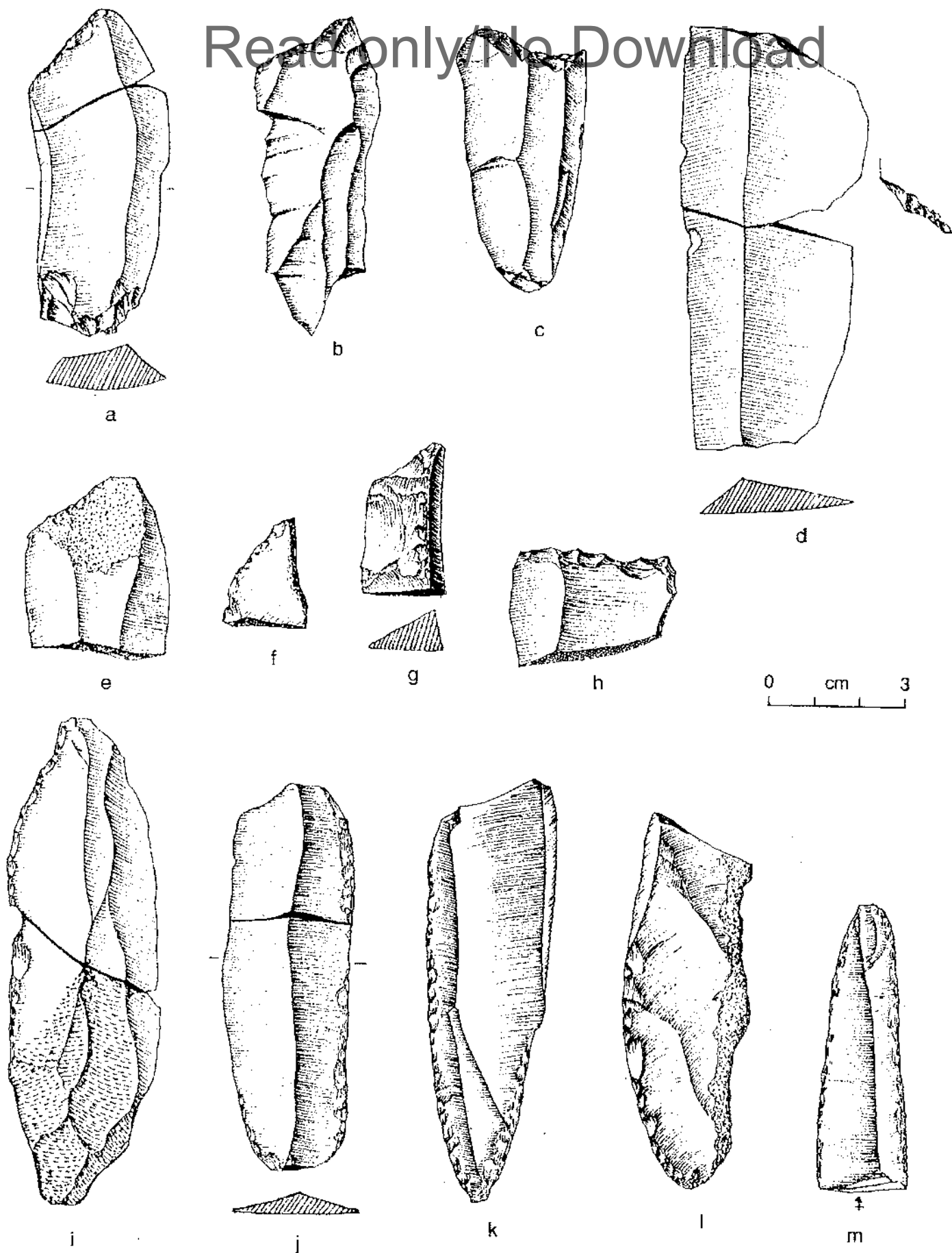


Plate 42. Couche 6-M (Rayssé Perigordian): truncations (a-h) and retouched pieces (i-m)

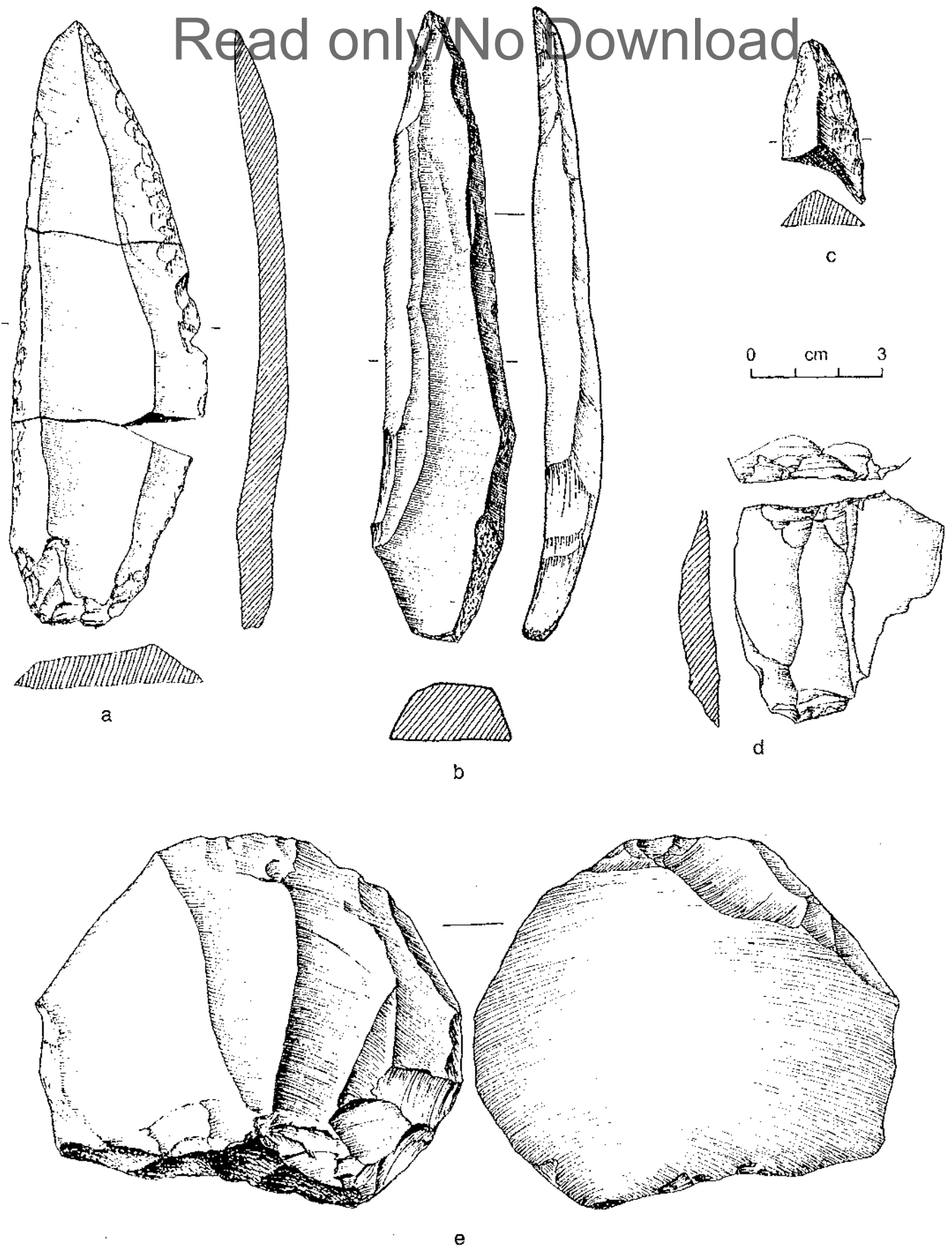


Plate 43. Couche 6-M (Raysses Perigordian): diverse and miscellaneous pieces

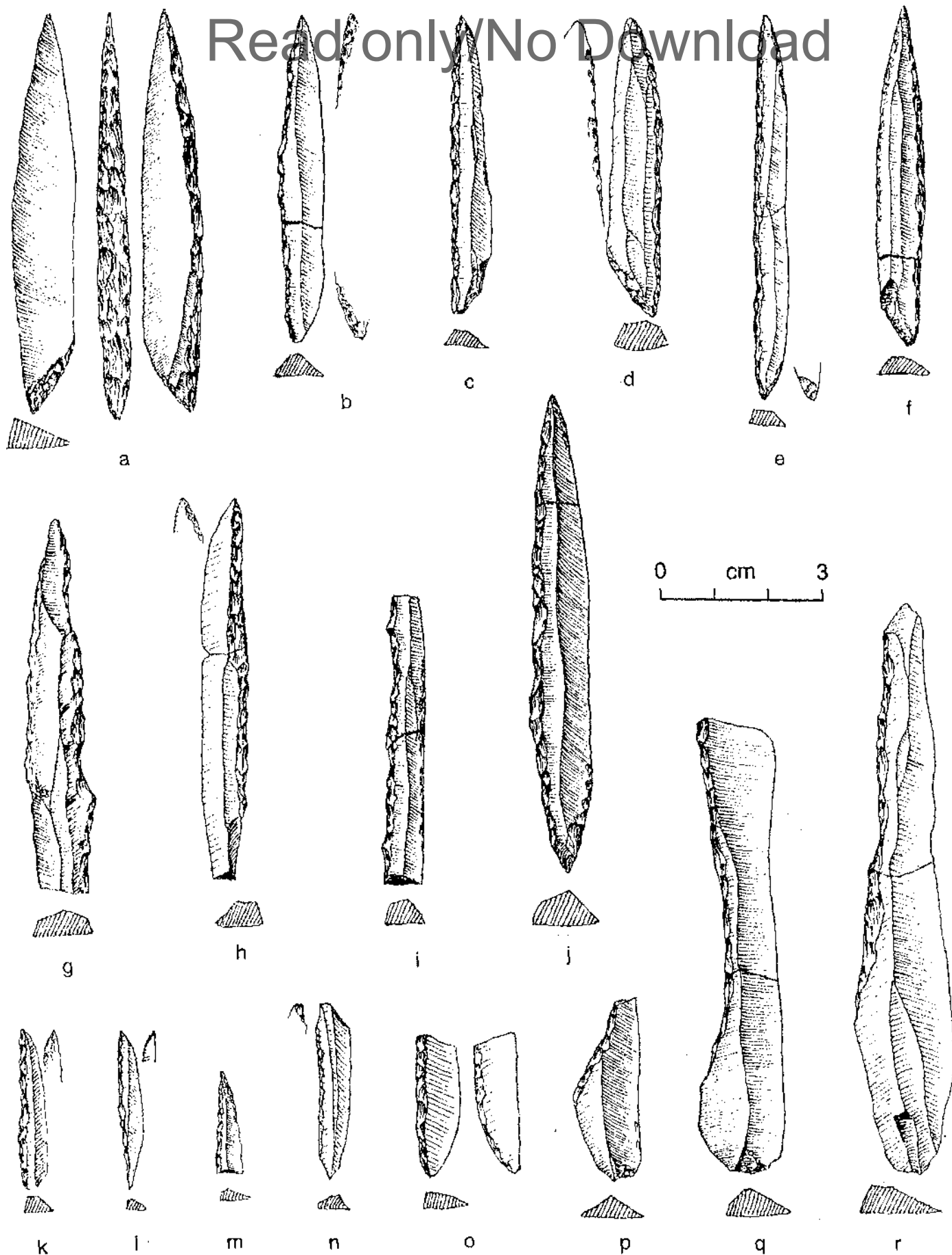


Plate 44. Couche 6-M (Raysses Perigordian): Gravettes and microgravettes

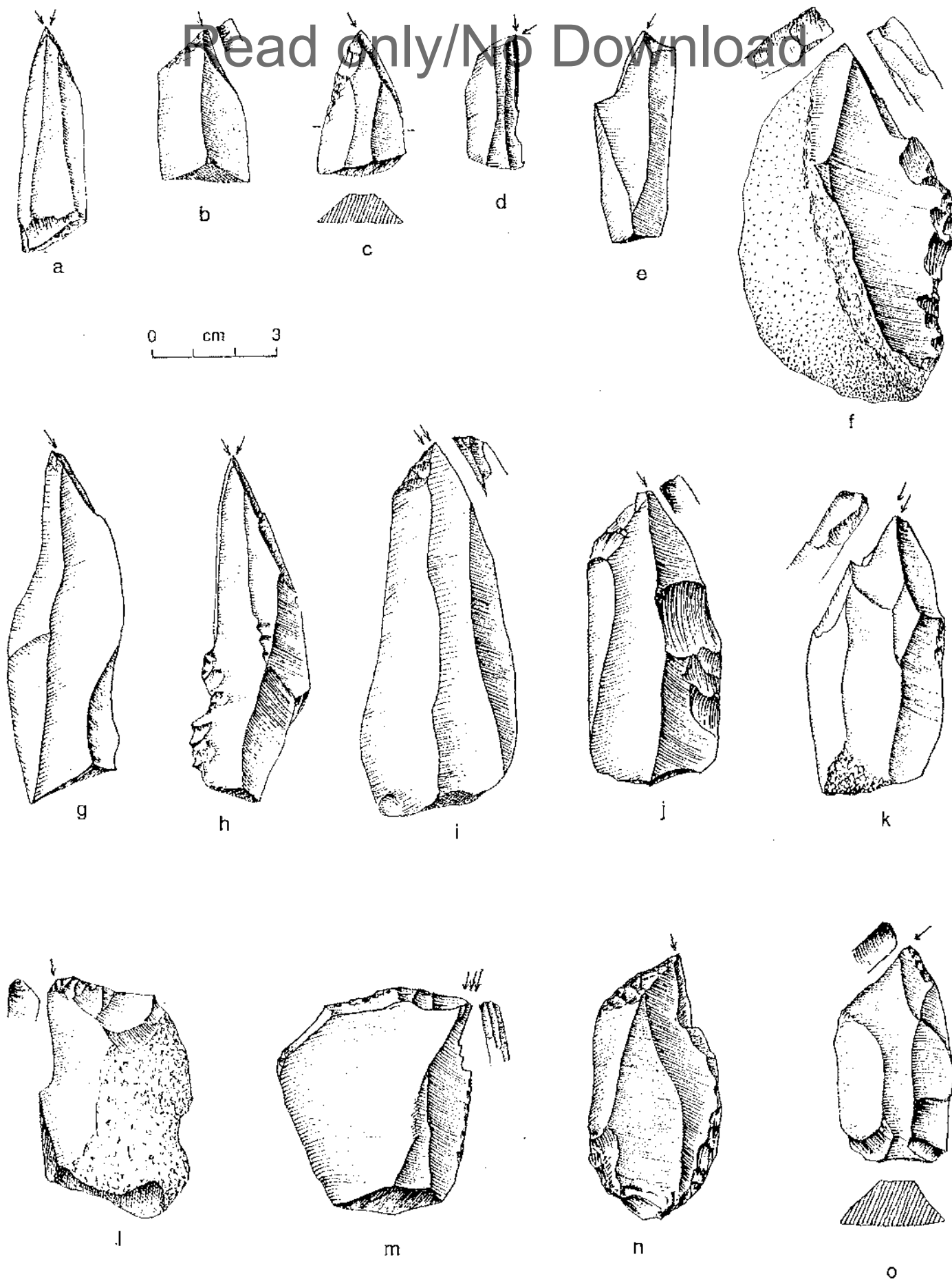


Plate 45. Couche 4-B (Rayssse Perigordian): dihedral (a–h) and truncation (i–o) burins

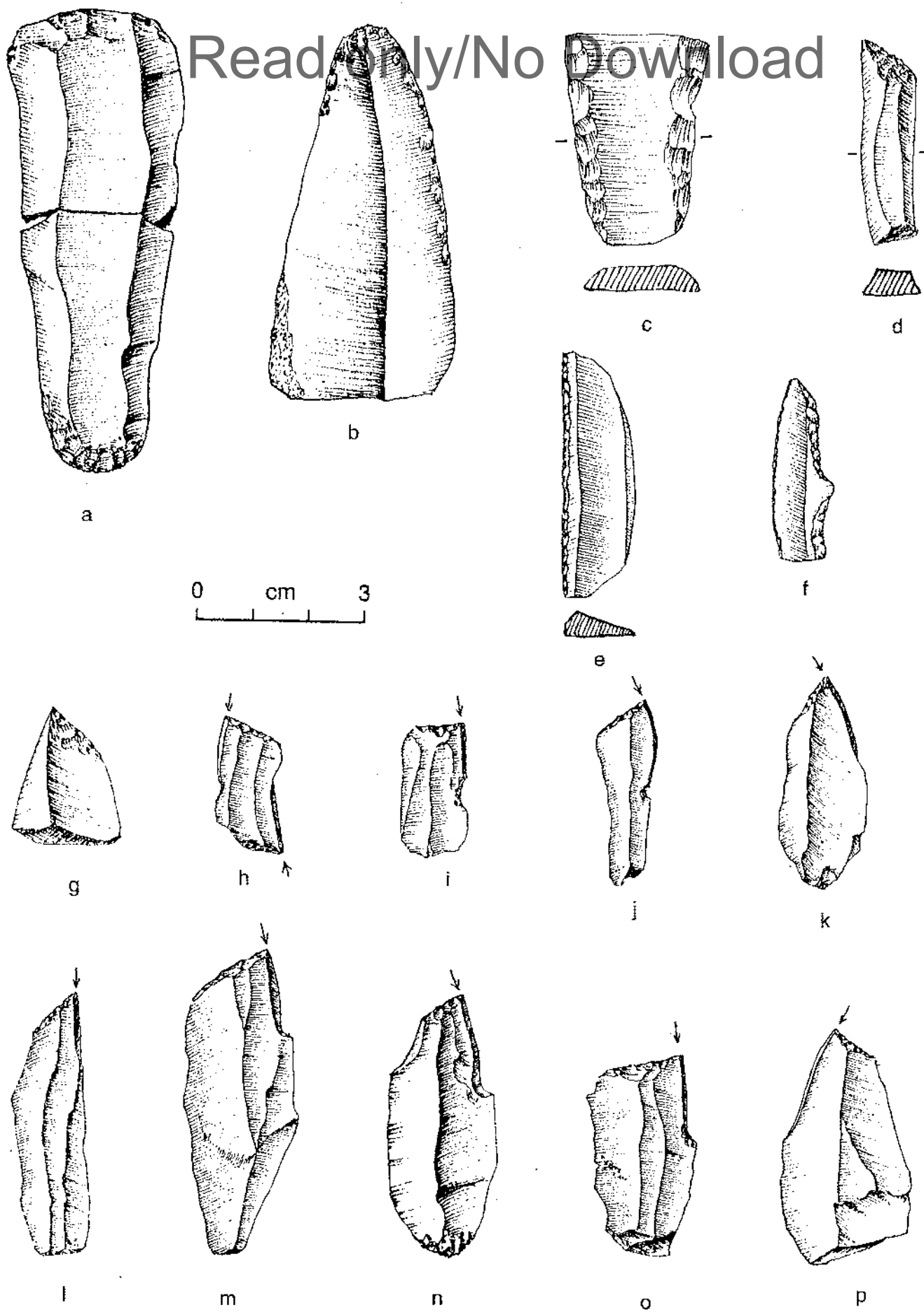


Plate 46. Couche 4-B (Raysses Perigordian): varied pieces (a-g) and Noailles burins (h-p)

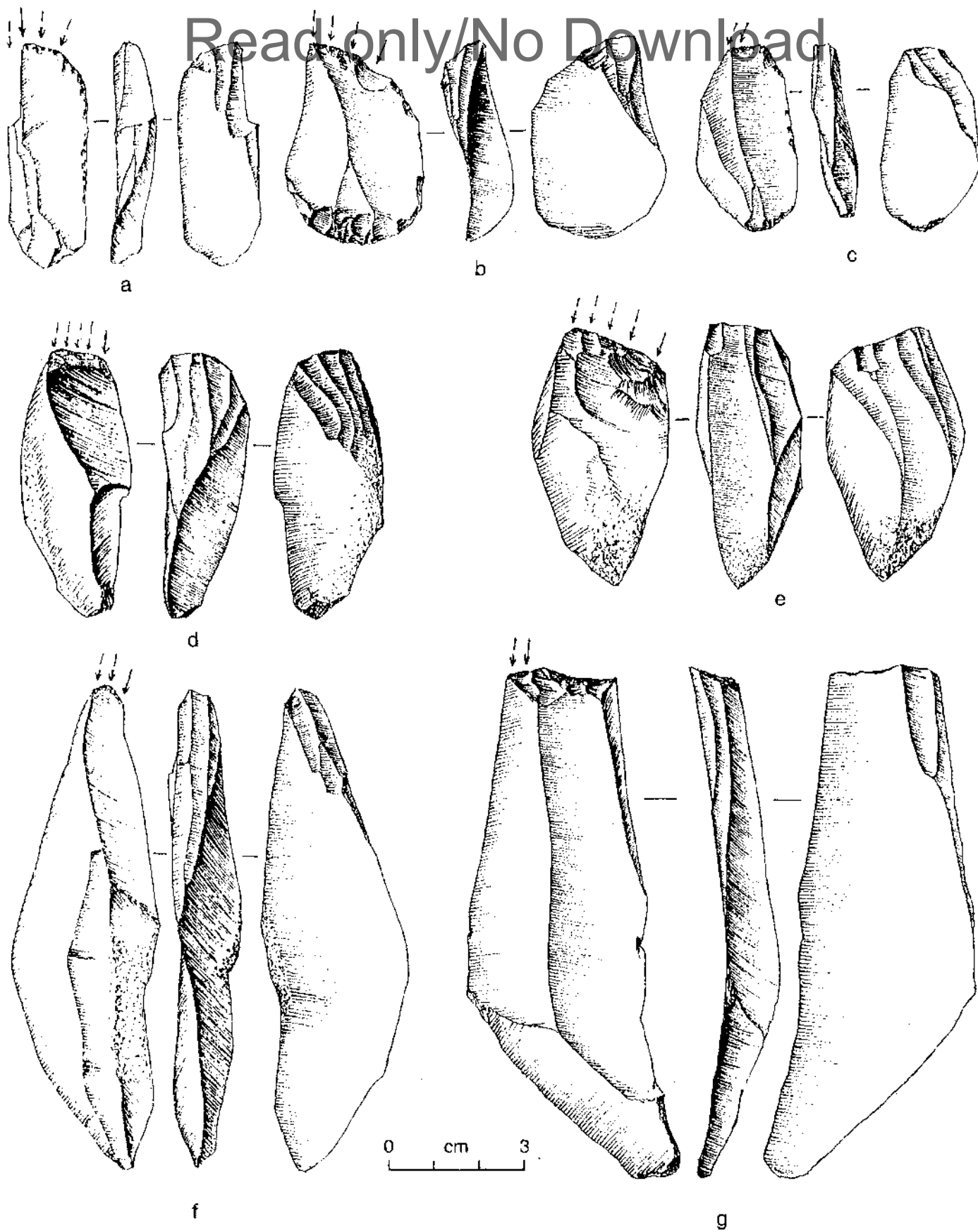


Plate 47. Couche 2-III (Raysse Perigordian): Raysse burins

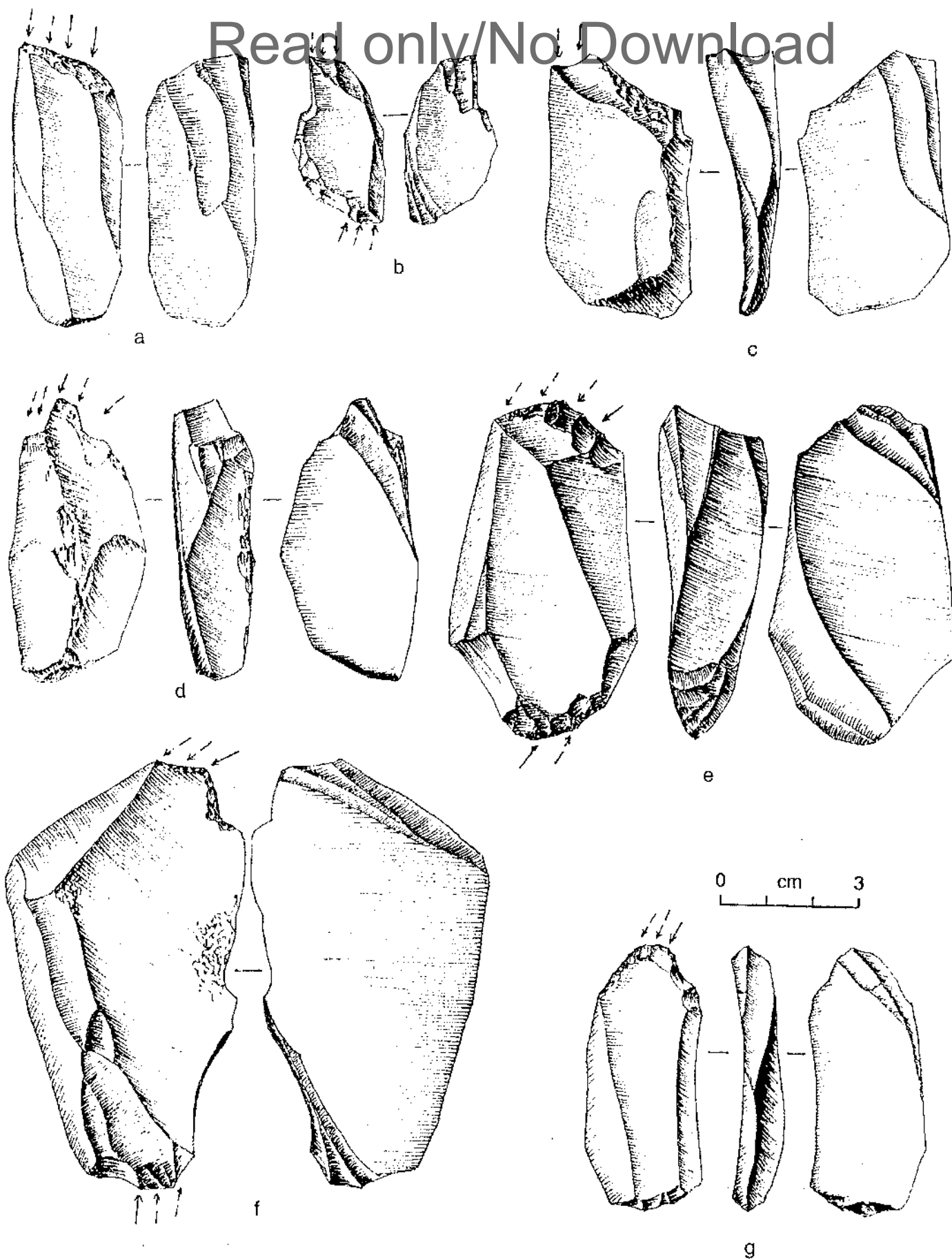


Plate 48. Couche 2-III (Rayssé Perigordian): Rayssé burins

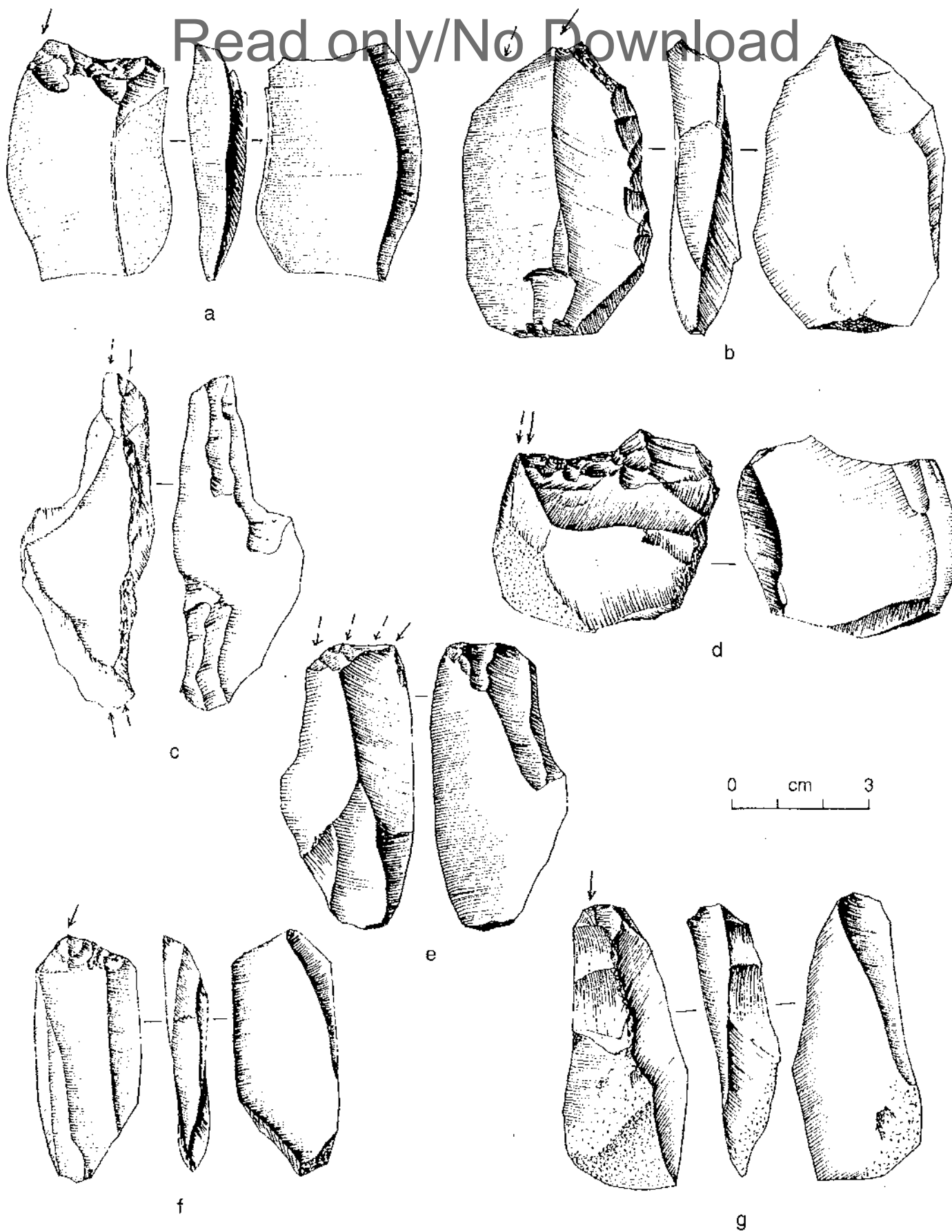


Plate 49. Couche 2-III (Rayssé Perigordian): Rayssé burins

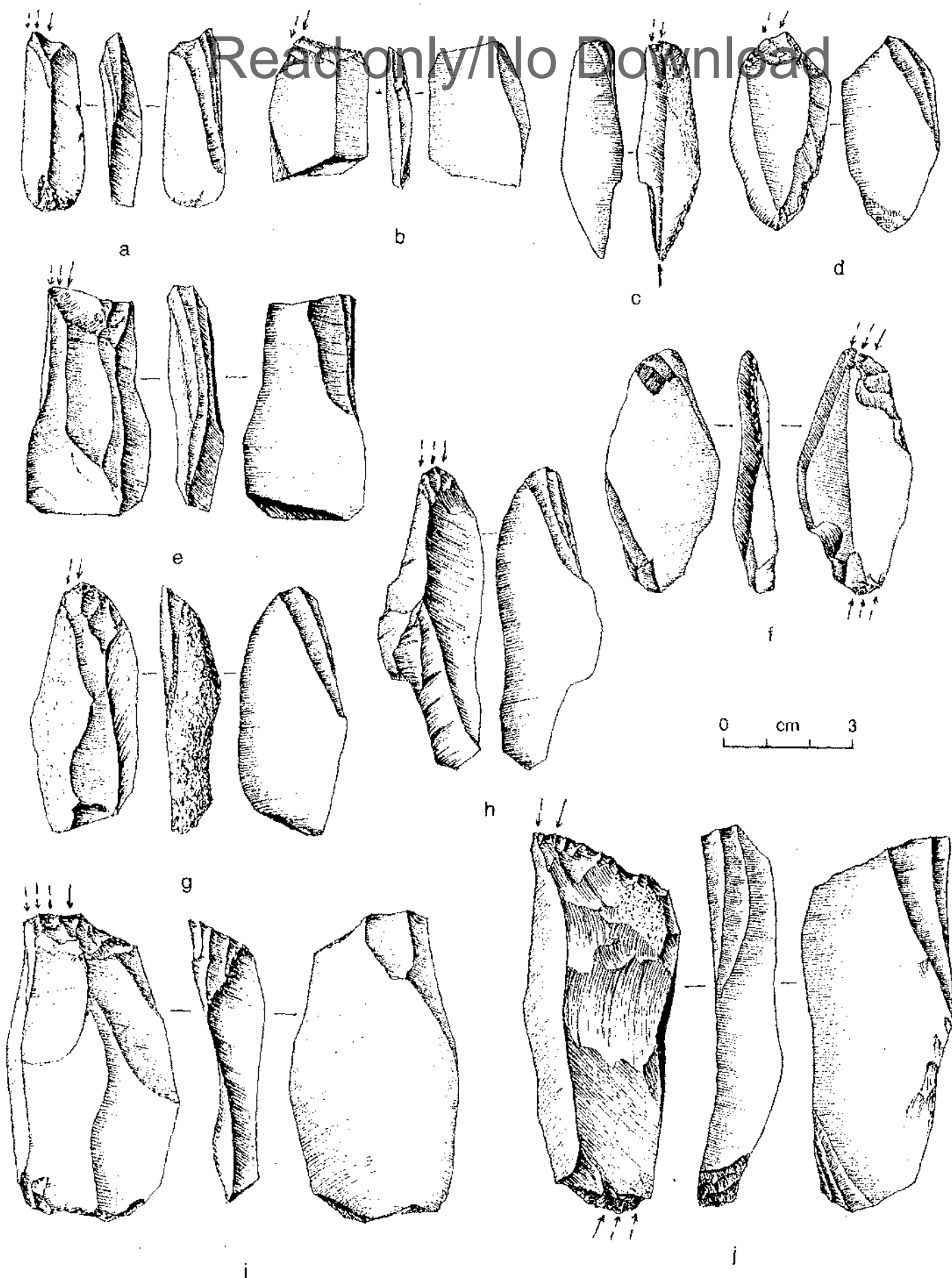


Plate 50. Couche 6-M (Rayssse Perigordian): Rayssse burins

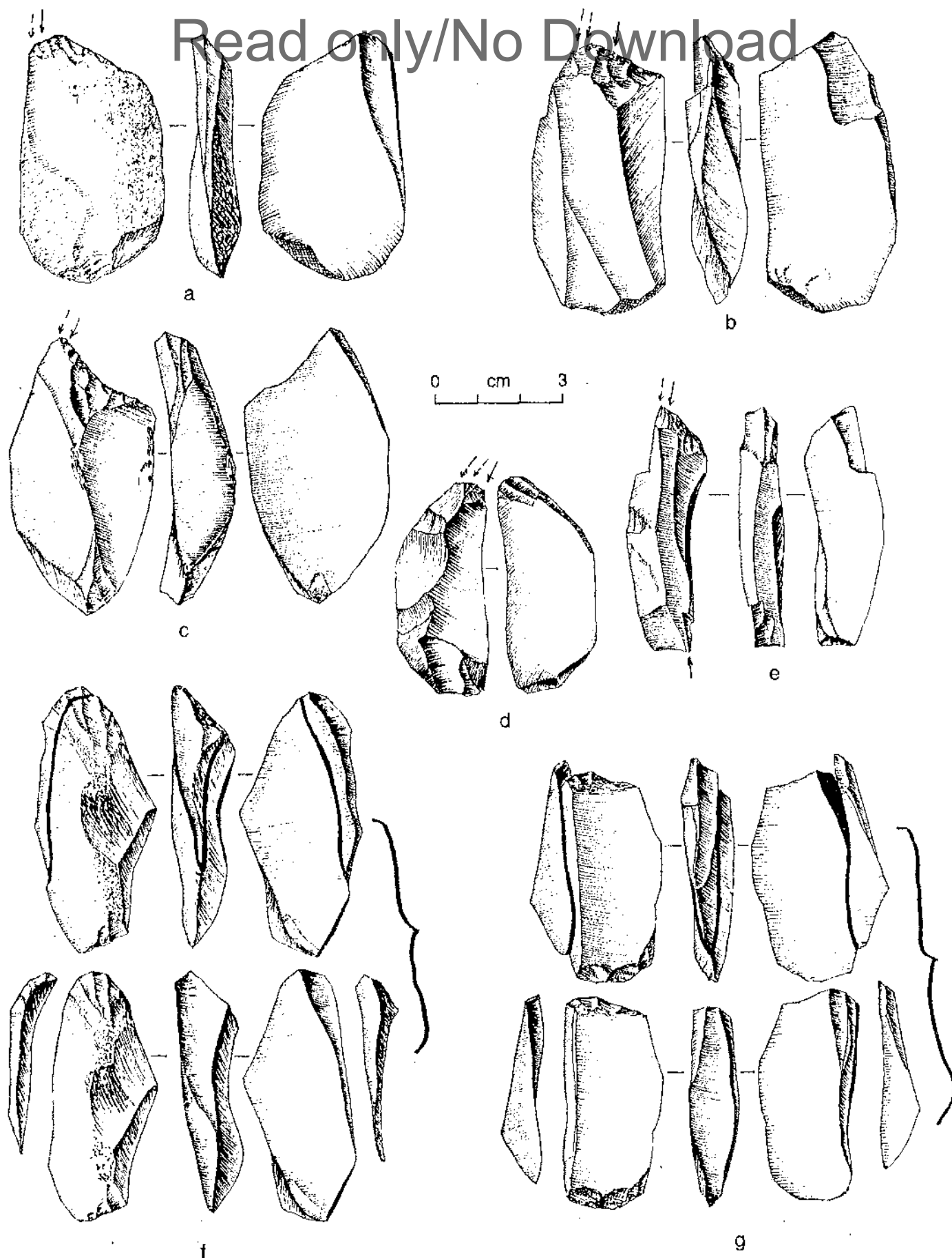


Plate 51. Couche 6-M (Rayssse Perigordian): Rayssse burins

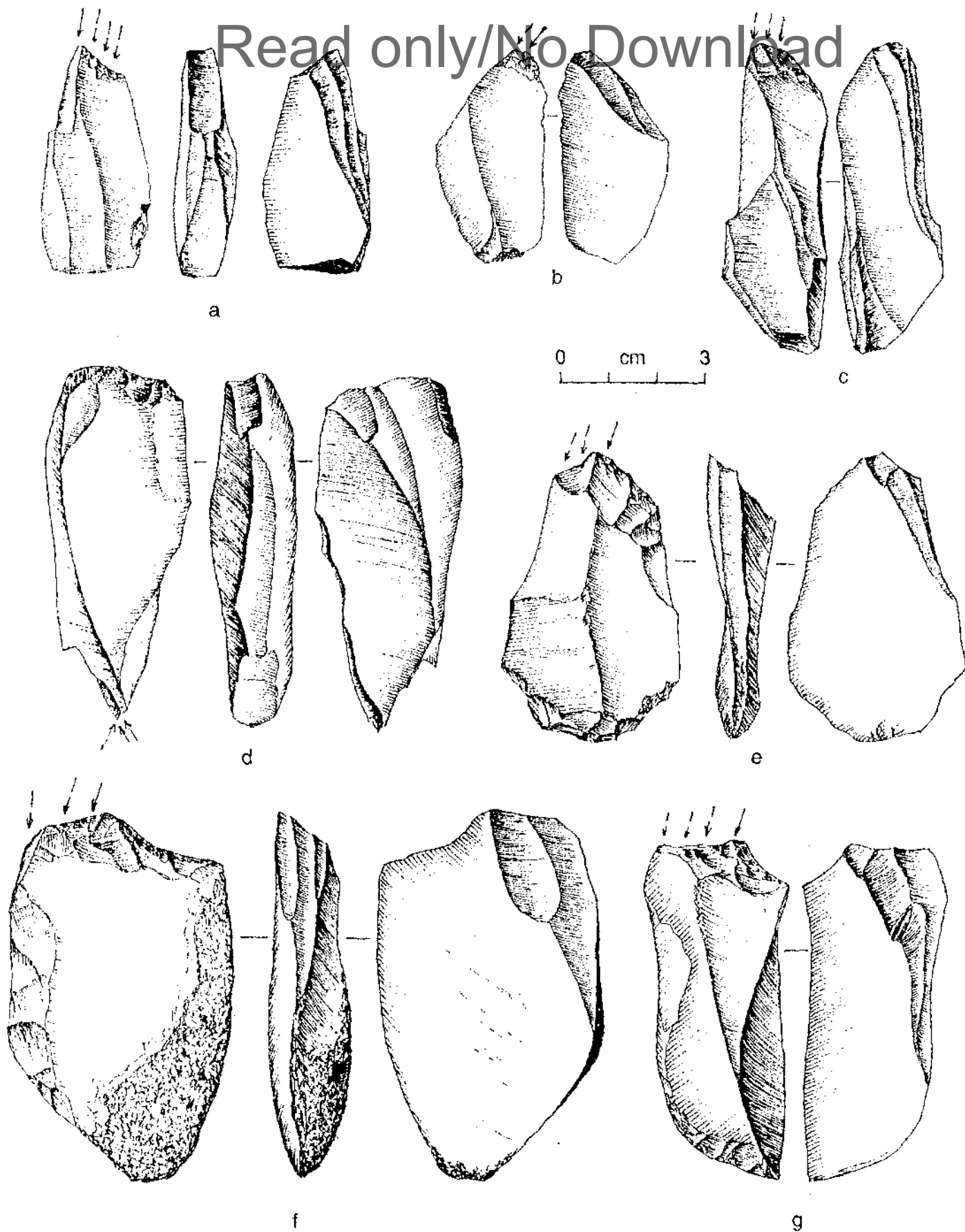


Plate 52. Couche 4-B (Rayssse Perigordian): Rayssse burins

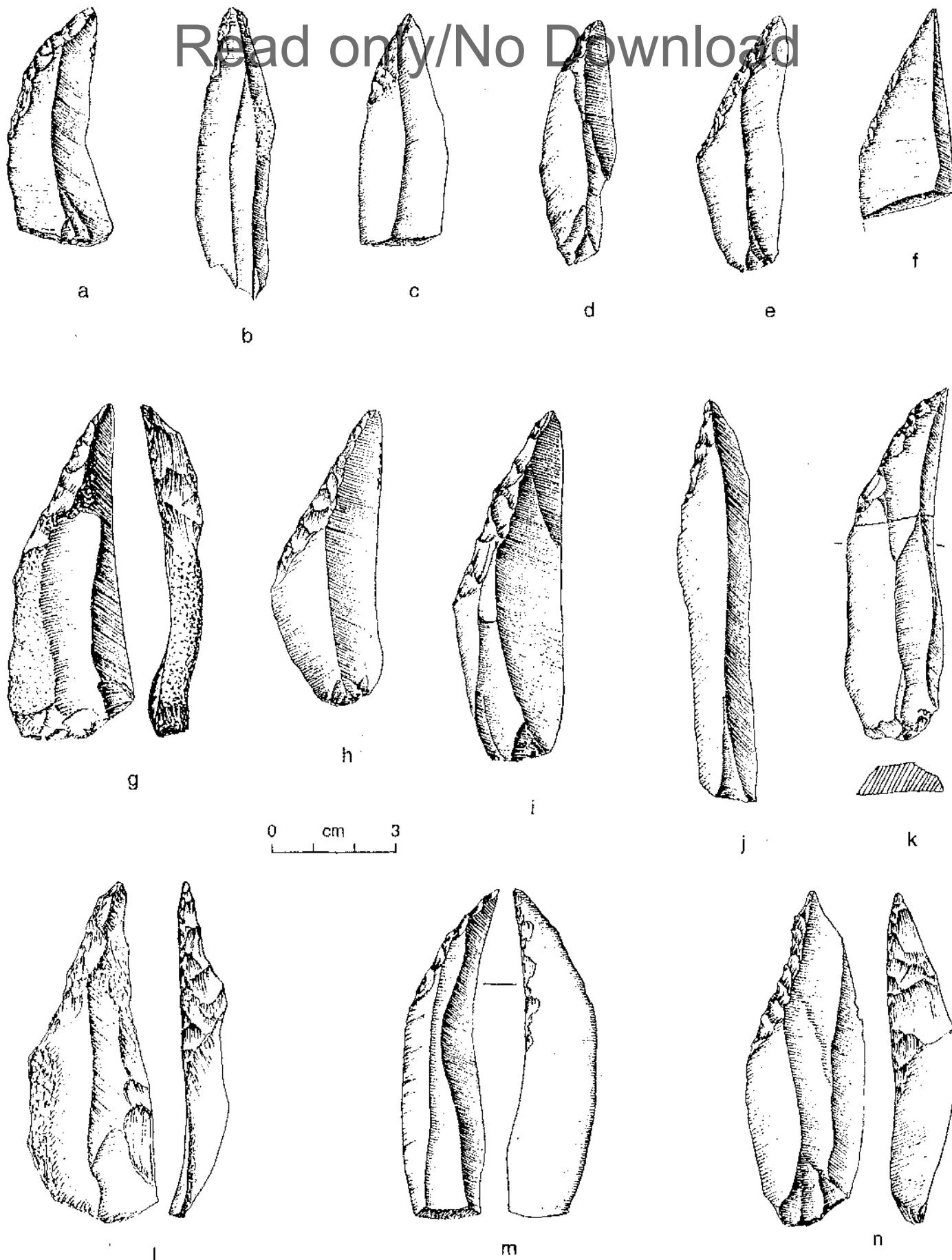


Plate 53. Couche 2-IV (Beauronnian): very narrow Solvieux truncations

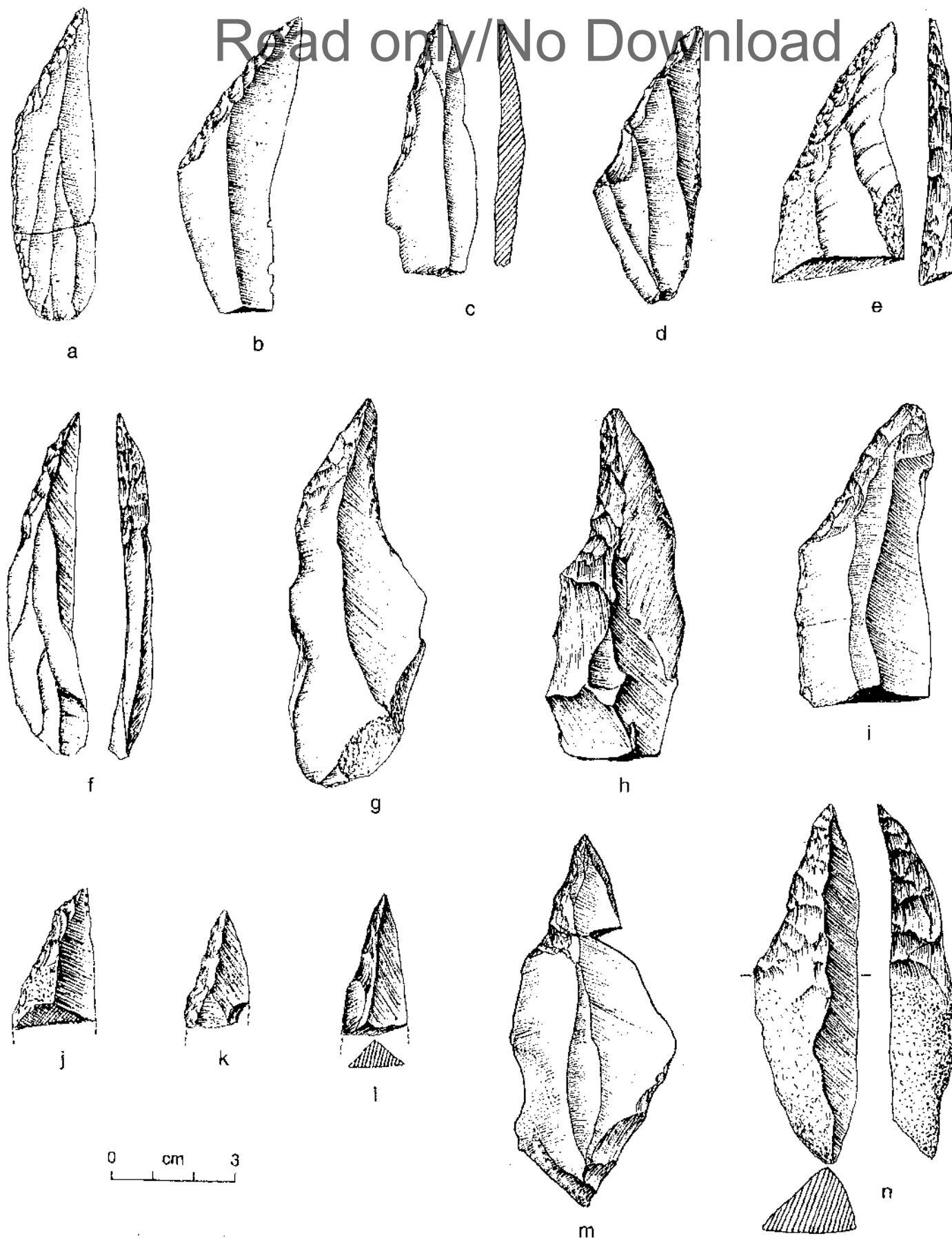


Plate 54. Couche 2-IV (Beauronnian): very narrow Solvieux truncations

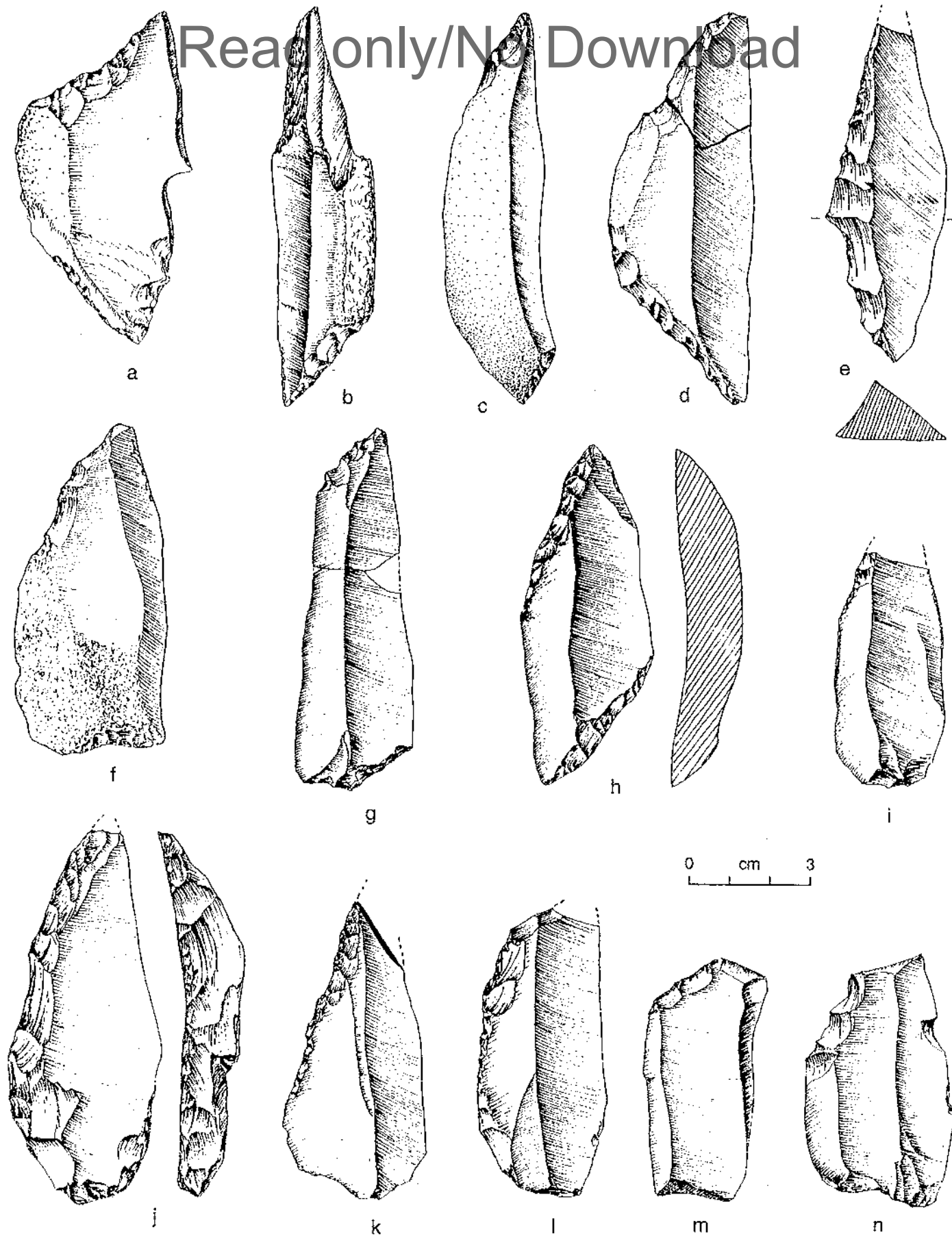


Plate 55. Couche 2-IV (Beauronnian): double (a-d, f-h) and broken (e, i-n) Solvieux truncations

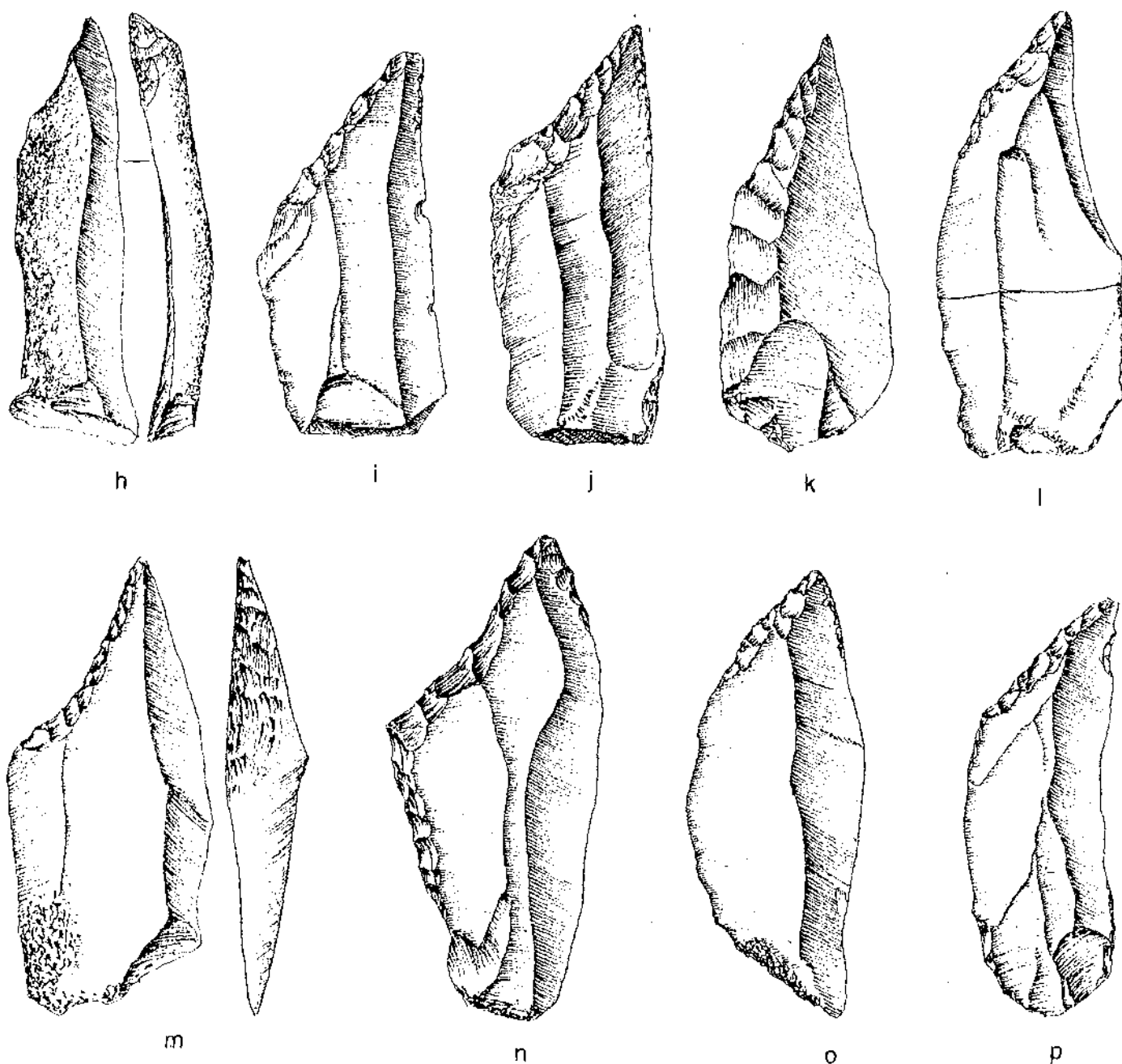
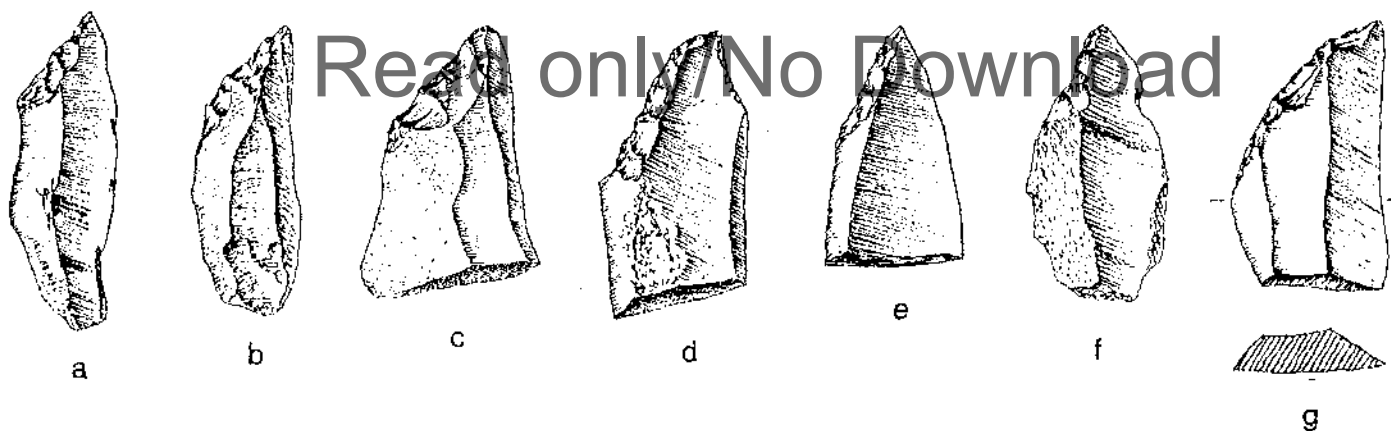


Plate 56. Couche 2-IV (Beaumontian): narrow Solvieux truncations

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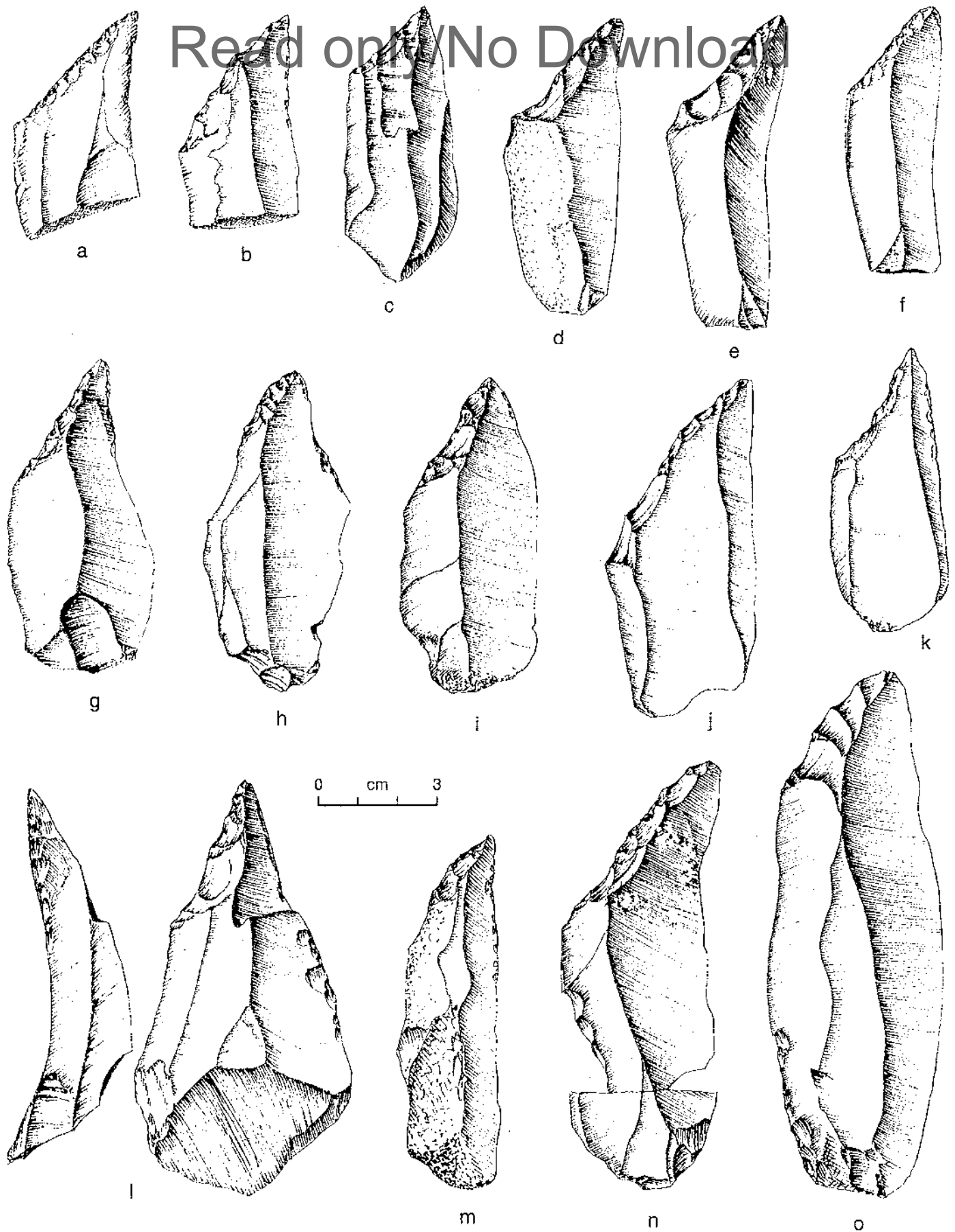


Plate 57. Couche 2-IV (Beauronnian): narrow Solvieux truncations

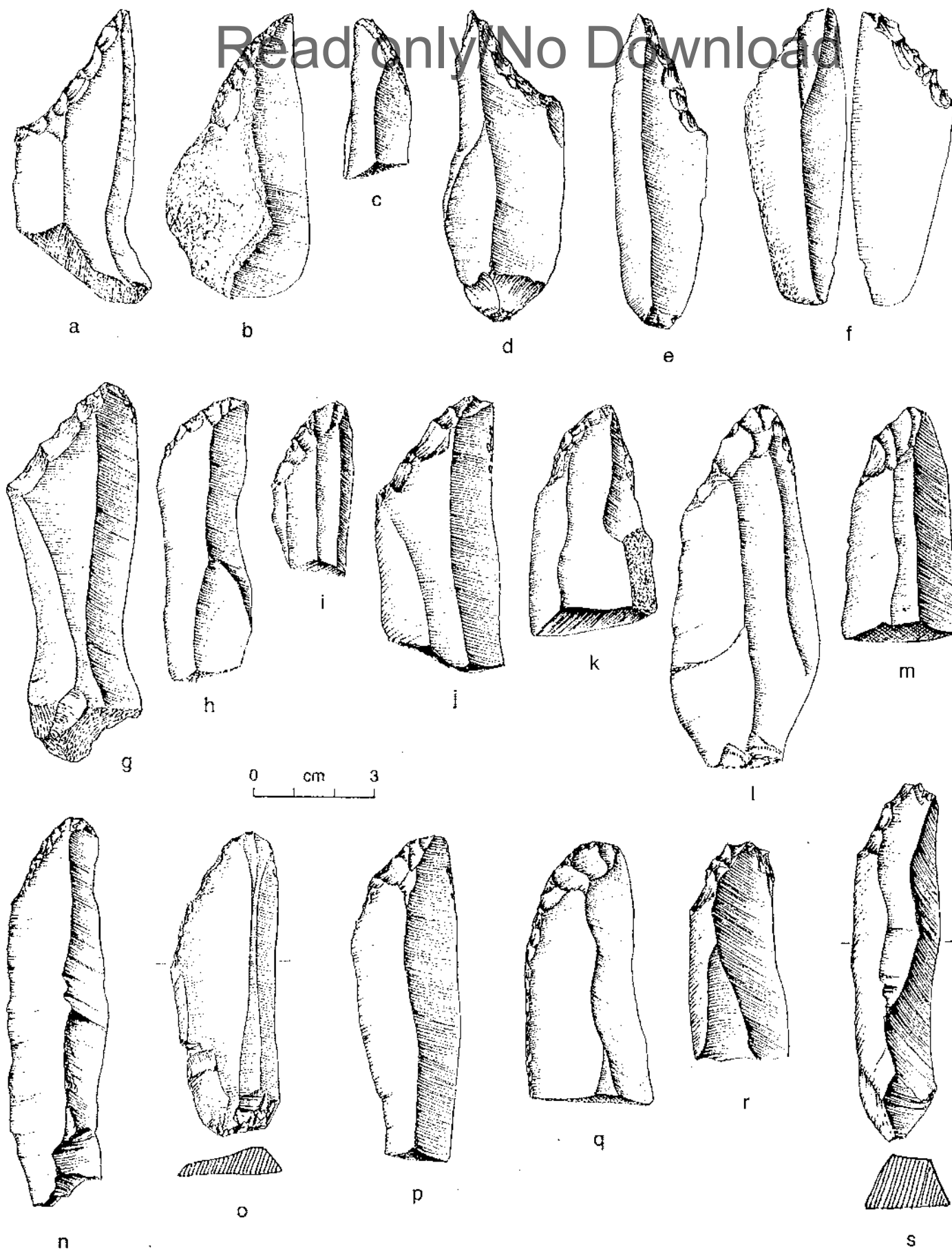


Plate 58. Couche 2-IV (Beauronnian): narrow Solvieux truncations

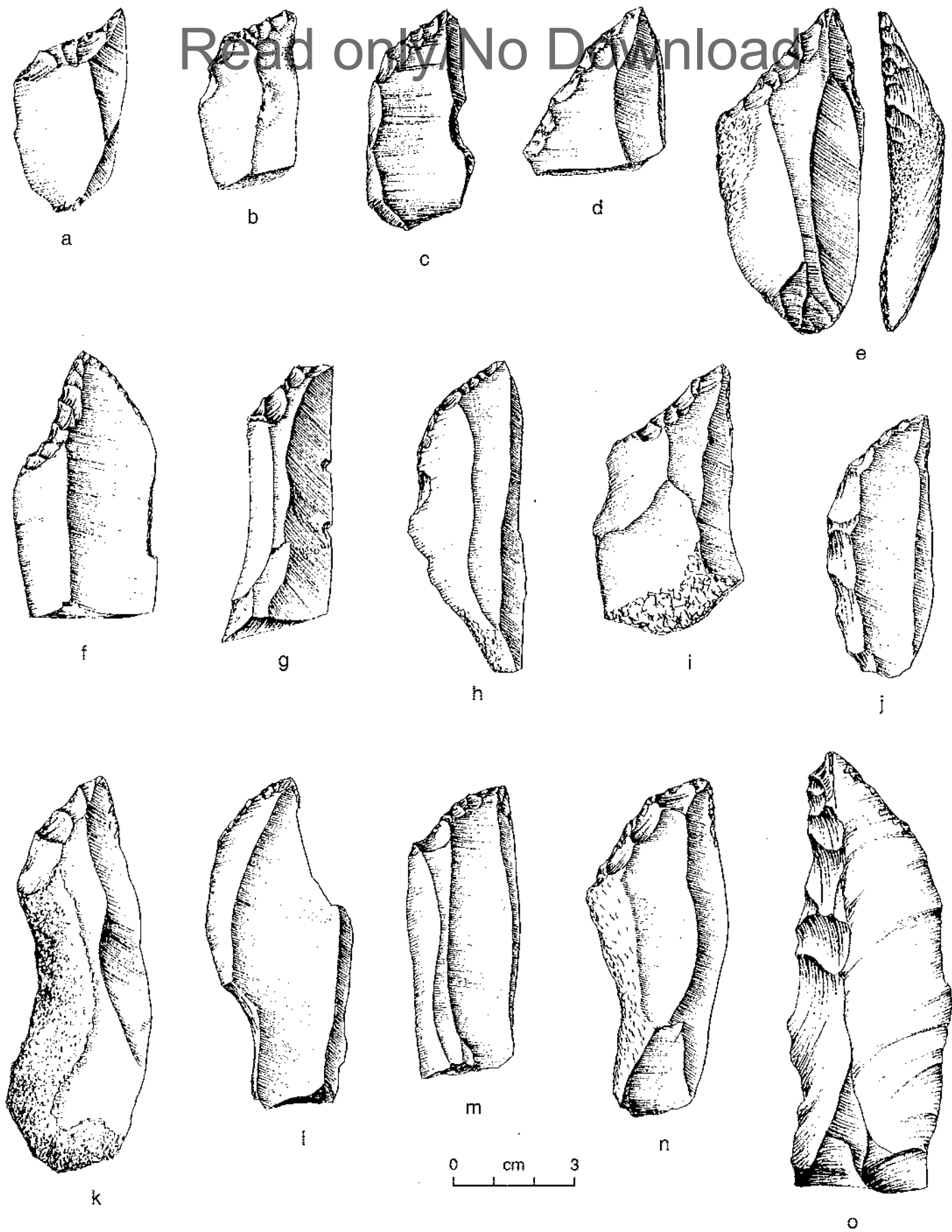


Plate 59. Couche 2-IV (Beauronnian): medium angled Solvieux truncations

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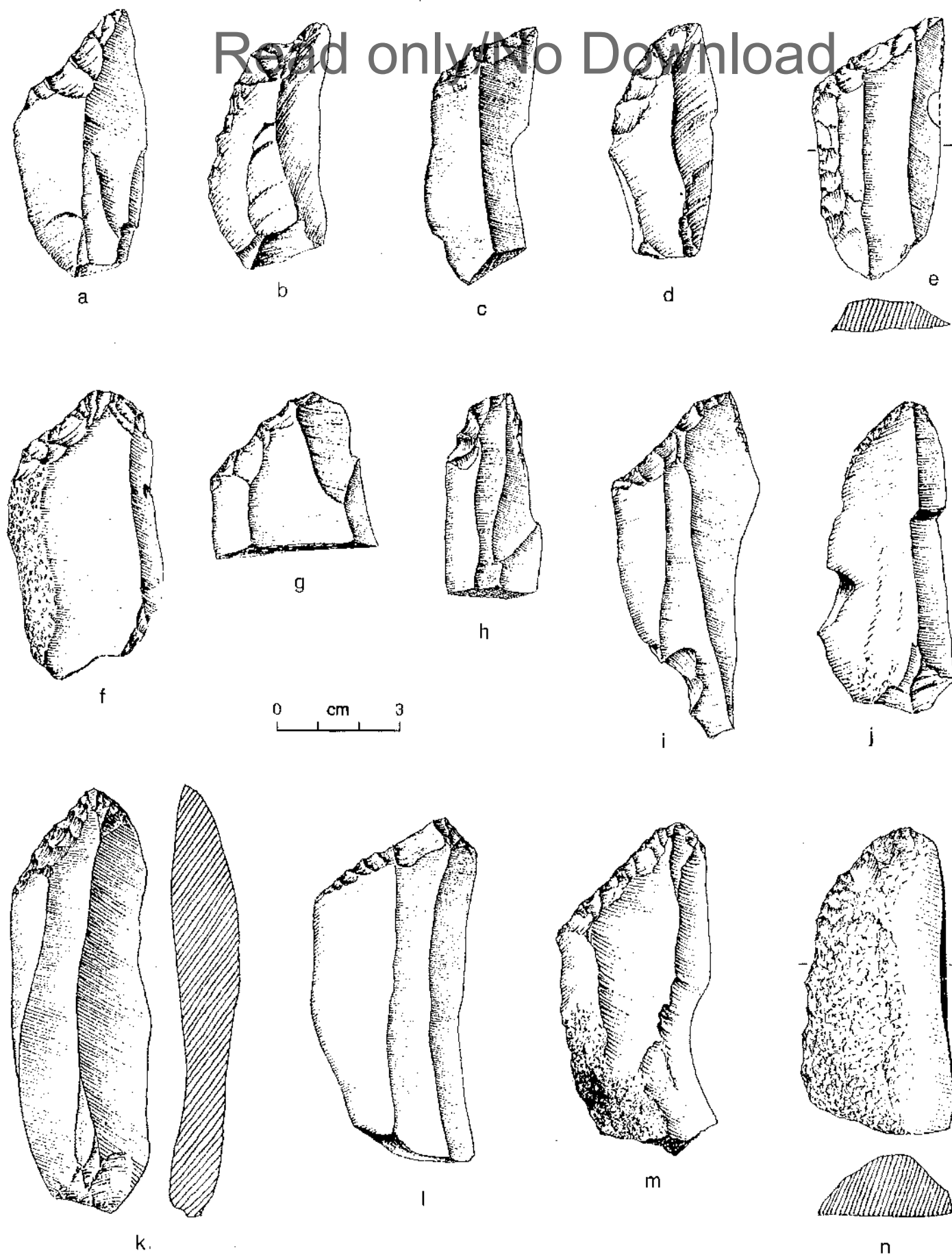


Plate 60. Couche 2-IV (Beauronnian): medium angled Solvieux truncations

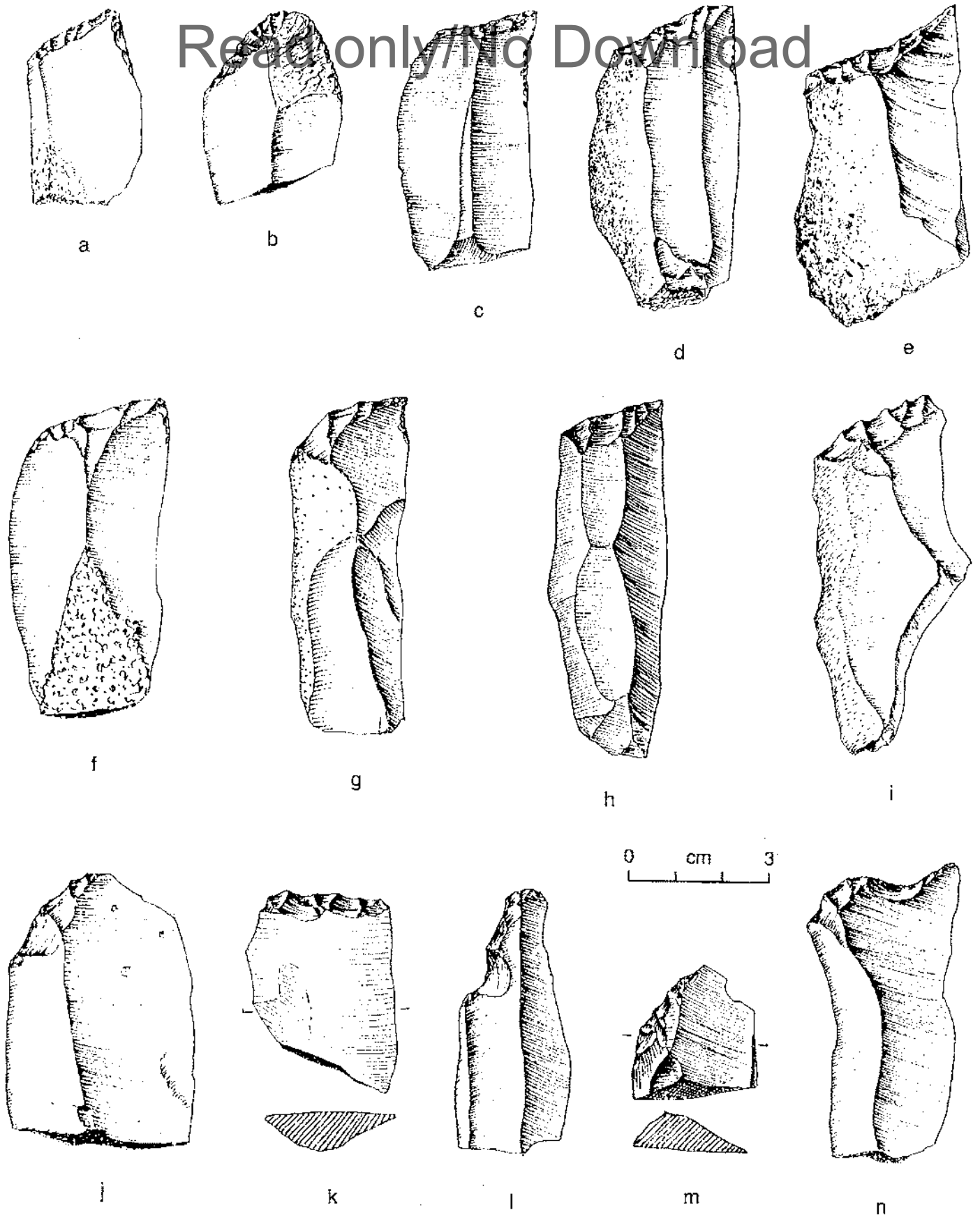


Plate 61. Couche 2-IV (Beauronnian): broad Solvieux (a-i) and standard (j-n) truncations

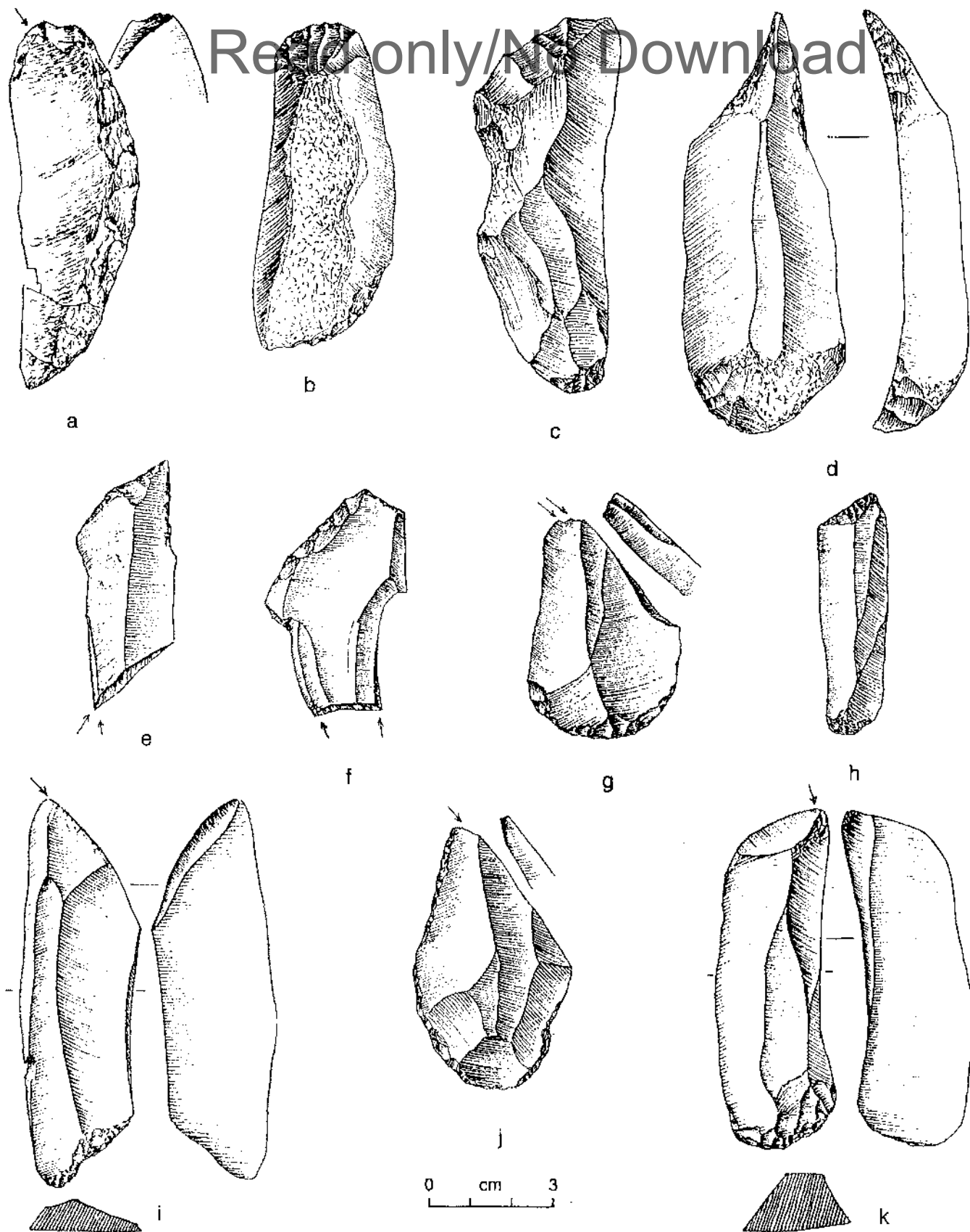


Plate 62. Couche 2-IV (Beauronnian): composite pieces

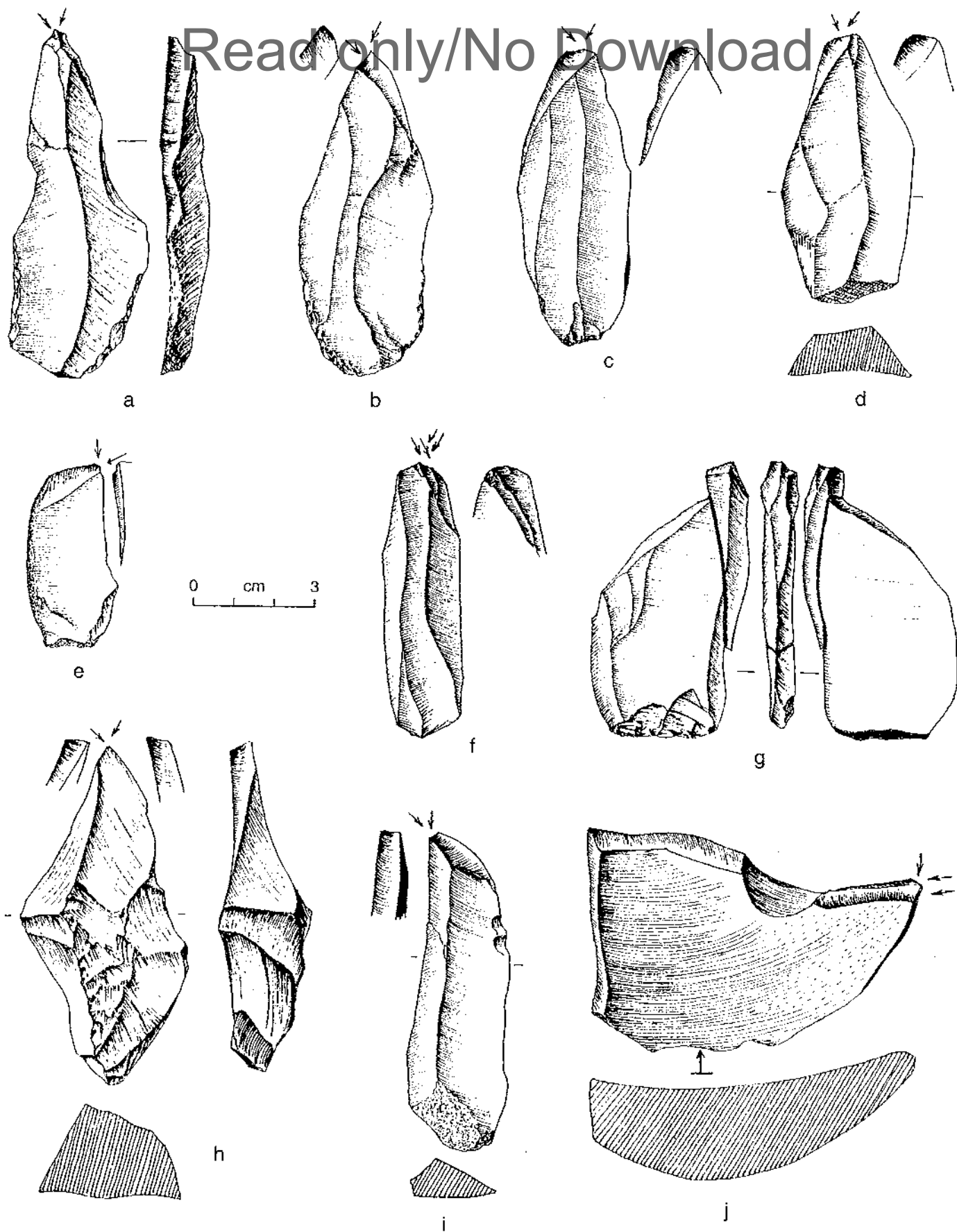


Plate 63. Couche 2-IV (Beauronnian): dihedral burins

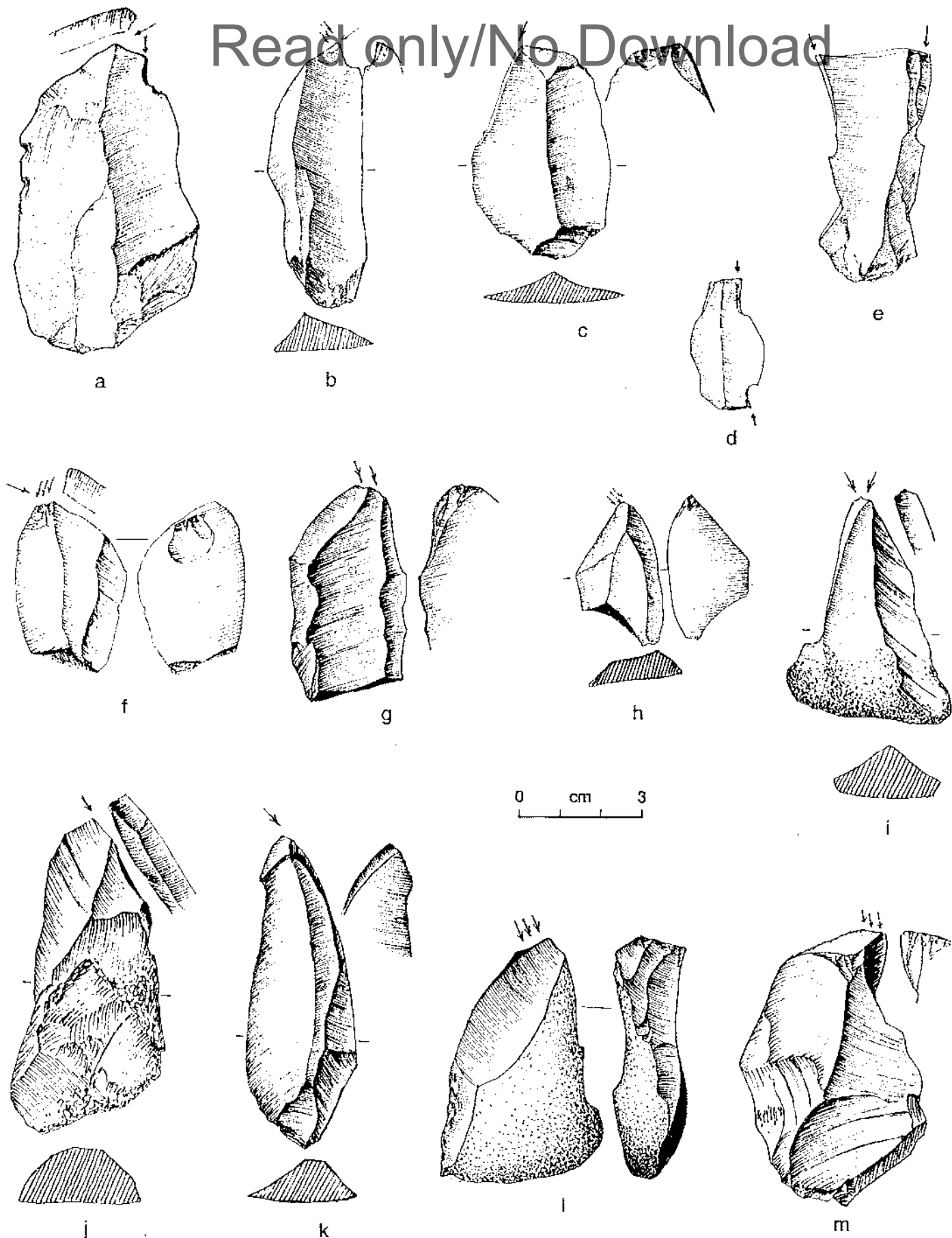


Plate 64. Couche 2-IV (Beauronnian): dihedral (a, b, f), break (c-e), and unmodified edge (g-m) burins

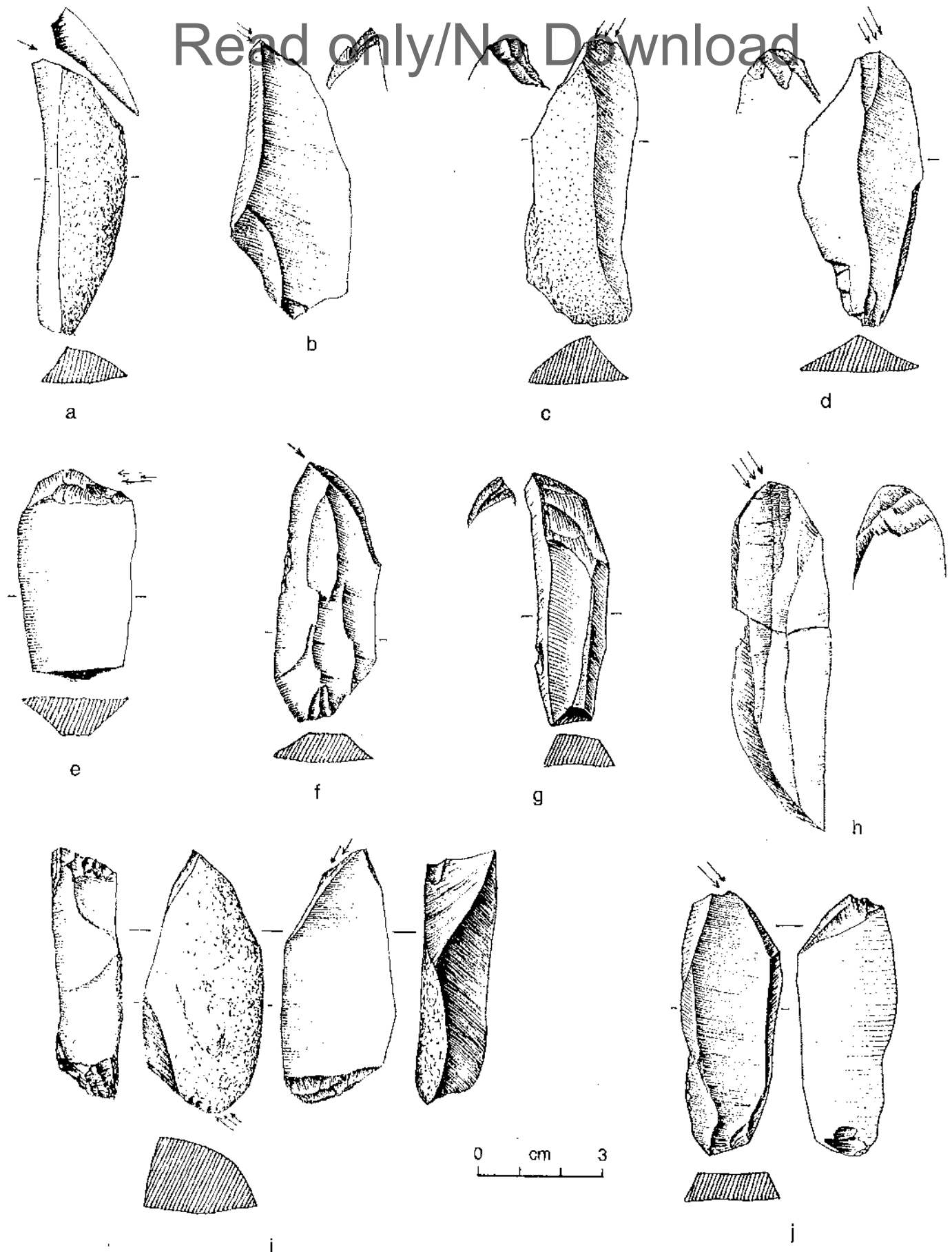


Plate 65. Couche 2-IV (Beauronnian): quasi-dihedral flank burins

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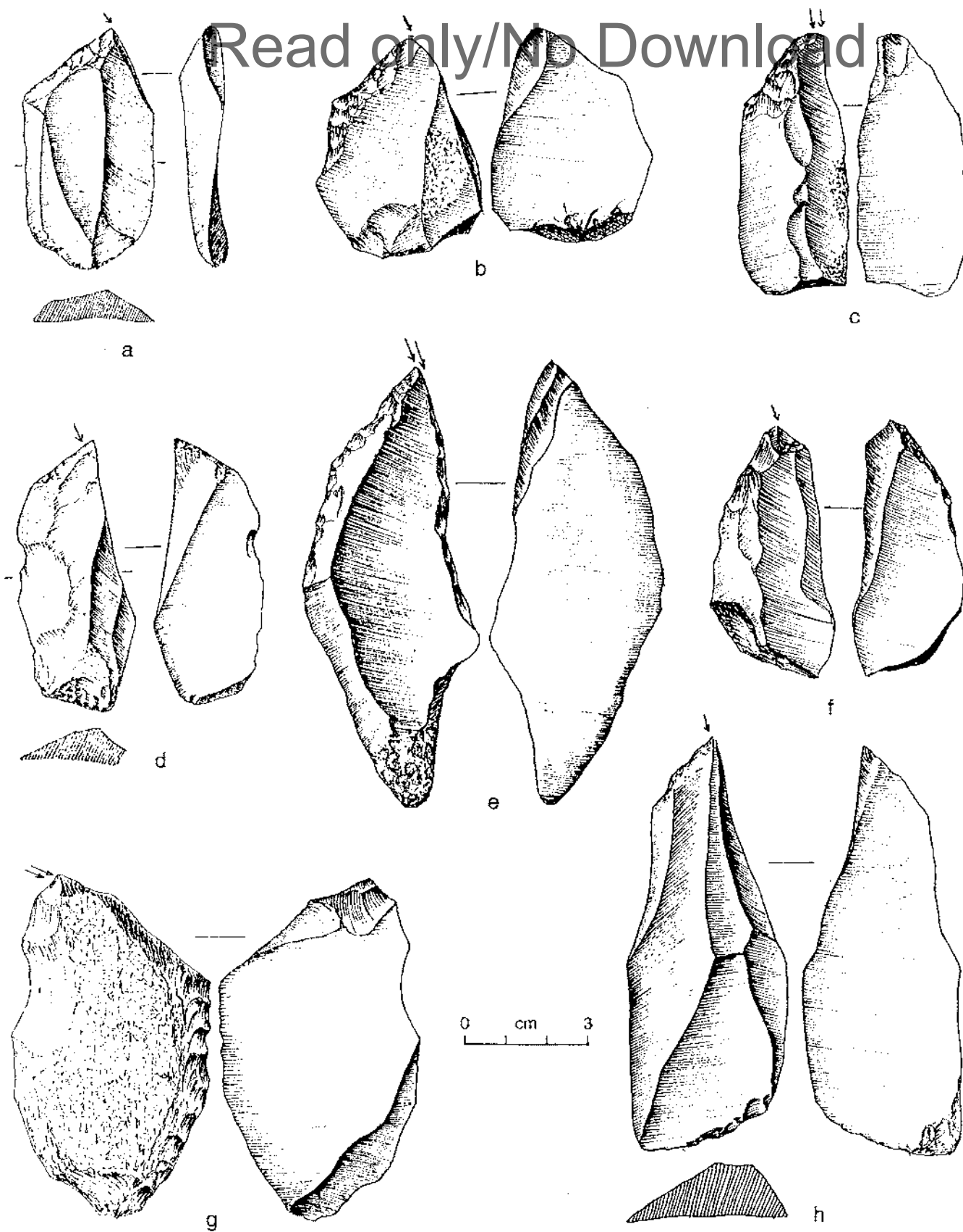


Plate 66. Couche 2-IV (Beaurennian): truncation burins

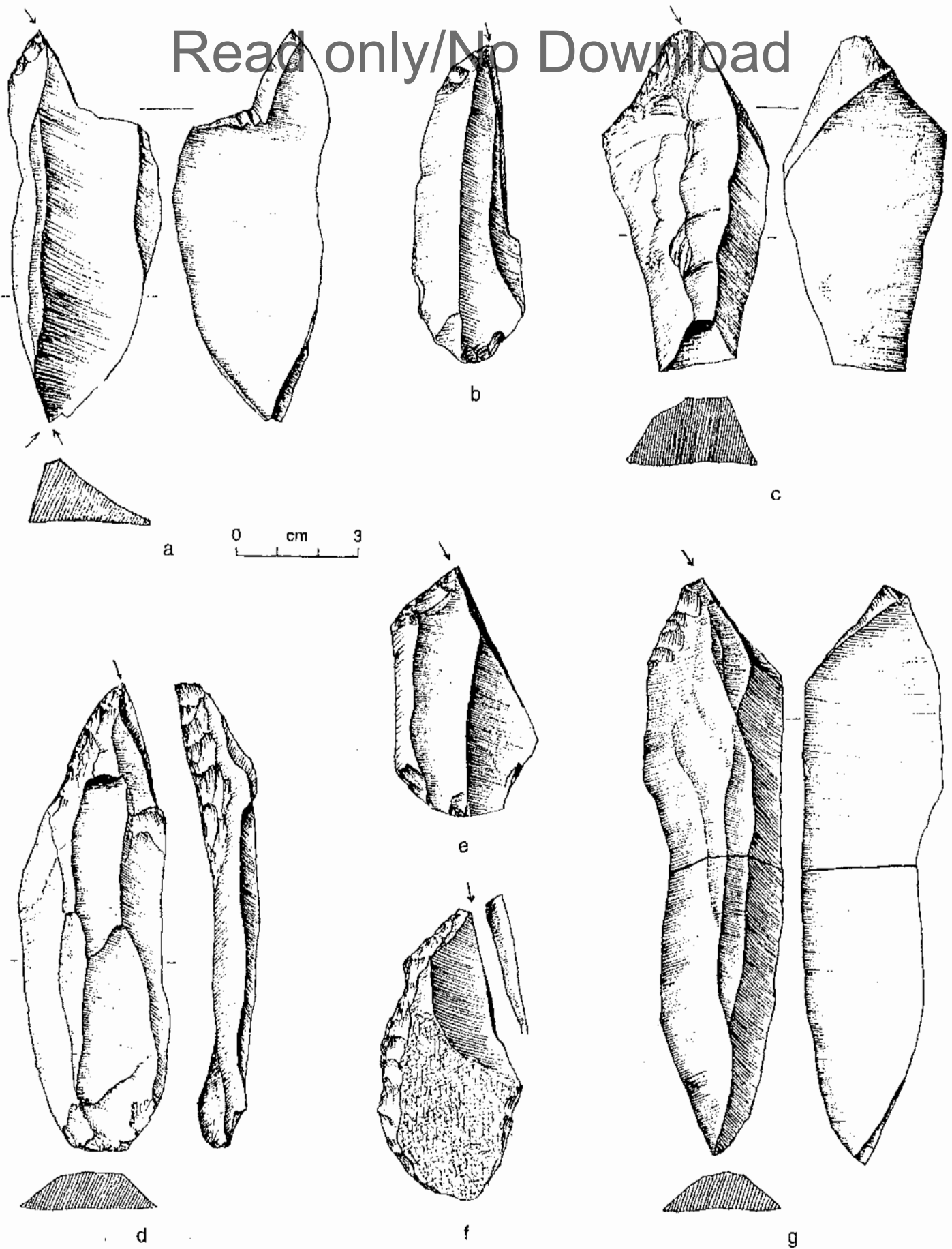


Plate 67. Couche 2-IV (Beauronnian): truncation burins

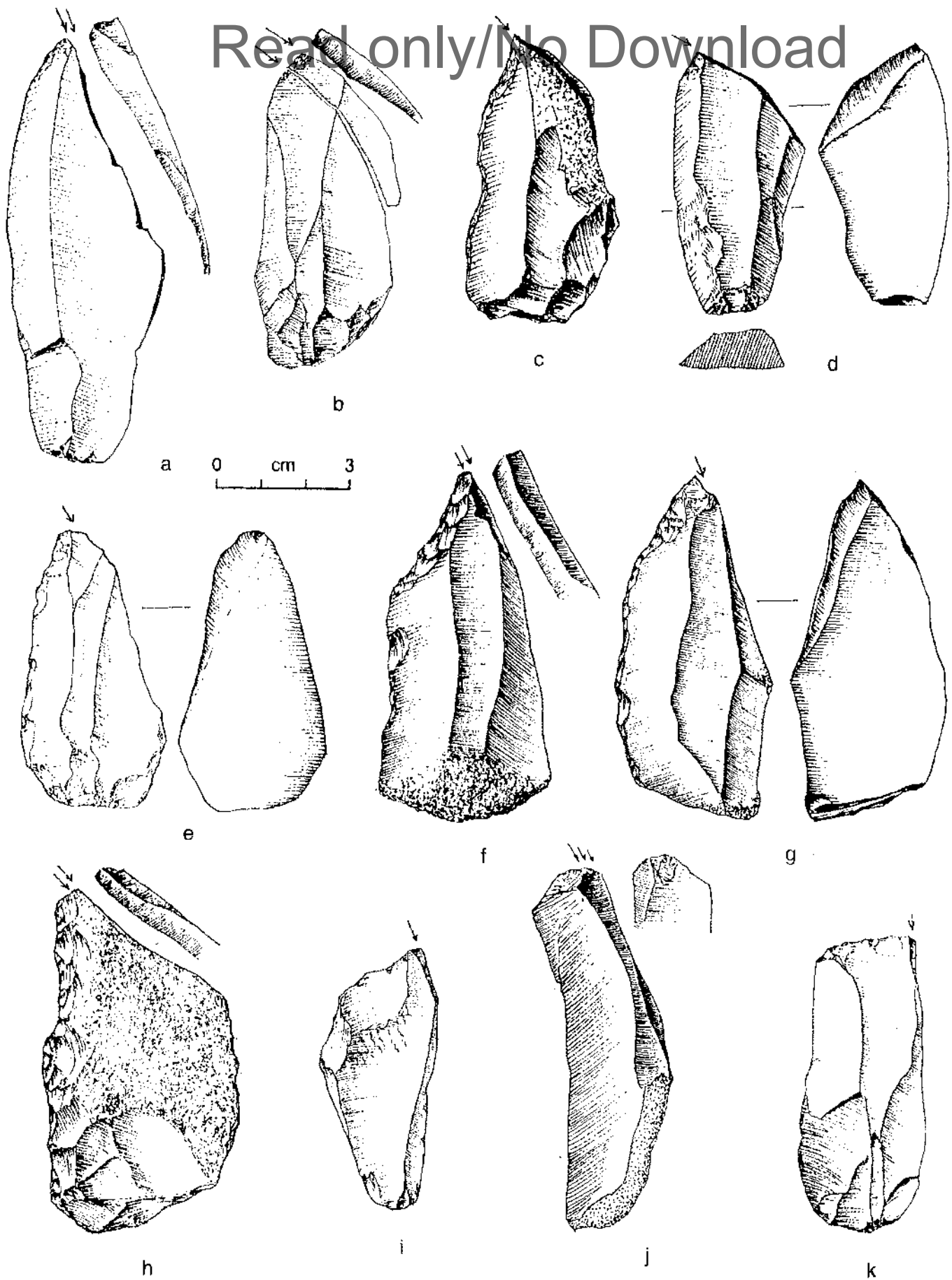


Plate 68. Couche 2-IV (Beauronnian): truncation burins

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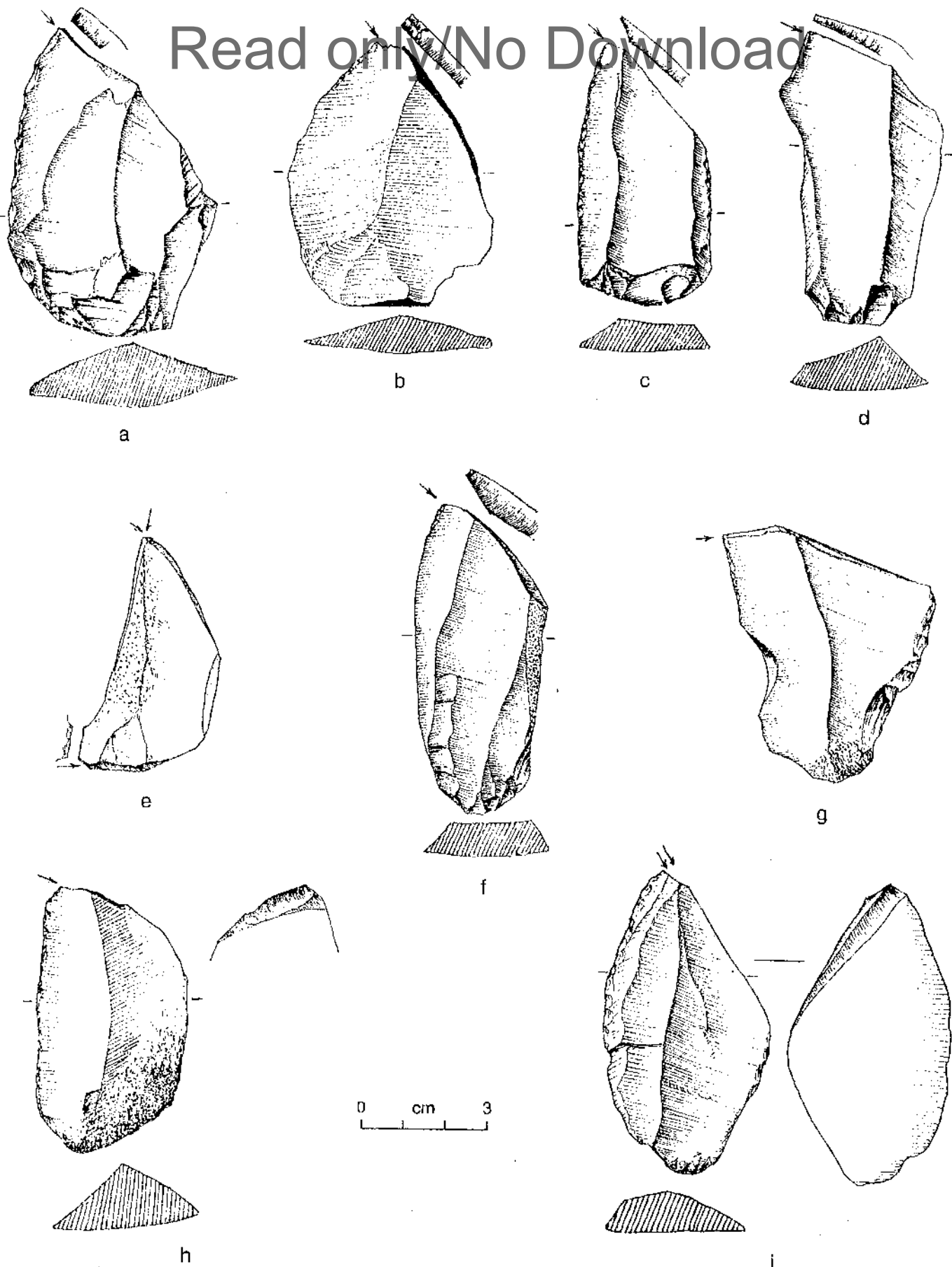


Plate 69. Couche 2-IV (Beaurennian): burins on retouched edges (a–g) and quasi-truncation flank burins (h, i)

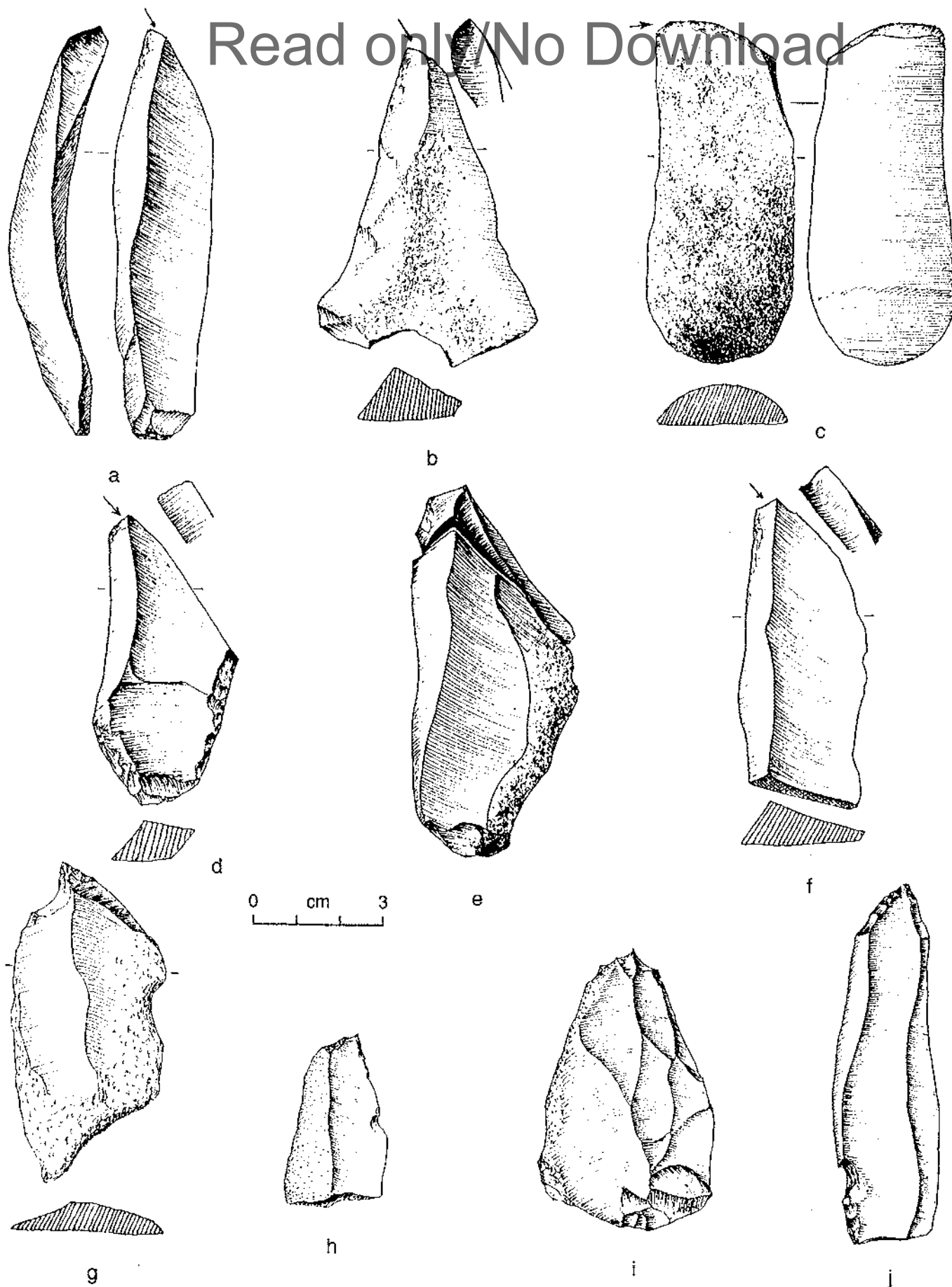


Plate 70. Couche 2-IV (Beauronnian): quasi-truncation flank burins (a-f) and perforators (g-j)

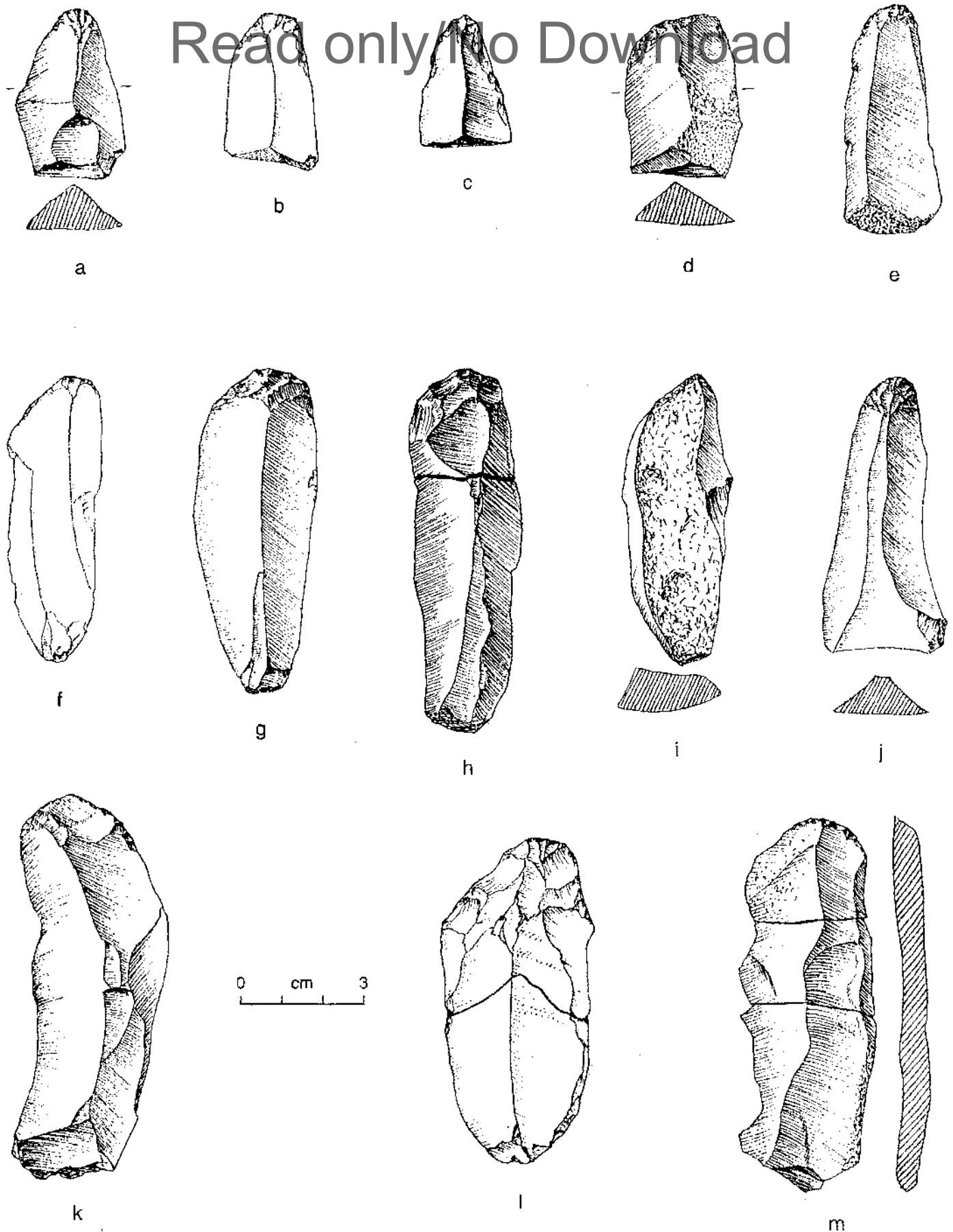


Plate 71. Couche 2-IV (Beauronnian): endscrapers

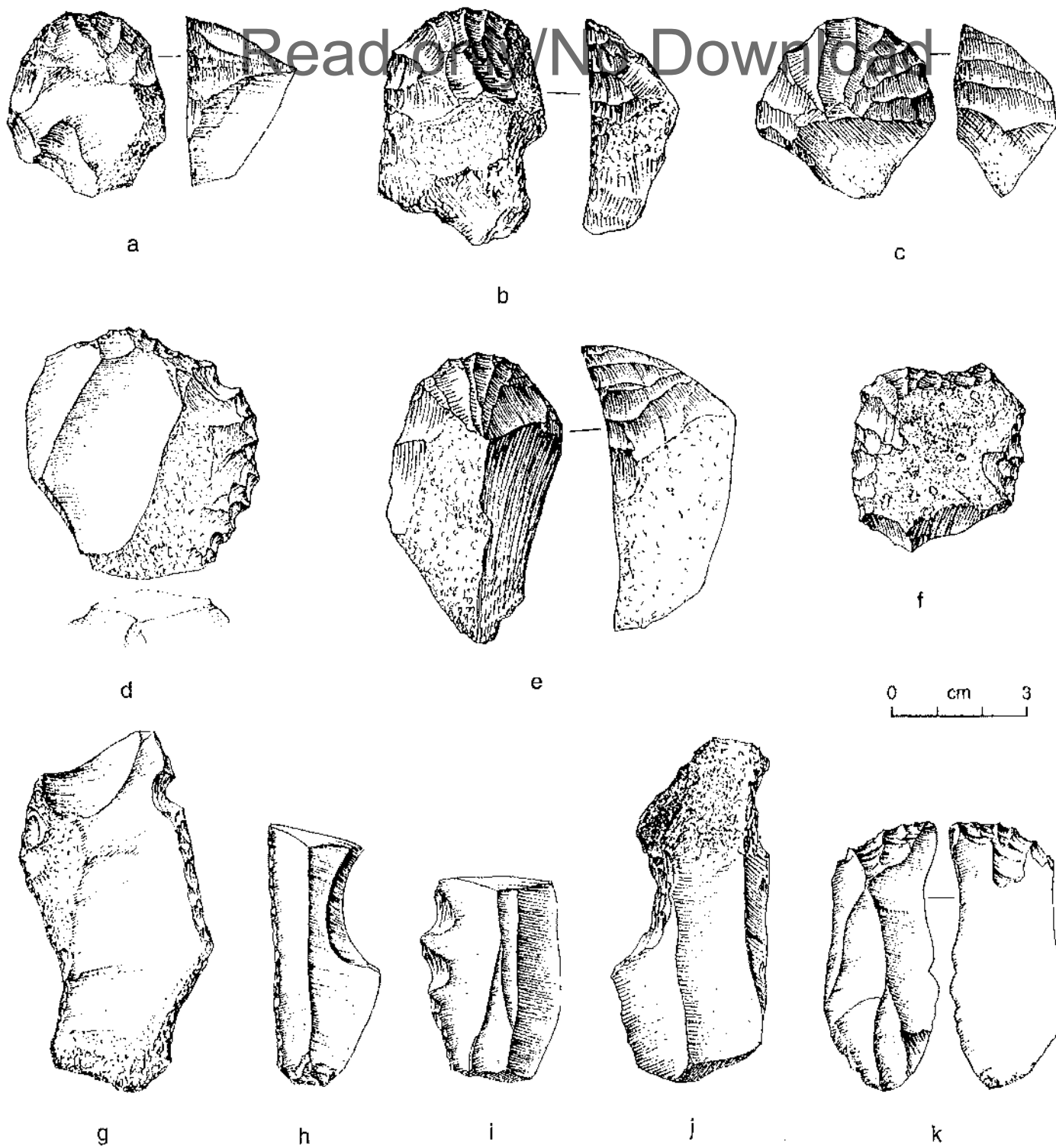


Plate 72. Couche 2-IV (Beauronnian): scrapers (a-f), retouched (g-j) and ad hoc (k) pieces

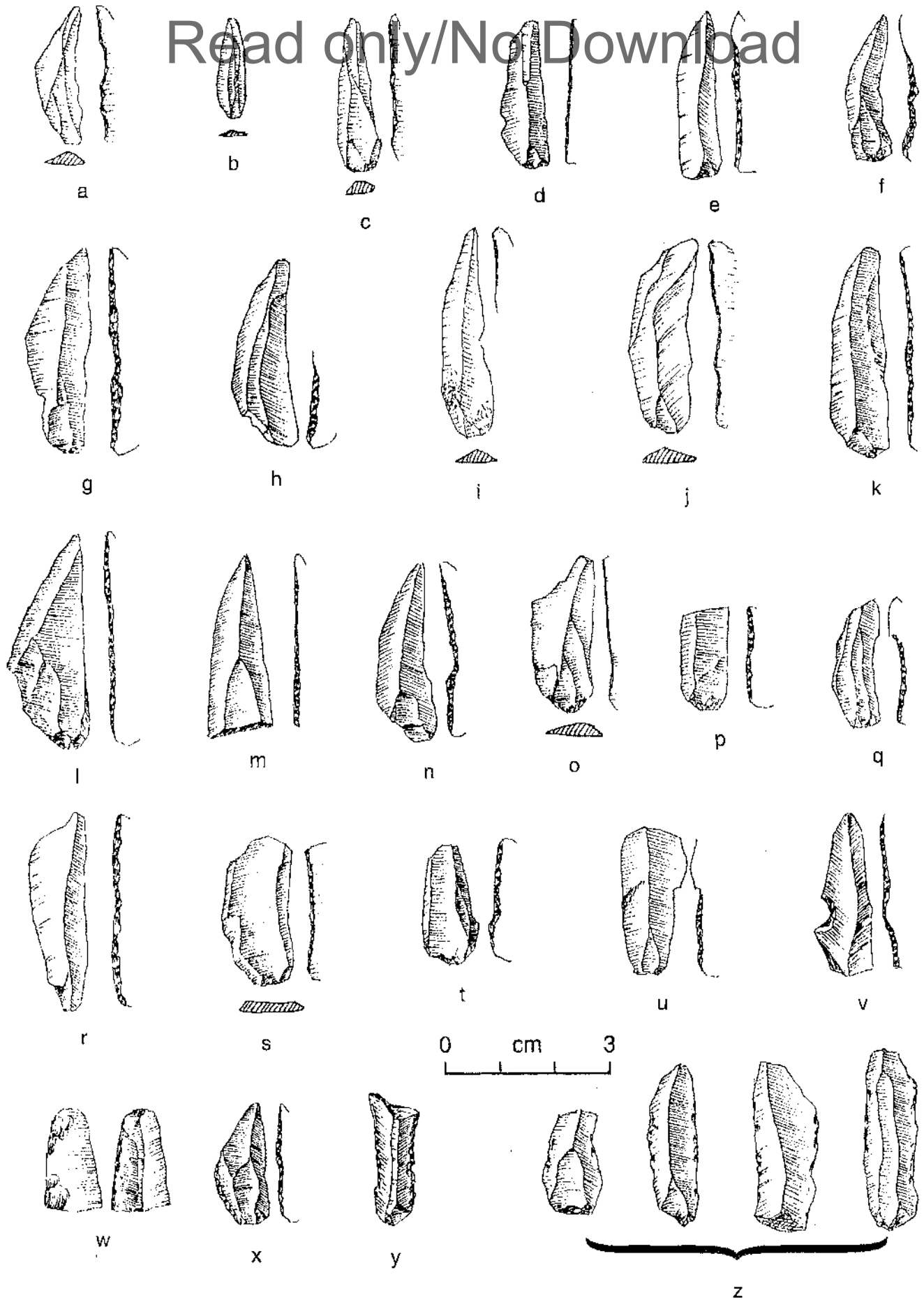


Plate 73. Couche 2-IV (Beaumontian): retouched bladelets

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