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Forged by Society: An Interregional Investigation into the Social Implications of Metallurgical Knowledge Transfer in the Southern Levant and Egypt (ca. 5000-3000 BCE)

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Forged by Society: An Interregional Investigation into the Social Implications of Metallurgical Knowledge Transfer in the Southern Levant and Egypt (ca. 5000-3000 BCE)

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in Near Eastern Languages and Cultures

by

Nadia Ben-Marzouk

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ABSTRACT OF THE DISSERTATION

Forged by Society: An Interregional Investigation into the Social Implications of Metallurgical Knowledge Transfer in the Southern Levant and Egypt (ca. 5000-3000 BCE)

by

Nadia Ben-Marzouk

Doctor of Philosophy in Near Eastern Languages and Cultures

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Professor Aaron A. Burke, Chair

Metal played an important role in developing the regional economies of the southern Levant and Egypt. However, very little is known about the contexts in which knowledge of extractive metallurgy was procured by these communities and thus how the learning process may have contributed to shaping local identities, power structures, and systems of belief. In the last decade, research has expanded available datasets to begin refining timelines and interpretations. By combining anthropological game theory with a communities of practice approach to learning and identity, this study surveys the transformation of economic cooperation between communities in the southern Levant and Egypt around the mining and production of copper. I propose possible contexts in which production-related knowledge may have been transmitted between members of socially differentiated groups and explore the significance of those exchanges as they relate to the rise of the early Egyptian state. The dissertation argues that copper production played a central role in fostering economic cooperation among communities in the Nile Valley, southern Levant, and southwest Asia during the fifth millennium, creating a shared landscape of ritual praxis and knowledge that would last for millennia. I propose that core symbols of an elite Egyptian political identity were the product of active participation in early metalworking communities in southwest Asia during the fifth and fourth millennium, and further explore the central role of copper in the economic foundation of the early Egyptian state and ideological system which legitimized its authority. The study of the contexts and subsequent implications of metallurgical knowledge transfer via cooperation between communities of practice allows us to move toward a more nuanced understanding of the social environments in which new practices, identities, and power structures were forged.

This dissertation of Nadia Ben-Marzouk is approved.

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Kathlyn M. Cooney

Sarah P. Morris

Willemina Z. Wendrich

Aaron A. Burke, Committee Chair

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2020

To my family (and Garbie).

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Chapter 1. Crafting Communities into Contact: Recasting the Nature of the Egypto-Levantine Interaction around Metallurgical Production

"The action of making and the outcome of a crafted object connects cultures, communities and generations" (Greenlees 2011, 5)

Production systems are fundamentally social systems. They involve human agents, economic cooperation, communal decision-making, and a system of ideology that legitimizes the existence and structure of the whole. Why do we make what we do? Why do we make things *as* we do? How do the things we make shape us in the process? The answers to these questions are located in the communities in which we learn. Knowledge of how to make something is therefore more than just the steps by which something is fabricated: it involves internalizing a set of practices that legitimizes *why* we make what we do and why we make it *as* we do. Crafting know-how is the shared set of symbols, signs, and stories that mark membership in the production community, reshaping our identities as we become full participants in the system. There can be power in embodying production-related knowledge, and prestige in participating in the production process. Production systems can include or exclude, and thus form a locus around which new power dynamics can arise. While learning a new technique involves the collaboration between individual persons, the spread of technological practice requires the reconstitution of communities. The study of production therefore provides a window into the worldview of a people—it fabricates the individual, forges the community, and weaves together the disparate threads of society. As Greenlees (2011, 5) states, "the action of making and the outcome of a crafted object (can) connect… cultures, communities and generations." The discovery and subsequent transmission of extractive metallurgy in Europe and southwest Asia during the sixth millennium—a transformative technology that would fundamentally reshape local practices, identities and power structures—illustrates this statement.

When we look to the southern Levant and Egypt, however, very little is known about the contexts in which extractive metallurgy was introduced into each region. Nevertheless, the monumental displays of Egyptian kingship in the mines at Sinai and the hoard of over 400 lost-wax-cast objects from Nahal Mishmar in the Judean Desert inform us that metal mattered to these communities. But when and why this system of production was adopted remains unclear. Who were the producers and how did they procure their knowledge? How did the collaboration between individuals result in the forging of new identities? And what role did cooperation play in shaping the worldview of each community? These questions drive this study.

Building on new research from the last decade, I argue that metal came to play a fundamental role as a life-cycle metaphor that shaped both southern Levantine and Egyptian worldviews. Core elements of this belief system—each of which flourished and later transformed in their unique social contexts—were shaped by Nile Valley communities cooperating with metalworking communities in the southern Levant as early as the Late Chalcolithic. Such cooperation and collective participation in this technological system would last for a millennium, until the institutionalization of coercion in the Nile Valley resulted in the need to hide this knowledge—removing it from the wider community to serve the agenda of the state. Nevertheless, I demonstrate how core symbols of the Egyptian king's political identity can be traced to Late Chalcolithic metalworking communities in the southern Levant and argue that copper production played a key role in legitimizing early Egyptian elites. This argument is made through surveying four key phases in the evolution of economic cooperation between communities in Syro-Anatolia, the southern Levant, Nile Valley, and Delta through the lens of copper production, beginning with the production of greenstone and ending with the rise of kingship in Egypt (Table 1).

Table 1 Chronology of social developments in Nile Valley and Delta, southern Levant, and southeastern Anatolia/north Syria. All absolute dates BCE.

Egypt		Southern Levant		SE Anatolia/N. Syria	
Relative & Absolute[1]	**Social Development**[2]	**Relative & Absolute**[3]	**Social Development**	**Relative & Absolute**[4]	**Social Development**
Neolithic Pre-4500	Initial settlement in Delta, introduction of agriculture and domesticated caprids; primary pastoral community	Pre-4500	Greenstone production; introduction of extractive metallurgy ca. 5000	Pre-4500	Greenstone production; beginning of extractive metallurgy
Badarian 4500-3800	New attachments to landscape as result of agropastoral activities; copper awls and beads; foundation of belief system tied to greenstone	Late Chalcolithic 4500-3900/3800/3600	Intensification of metallurgical production; ritual mode of production; rise of mortuary cult centers and ritualists-smiths	Late Chalcolithic 1-2 4700-3900	Ubaid/post Ubaid
Naqada IA-IIB 3800-3450	Rise of central place and elite cosmologies Amratian, C ware 30-38	EB IA 3800/3600-3450/3100	Participation in overland and maritime exchange with Delta and Syro-Anatolia; continuation of Chalcolithic mode of production	Late Chalcolithic 3-4 3900-3350	Early to Mid Uruk
Naqada IIC-D 3450-3325 Naqada III 3325-3050	Coalition-building and new sources of power Tomb 100. Gerzean D, W, L, R ware 38-62 Institutionalized elites, standardization of ideologies of kingship Writing-Tomb UJ Dynasties 0-1 (early) Semainean D, L ware 63-80	EB IB 3450/3100-3000	Intensified Nile Valley and Delta presence in southern Levant; Kfar Monash hoard; shared conceptions of space; deposition of Nahal Mishmar hoard	Late Chalcolithic 5 3350-3000	Late Uruk

[1] Relative dating for Upper Egypt follows Hendrickx (1996), who revised Kaiser (1957). Absolute dates for Egypt follow (Dee 2014, Dee et al. 2013).

[2] These are the stages of state formation developed by Stevenson (2016, 424).

[3] Absolute dates for Egypt follow Regev et al. (2012).

[4] Absolute dates for southeastern Anatolia and Syria follow Vignola et al. (2019)

Objectives of Study

Three main questions drive this research: 1) What are the possible contexts in which extractive metallurgy was introduced into the southern Levant and Egypt; 2) What role did this new technology play in the curation of identities, power structures, and systems of belief?; and, 3) How was this knowledge transmitted between members of socially differentiated groups? These three questions drive the fourfold objectives of this study: 1) to describe regional systems of copper production (to the extent possible) in terms of their technology, human agents, ideological systems, and organizing principles; 2) to explain why each system developed as such during the period under study; 3) to identify and explain the regularities and variability in these systems in relation to one another; and 4) to investigate the diverse social environments in which technological knowledge transfers were able to operate and explore the social implications of these exchanges as they pertain to the construction of producer and consumer identities and power dynamics.[5] In order to present a flexible, holistic framework capable of responding to the above-posed questions, we must first survey the current state of knowledge to examine previous approaches.

State of the Question

Regional systems of metallurgical production in the southern Levant and Egypt tend to be investigated independently—the result of divergent research trajectories, differing datasets, and assumptions about identity. With few exceptions, such investigations tend not to explore how potential collaboration *between* individuals in diverse geographic communities could have resulted in knowledge exchange, nor how the construction of a shared group identity can be borne out of participation in the same technological system. Most studies on metallurgical production during

[5] Objectives 1-3 originate from the framework proposed by Costin (2001) for studying systems of craft production.

the fifth and fourth millennium in the southern Levant and Egypt have as their primary focus either technological aspects of the mining and metallurgical production process, provenance studies, typological categorizations of artifacts, region-specific constructions bounded in time (i.e., *only* the Chalcolithic vs. EB I), or investigations exploring the role of copper in the *commercial* networks between these communities. Agent-centered investigations into how the learning process contributed to the formation of local identities and power dynamics is therefore largely relegated to the margins, if investigated at all. In the discussion that follows, I provide a brief overview on the current state of interpretation regarding the introduction, transformation, and social significance of metallurgical production in the southern Levant vs. Egypt through the end of the fourth millennium BCE. This review is not meant to be comprehensive, but rather ground the reader in the approaches to—and interpretations of—the current state of the data, as well as highlight new information that raises questions with regard to these previous models. Each chapter will provide a more in-depth discussion surrounding specific aspects of the scholarship where warranted. I will also provide answers to the questions posed at the end of this section.

Brief Overview on Discovery of Extractive Metallurgy

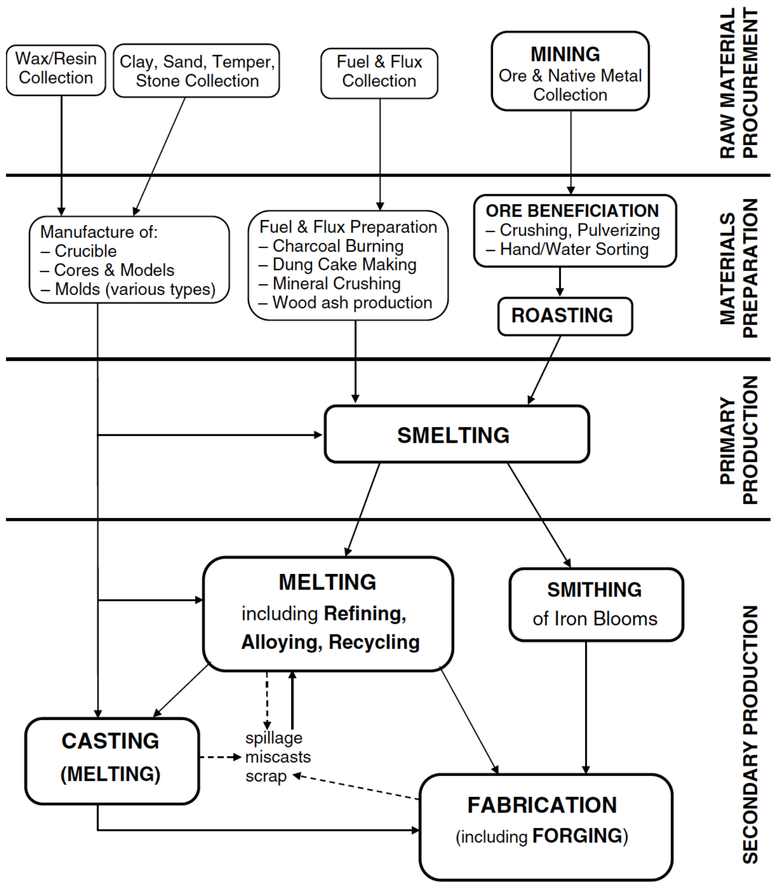
Before we begin the review, it is necessary to provide a brief overview on the state of the knowledge surrounding the discovery of how to extract metal from stone. Extractive metallurgy refers to the separation of metal from its ore body through the application of both heat and a fluxing agent (Figure 1).[6] Within the context of the current discussion, an ore is a naturally occurring, metal-bearing mineral or rock from which metal can be extracted. A copper mineral is transformed

[6] A flux is defined as a material substance that reacts to the unwanted minerals in the ore, resulting in the separation of the metal from the gangue via the creation of slag. Fluxing agents can be included in the ore body, resulting in a self-fluxing ore or a fluxing agent that is added to the charge.

from a rock into an ore via the human recognition that it has the potential to become metal. As the first metal to be extracted from ore, copper originates in green-colored rocks referred to here to as "greenstone"—a catchall term for *both* copper and non-copper-bearing minerals. Local flora in the landscape such as certain trees and plants will grow on top of or near copper minerals, providing visual cues where a potential ore source might be located. A comprehensive knowledge of local landscape is thus important for mining communities. Once a producer has identified a copper ore for smelting, beneficiation begins wherein the ore is crushed into smaller pieces or ground into a powder to remove as much gangue as possible (i.e., unwanted minerals and rock), increasing the productivity of the smelting process. If the ore is a copper sulfide, the producer might roast it to remove the sulfur and convert it to an oxide state.[7] The crushed ore is then placed into a pit furnace or crucible, filled with charcoal, and heated from above to create the ideal reducing conditions necessary to "free" the copper from its ore body. In the earliest stages of extractive metallurgy, a highly viscous slag was produced, meaning that copper did not reach a liquid state but formed prills within the slag that had to be crushed and retrieved. It was only then that the metal could be collected, melted, and cast into various shapes.

[7] It should be noted, however, that roasting a copper sulfide is not required as reduction can also take place during the smelting process.

Figure 1. Simplified operational production sequence for extractive metallurgy (Miller 2009, fig. 4.11).



Prior to the introduction of extractive metallurgy in the southern Levant, local communities had exploited copper-bearing greenstone as early as the Late Natufian, when certain mobile groups began adopting more sedentary practices (Bar-Yosef Mayer and Porat 2008). It was during this time that the region became integrated into an interregional obsidian exchange network with Anatolia (Khalaily and Valla 2013), establishing sporadic contact between communities in the north and south. By the ninth millennium, communities across Eurasia began exploiting green-colored copper minerals alongside native copper metal, adopting agricultural practices, as well as demonstrating a new command of pyro-technology for the production of lime plaster. Given the quick rate at which this new technological package spread, it appears these practices formed part of a shared landscape of knowledge exchange.

It is against backdrop that extractive metallurgy appears to have been discovered some time during the sixth millennium, however the geographic origin of this discovery currently remains debated.[8] While the earliest evidence of smelting copper is currently attested in the Balkans and dates to the late sixth millennium (Radivojevic et al. 2010), similar evidence is also attested in near-contemporaneous contexts at Tal-i Ibis in Iran (Thornton 2009). Debate thus currently centers on whether such a technological discovery was made only once and diffused to other regions (Wertime 1964, Roberts, Thornton, and Pigott 2009), or if communities independently discovered how to extract metal from stone (Radivojevic and Rehren 2015, Renfrew 1969). Given the contemporary evidence for smelting in the Balkans and Iran, the most plausible model is the one proposed by Roberts, Thornton, and Pigott (2009) wherein extractive metallurgy was discovered only once and spread through pre-existing social networks to all other locales via the movement of individuals with such knowledge.

Southern Levant

In the southern Levant, very little is known about the introduction of extractive metallurgy. Currently, the earliest metal object in the region is a cast copper awl from Tel Tsaf that dates to the late sixth/early fifth millennium—relatively contemporary with the evidence for metallurgical production in the north (Garfinkel et al. 2014). The awl is typologically similar to those in the Ubaid sphere of exchange but believed to have been cast from copper potentially originating in the Caucasus (Garfinkel et al. 2014). While evidence suggests the community at Tel Tsaf was integrated into Syro-Anatolian exchange networks (Streit and Garfinkel 2015), ceramic data from throughout the southern Levant reveals participation in these networks resulted in the exchange of

[8] See various discussions in Roberts and Thornton (2014).

various types of production-related knowledge (Gabrieli 2016). We might therefore expect that knowledge of extractive metallurgy spread south into the southern Levant, however the earliest evidence for smelting in the region does not appear until several hundred years later during the late fifth millennium.

The oldest unequivocal evidence of extractive metallurgy in the southern Levant thus dates to approximately 4200 BCE and appears centralized in the Beersheba region of the Negev, concentrated in sites like Shiqmim (Shalev and Northover 1987, Golden, Levy, and Hauptmann 2001) and Abu Matar (Perrot 1955c, Shugar 2000). Analysis from these settlements demonstrates that ores were mined locally from the Feinan region and then transported back to these settlements where they were smelted it in crucibles and pit furnaces and cast into tools in simple, single sided molds (Shalev and Northover 1987, Shugar 2000, Golden 1998, Golden, Levy, and Hauptmann 2001). In addition to tools cast within these settlements, ceremonial scepters, standards and maceheads were also produced using the lost-wax method in a currently unknown location perhaps somewhere in the region of the Dead Sea or Shephelah (Goren 2008). While the clustering of production refuse within the Beersheba settlements has led to the general acceptance that smelting near the mines did not occur until the mid-fourth millennium, research from the last decade raises the possibility that smelting and habitation actually did occur near Feinan and Timna during the fifth millennium, pointing to a secondary mode of production (Baker and Mattingly 2008, Grattan et al. 2016, Grattan, Gilbertson, and Hunt 2007, Ben-Yosef et al. 2008).

In addition to local mining efforts, the Beersheba communities appear to have been actively engaged in long distance procurement strategies, attesting to their wide-reaching contacts. Complex metals containing high amounts of antimony, arsenic and nickel were imported from Anatolia, Iran and possible the Caucasus (Key 1980, Shalev and Northover 1993, Tadmor et al.

1995, Shugar 2000). Polymetallic *ore* from central Anatolia was also identified locally at Abu Matar (Shugar 2000, 2018), attesting to the exchange in metal and copper-bearing greenstone. Further evidence for contact with metalworking communities in Anatolia is suggested by the isotopic signature of a lead macehead from Ashalim cave in the Negev (Yahalom-Mack et al. 2015). Leaded copper was also recently discovered in an assemblage of tools and a lost-wax-cast piriform macehead at Bet Shemesh, although a potential local origin of the metal was proposed by the researchers (Ben-Yosef et al. 2016). In addition to copper and lead, round gold and electrum objects (ingots?) were excavated from a rich burial cave at Nahal Qanah. These enigmatic objects are believed to originate in the Nile Valley, identified as such on the basis of known gold-electrum deposits in the region and Dynasty 5 funerary depictions of similar gold ingots (Gopher and Tsuk 1991, Gopher and Tsuk 1996). Such an origin is viewed here as questionable given the trajectory of metallurgical development in Egypt (see below and Chapter 5). Indeed, gold cast using the lost-wax method is known from the contemporary graves at Varna in Bulgaria (Leusch et al. 2015) and gold is similarly attested in contemporary contexts in the Caucasus (Courcier 2014). Of relevance here is the recent proposal by Klimscha (2017) that the local system of production was connected to the broader exchange network of metal across Eurasia during the fifth millennium. While we must acknowledge that the isotopic signatures of local sources are not well understood outside of Feinan and Timna (Ben-Yosef 2018), when taken together the data supports a model wherein the Beersheba communities were very much integrated into interregional networks in the metalworking to the north in the Syro-Anatolia region.

The importation of both ore and metal from such great distances appears connected to the expertise of certain individuals, who were well acquainted with their craft. It is believed color and casting properties played a role in determining production techniques (Shugar 2000). At Abu

Matar, the presence of arsenical-rich ores imported from Anatolia were thus co-smelted with local ores, potentially to lower the melting temperature of the cast, increase its fluidity, and result in a silver-colored metal (Shugar 2000, 2018). While these imported complex metals appeared to have played a key role in helping the producers achieve certain material properties, both imported and local metal was employed to cast tools in single sided open molds as well as scepters, standards, and maceheads using the more complex lost-wax casting method. When combined with the lack of use-wear on many of the tools, some scholars believe the entire industry was ceremonial in nature.

The Chalcolithic importance of metal in ceremony and display is best attested in the Nahal Mishmar hoard. While tools and lost-wax casts were discovered in caves (Segal, Kamenski, and Merkel 2002, Shalem, Gal, and Smithline 2013) and as foundation deposits in settlements (Levy and Alon 1985), the hallmark of Chalcolithic metallurgy is the assemblage from the so-called Cave of the Treasure in the Judean Desert (Bar-Adon 1980). The hoard is comprised over 400 lost-wax-cast maceheads, scepters, standards, as well as tools cast in the same method as in the Beersheba community (Shalev and Northover 1993, Tadmor et al. 1995). Based on the most recent date of 4300 BCE for the reed mat used to wrap the hoard (Aardsma 2001), several scholars have accepted a late fifth millennium date of deposition, rendering it contemporary with the Beersheba settlements (Amzallag 2018, Sebbane 2017, 2014).[9] Such a cache raises questions about the role of metal in the transformation of social rank and inequality.

Debate on the connection between metal and social complexity has thus far traditionally focused on whether Chalcolithic communities in the southern Levant should be characterized by

[9] There are a number of issues that arise surrounding the dating of the hoard's deposition. This study presents a new chronology of the hoard as well as recontextualizes the social processes that led to its final deposition (see Chapter 8).

institutionalized hierarchy (Levy 1986, 1995, 2007) or egalitarianism (Gilead 1988). Rowan and Ilan (2007) have tempered both of these previous models by recognizing the central role of community ritual and its diversity that render the period unique. As such, they proposed inequality and social differentiation were most likely uneven across the landscape. Whereas Levy (1986, 1995, 2007) argued that chiefs had accumulated surplus and thus were able to control cult and production, Rowan and Ilan (2007) proposed the accumulation of resources within the community around the belief that necessity would have been prompted the pooling of resources between households. According to their reconstruction, ritual practitioners such as shamans and priests are therefore suggested to have formed the agents of power within the landscape as they administered various cultic events. Building from this now generally-accepted model, Gošić and Gilead (2015a, b) have focused specifically on the cult and ritual surrounding the production of copper—one of the most neglected aspects studied for copper production. Noting that the introduction of new technologies tends to be accompanied by intensive ritualization, they proposed the entire process of production was highly ritualized with producers serving in shaman-like roles (Gošić and Gilead 2015a, b). Given that the earliest evidence of copper did not displace certain industries such as that of stone tools (Rosen 1984), Gošić (2015) further argued copper skeuomorph of various objects served as a type of sympathetic magic to express the power of copper over other materials. While almost all of the analyzed stone tools lacked evidence of use wear, Sebbane (2017, 453) critiqued the ritual model since it disregards the palpable economic and technological impact of early copper production.

Instead, in his analysis of the Nahal Mishmar hoard, Sebbane (2017) contended that the nature of the assemblage is what we would expect to see in a temple deposit. His proposal is based on the high quantity of maceheads (approximately 250) and the fact that many pieces in the hoard had been repaired, attesting to their long use in circulation. When combined with the role of religious agents, such a proposal raises questions about the connection between metal and institutionalized power structures during the Late Chalcolithic. More specifically, it raises questions about the connection between metal and the rise of what appear to be public cult centers at En Gedi (Ussishkin 1980), Gilat (Levy 2006), and Teleilat Ghassul (Bourke 2002). Significantly, the importance of religious servitors is attested at Teleilat Ghassul, where frescoes depict individuals engaging in some sort of ceremonial procession potentially connected with mortuary rites and wherein the artists employ scale for the first time presumably to imply rank (Drabsch and Bourke 2014, 2019). When taken together, the first evidence of extractive metallurgy practiced on southern Levantine soil coincides with a highly developed system of production that comprised expert metalsmiths who were integrated into the broader exchange networks of southwest Asia. Such evidence calls for a reanalysis of the contexts and timeline in which this occurred as well as the social significance of metal in its local context. Whereas we can assume knowledge of extractive metallurgy would have been procured from communities in the north, the timeline and social processes that resulted in its integration into local communities remain unknown.

While the Chalcolithic system of production is largely considered ritually and economically important, the poorly understood abandonment of the Beersheba sites around 3800 BCE resulted in an intensification of production alongside a transformation in the social significance of metal. During the EB IA, lead, gold, and polymetallic ores are no longer attested in assemblages and lost-wax castings disappear from the archaeological record. Rather, only local copper is employed, and single-sided molds were used to produce axes, chisels, and awls (Shalev 1994). This reduction in the techniques, metal, and typology of objects is interpreted as tied to the intensification of production, resulting in metal becoming less ideologically significant (Shalev

1994, 636). Such observations led Ilan and Sebbane (1989) to argue for the central role of copper in sparking processes of urbanization by the late EB I and into the EB II; however,r this argument has been debated given the seeming importance of pastoralists in copper production (Genz 2000). This supposed lack of prestige goods was explained by Rehren, Hess, and Philip (1997, 637) as potentially reflective of new depositional practices; what these practices were remains unknown. It should be recalled that metal tools appear to have formed part of the same prestige industry in the Chalcolithic and thus there may have been more continuity that previously assumed.

Evidence of both change and continuity are attested when we view the overall organization of production, as sites appear to become more specialized in the Negev but continue the Chalcolithic mode of production in the region of the Red Sea (e.g., Klimscha 2013b). Whereas smelting is traditionally claimed not to have occurred near the mines during the Chalcolithic, during the EB I the settlement at Wadi Fidan 4 attests to a small community of mining and smelting operations in Feinan (Adams and Genz 1995). It is believed that the copper from Feinan was then shipped to sites near the coast like Ashkelon-Afridar for refining and export abroad (Segal, Halicz, and Kamenski 2004, Golani 2014, Shalev 2003), presumably via maritime transport to markets in Egypt and further north (Gophna and Milevski 2003). In the Negev, settlement shifted west to the region of Besor, which appears to be connected to overland routes across Sinai to the eastern Delta. Within this context unpublished findings from the 2019 season at Tel Erani are reported to push the "Egyptian trading center" back to the EB IA/Naqada I (Staff 2019), demonstrating a need to rethink the nature of interaction between communities around the trade in copper.

While production became increasingly specialized in the Negev, the continuity of the Chalcolithic mode of production is attested at Tall Magass and Tall Hujayrat al-Ghuzzlan in the region of the Red Sea (Khalil and Schmidt 2009, Klimscha 2012, 2013b). Here the technology was similar to that of the Beersheba settlements (Pfeiffer 2009) and production contexts radiocarbon date to right after the abandonment of the Beersheba settlements (Klimscha 2009). At Tall Hujayrat al-Ghuzlan, metallurgical production was attested across the site, with ingot molds matching the shape of the ingots discovered at Maadi in the eastern bank of the Nile River just south of the Delta (Klimscha 2013b). From Maadi, the copper is said to be isotopically similar to that from Feinan (Pernicka and Hauptmann 1989). However, recent analysis of the ores from Wadi Amram—just 10 km north of Tall Hujayrat al-Ghuzlan and Tall Magass—has revealed an isotopic signature similar to that of the ores from the MBS unit at Feinan (Ketelaer and Hauptmann 2016). This new evidence raises questions with regard to whether the copper objects and ingots at Maadi were actually from Feinan—and thus part of the Negev system—or reflect cooperation with the communities in the Red Sea region, who presumably exploited the mines at near Wadi Amram. Evidence for interaction with Nile Valley communities is attested at Tall Hujayrat al-Ghuzlan (Klimscha 2012), demonstrating the newfound importance of interregional exchange with the ancestors of the later Egyptian state. Such a system implies larger scale cooperation between communities as copper became economically important for the entire region south of the Dead Sea, seemingly tied to a burgeoning demand in the Nile Valley and Delta.

It is against this backdrop of increasing interaction with Nile Valley communities that production continued to intensify into the second half of the fourth millennium, resulting in the movement of individuals from the Nile Valley into the southern Levant. Egypto-Levantine interaction has traditionally been analyzed through a culturally homogenous lens, seeking to categorize the nature of social interaction through the presence of non-local objects. These materials included "Egyptian style" bread molds and cooking pots made from local clay, architectural features attested in the Nile Valley, serekhs bearing the names of the early kings of

Egypt, and several other material manifestations of an immigrant presence (Braun 2011). In the Nile Valley, it is believed wine, olive oil, and copper were imported, with state interaction in the southern Levant manifesting in the numerous storage vessels filled with wine in Tomb U-j at Abydos, believed to be the tomb of king Scorpion.

Scholars have debated for over half a century on the nature of this interaction, however. Early scholars interpreted the presence of non-local material as reflective of the Egyptian state's conquest of the region (e.g., Yadin 1955), however, such a depiction of stately power in the southern Levant is now known to have been relatively weak and decentralized (Kansa 2001). Given the number of traded goods into Egypt, many scholars have favored a commercial exchange model to classify interaction (e.g., van den Brink and Levy 2002). According to variations of this interpretation, pastoralists-turned-merchant entrepreneurs procured exotic goods such as metal and perishable goods for the consumption of settled elites (e.g., Harrison 1993, Anfinset 2010). While goods no doubt moved between regions, such a model assumes trade-for-profit, which is a highly Western economic concept and not one that appears to categorize complex stateless societies (e.g., Stanish 2017). Moreover, recent research has demonstrated that the wine vessels from Tomb U-j at Abydos appear to have been produced farther north, in the region north of the Galilee and into Lebanon (Hartung et al. 2015). When combined, the nature of the evidence does not support intensified exchange for state consumption.

Other scholars favor a colony model, wherein certain Egyptian practices could be equated with the ethnic identity of immigrants—a problematic proposal for a number of reasons. The first is the notion of cultural homogeneity and unified place. Given that the state was in its infancy, notions of a unified territorial place via political system just do not appear supported by the evidence. The second problem is the use of Egyptian-style ceramics produced from local clays, which are now known to be petrographically linked to the region around Tel Erani and subsequently distributed to other sites in the region for an unknown reason (Braun 2005). Rather than looking only at objects, when we look to the social practices that are archaeologically attested we find individuals living integrated lifestyles alongside one another. With the exception of a few places such as Tel es-Sakkan (de Miroschedji 2000b, a) and En Besor (Gophna and Gazit 1985, Porat 1992) that do indeed appear to be comprised almost entirely of immigrants from the Nile Valley and Delta, we see a different picture in most southern Levantine settlements with an "Egyptian" presence. Studies have demonstrated a lack of identity maintenance with regard to foodways (Kansa, Kansa, and Levy 2006) and various ritual practices (Allentuck 2015) supporting close cooperation between groups and even the construction of a shared identity. These include the construction of a monumental temple at Megiddo that contained a mix of Nile Valley elite culture and local features dating back to the Chalcolithic (Adams, Finkelstein, and Ussishkin 2014, Ussishkin 2015). The site also contained a monumental tomb (Tomb 910) with possible parallels in the Nile Valley that date to the Early Dynastic (Ilan 2013, 139-140). Local communities appear to have adopted the same ritualized preference for cattle forelimbs as Nile Valley elites (Allentuck 2015). With regard to copper production, burials at Azor reflect Nile Valley weapons mixed with local ceramic assemblages (Ben Tor 1975) and a cache of copper weapons and various other copper objects of potential Egyptian origin was found in the coastal plain (Hestrin and Tadmor 1963, Key 1963, Sebbane 2003). Ilan and Rowan (2015) have also noted similarities in the spatial distribution of burials of the Judean Desert on the west bank of the Dead Sea and funerary settlement in dynastic Egypt and posed questions regarding the potential influence between these communities. This practice of burying the dead facing the west—where the sun sets vs. rises—is also attested in the Sinai (Bar-Yosef et al. 1986, Bar-Yosef et al. 1983), where pastoralists are believed to have transported copper from east to west. These shared ritual practices are important for understanding the nature of interaction.

Within this vein, Amzallag (2019) has recently proposed that the esoteric knowledge surrounding the metallurgical production process played a key role in the belief systems of Bronze Age societies and can be detected in later myth. His proposal implies that the symbolic importance of metal in society extended throughout the EB I, when such knowledge became hidden from public view, raising questions about transformations in practice and the importance of display. Similarly, Avner (2002, 2018) has argued that desert pastoralists played a central role in in the spiritual life of settled Chalcolithic and Early Bronze Age communities. He supports this proposal by demonstrating the inclusion of several key architectural features incorporated from the cultic desert life into the cult structures of the southern Levant (Avner 2018). Important here is the proposal by Andelković (2012) that the southern Levant appears to have been viewed as *part* of the early Egyptian conception of the early state landscape. This proposal gains new light when we consider that contact between certain Nile Valley communities and those in the southern Levant can be traced back to the fifth millennium. Such close, established cooperation between communities raises a number of questions with regard to the role that mining and metallurgical production played in the construct of a shared community identity around the procurement and production of copper.

Egypt

When we turn to Egypt, mining and metallurgical production during dynastic Egypt were viewed as acts under the domain of the king. The two-volume study on the cosmological significance of mining and the mineral universe by Aufrère (1991) demonstrated the fundamental importance of metals and stones to the elite Egyptian worldview, which formed the landscape of the gods. We might surmise that the origins of this cosmology lay in the Predynastic, as the ideological importance of mining is best reflected in the epigraphic imprint left behind by early Dynasty 0 kings. It is thus during the Naqada III that inscriptions from Iry-Hor and Narmer are found in the region of the Wadi `Ameyra in southern Sinai (Tallet 2015, Tallet and Laisney 2012)—concrete claims *to* the landscape and *over* production. Indeed, Trigger (1983, 39-40) proposed that it was the control over the mining industry that may have played a critical role in consolidating the early power of the state. Metals thus appear to have played a significant role for the identity and power of Egypt's early kings. It is therefore unfortunate that we know so little about where the Egyptians learned this knowledge as that may provide insight into the construct of early elite identities.

Archaeologically, evidence of metallurgical production during the Predynastic is spotty at best. By the fifth millennium, it is suggested that pastoral groups from the Nile Valley began exploiting the Eastern Desert and Sinai for its greenstone. Nuggets of malachite and crushed green pigments begin to appear in burial assemblages alongside stone palettes and bone awls for application of the pigments to the body. It is also during the late fifth millennium that copper beads make their first appearance in a few Nile Valley graves. By the Naqada I, copper awls become the most frequently attested object alongside axes, adzes chisels and pins (Anfinset 2010, 144-146). In his analysis of Naqada I-II assemblages, Davis (1983, 121) proposed that individual families may have been in charge of producing some of the material interred in burial assemblages, raising questions about the role of kinship ties in structuring production during the early Predynastic.

The real shift in production appears to have taken place between 3450 and 3300 BCE during the Naqada IIC-D, when Nile Valley practices were adopted into the Delta. It is during this time that copper, gold and silver are attested alongside a sudden increase in the repertoire of objects, which now include a variety of weapons (daggers, crescent axes, spears), many of which are typologically similar to those in southwestern Asia. It is during the Naqada IID/IIIA that we are provided with the first evidence of secondary production (e.g., casting, forging, recycling) in the eastern Delta at Tel el-Farkha, where the producers appear to have been proficient in working metal from Sinai (Rehren and Pernicka 2014). In south Sinai, archaeological evidence attests to its exploitation for copper as early as the fourth millennium (El Gayar and Rothenberg 1995, Abdel-Motelib et al. 2012, Rademakers et al. 2018). In the Nile Valley, by the Naqada III the first evidence of mining in the Eastern Desert is attested at Wadi Dara (Castel 1992, Castel et al. 1996), Um Balad (Castel et al. 1998, Köhler 1998, Mathieu 1998), Wadi el-Urf (Tawab, Castel, and Pouit 1990), and Semna (Abdel-Motelib et al. 2012). While the Egyptians are known for their gold, Klemm and Klemm (2013) have proposed that copper and gold mining may have evolved together given the geological makeup of the Eastern Desert. The first evidence of primary production (i.e., smelting) reportedly dates to the late fourth millennium at Elephantine (Kaiser et al. 1997), which would later form the southern border into Nubia where copper and gold were also mined.

Much of what is known about the Pre- and Early dynastic system of copper production derives from specific settlements. Important sites include: Maadi (Pernicka and Hauptmann 1989, Abdel-Motelib et al. 2012), Tel el-Farkha (Czarnowicz 2012, Rehren and Pernicka 2014), and Elephantine (Kaiser et al. 1997). With regard to the dynamics of power surrounding production, by the Old Kingdom copper tools were manufactured under the authority of the king and gifted to his coterie as part of their funerary assemblages (Odler 2016). The importance of copper for the afterlife is further attested by the end of Dynasty 2, where it appears to have been reserved for funerary interment and potentially cast near the tomb (Golden 2002, 2010, Rademakers et al. 2018). Such evidence appears to recall the Chalcolithic mode of production in the southern Levant, where tools without evidence of use were interred in various cave burial assemblages. Indeed, Egypt's procurement strategies were much more diverse than previously thought as metal from Anatolia is attested in the burial of the king Khasakhemy (Kmošek and Odler 2017, Kimošek et al. 2018, Rademakers et al. 2018). How did the Egyptians come to procure their knowledge?

While Trigger (1983, 30) proposed that Egypt formed an independent center of production, given that copper appears first in the Nile Valley vs. Delta, we must reject such a proposal in light of what we know now about the discovery and transmission of extractive metallurgy (Roberts, Thornton, and Pigott 2009). Rather, various scholars have long accepted the Egyptians learned to smelt from their eastern neighbors. Earlier scholars believed invaders from southwest Asia brought metallurgy to the Nile Valley (e.g., Naville 1907, 211)—a hypothesis that has now been largely discredited. However, other scholars such as Sydney Smith claimed that Egypt learned its knowledge from Anatolia (Forbes 1950, 15). To date, the absence of production refuse and near dearth of analytical data on early Predynastic copper artifacts has resulted in a gap in our knowledge about the context in which metallurgical knowledge was learned and the significance that may have had for certain corporate groups in the Nile Valley.

Of significance here is the study by Anfinset (2010, 190), who argued that pastoralists from the southern Levant and Sinai played a key role in the diffusion of metallurgical knowledge into the Nile Valley. According to his proposal, the development of specialized pastoralism during the sixth and fifth millennium in southwestern Asia brought communities in the southern Levant into more regular contact with those in the Nile Valley. By the late fifth millennium, these groups began trading copper and copper ore between settled communities in the southern Levant and Nile Valley. He claims that it was sedentary communities who placed more significance and value on the metal than pastoralists groups, and as the state began to crystalize and the need for exotica increased, these pastoralists became “entrepreneurs and big men (and women)” (Anfinset 2010, 199). While he proposed that it is within this context that knowledge of extractive metallurgy was procured, he did not explain how this knowledge was actually learned and transferred to the Nile Valley communities, nor the ways in which the embodiment of such knowledge would have shaped local identities and power dynamics. Indeed, Anfinset (2010, 145) stated more evidence is required to draw conclusions about the nature of metallurgy during the Badarian—echoing statements made over half a century ago (e.g., Baumgartel 1960) and revealing the relative stagnation of novel approaches to explore the potential ways in which such interaction may have led to metal-related knowledge transfer between communities. His study therefore forms the springboard for this investigation.

Rethinking the Role of Pastoralists and Knowledge Exchange in Interregional Networks

The assumption that pastoralists were mere middlemen to sedentary, metal consuming elites plays into an outdated narrative that the origins of the Egyptian state arose from settled, agricultural villages. Such an assumption can be traced back to early models of state formation, wherein the foundation of the Egyptian state is modeled on an agricultural archetype which draws its origins from Childe's (1950; 1957) model for the rise of urban society (i.e., social complexity). At the base of this argument is agricultural surplus, which allowed the emergence of an elite to support a class of specialist producers who were attached to—and reliant on—this newly formed ruling class (Childe 1957, 7). Wengrow (2003a, 131, 2006) has challenged this narrative for Egyptian state formation, arguing that it is the product of our own sedentary biases. Such a mindset conceptualizes the town as a metaphor for the home, forming the locus of power. As such, we must briefly dispel the image of the pre-industrial pastoralist as a member of a marginalized group, living on the fringes of technologically advanced, socially complex sedentary communities. Wengrow (2003, 134) has argued that such depictions developed and circulated in the literature as a result of the application of modern ethnographic accounts on pastoral groups to pre-industrial communities. Through a review of the literature, he has demonstrated how colonialism has permanently stained the image of the pre-modern pastoralist, generating an image of marginalized populations now living on the fringes of industrial society (Wengrow 2006, 63-65). The study of highly mobile groups in regions outside of southwest Asia and the Nile Valley has likewise illustrated the critical effect of colonialism on our reconstructions of the power dynamics at play in a pre-industrial, non-agricultural past (e.g., Sneath 2007). Rather, we must acknowledge that pastoral groups *can* serve as a "hub of social change" (Wengrow 2006, 64). Indeed, a recent study of Iron Age copper production in Feinan has demonstrated just this point: the Edomites were a socially complex, technologically advanced group of pastoralists capable of organizing copper production on an industrial scale (Ben-Yosef et al. 2019). When we consider the accepted function of pastoralists in the exchange systems of the southern Levant, Sinai, and Delta/Nile Valley, we must seek to nuance Anfinset's thesis and rethink their role in the dissemination of metallurgical knowledge and the construct of social power.

Wengrow's Primary Pastoral Community and Nile Valley Origins of Power

In order to bring nuance to our understanding of the contexts in which knowledge was exchanged and identities performed, we need to recognize the unique context in which power was institutionalized within the Nile Valley, where the ancient Egyptian state drew its origins. During the sixth and fifth millennium, divergent subsistence strategies were employed by communities in the Nile Valley and the Delta, resulting in different power strategies by which communal identities were reified and power negotiated (Wengrow 2006, 41-62). We can trace the foundations of this division back to the mid-sixth millennium when agro-pastoralists from the southern Levant migrated to the Delta, potentially as part of a search for new pasture during a time of climatic favorability (Streit 2017, 423).[10] As an arable fan of land fractured by the several branches of the Nile, the Delta has always formed the gateway connecting northeast Africa to southwest Asia and the broader Mediterranean basin. The settlement at Merimde Bene Salame thus resulted in the integration of immigrants from the Wadi Rabah horizon with local groups, establishing a unique communal identity that blended various practices and coalesced divergent social networks (Streit 2017, 423).[11] It was thus from the mid-sixth millennium on that communities in the Delta placed emphasis on agropastoralism and fishing, slowly transforming the region into what would later become the agricultural artery of ancient Egypt.[12] Emphasis on the household as the organizational unit of the community is attested by numerous storage pits, multi-stratified occupation of domestic spaces, and the burial of the dead in simple pit graves within the community, accompanied with little to no funerary goods (Wengrow 2006, 63). When compared to communities of the Nile Valley, we are provided with a stark contrast.

While domesticated animals are attested in the Nile Valley by the late sixth millennium,[13] there is little evidence to support claims that year-round sedentary living was adopted south of the Delta prior to the Naqada I (ca. 3800/3750 BCE; Wengrow 2006, 63-64; Wengrow et al. 2104, 104).[14]

[10] This migration has alternatively been understood as the product of environmental over-exploitation of the southern Levant (Wengrow 2006, 25, with reference to, Rollefson and Köhler-Rollefson 1989).

[11] It should be noted here that the long-distance contacts between the Wadi Rabah communities of the southern Levant and the Halaf communities in the north included the importation of obsidian, chlorite, stamp seals and certain iconographic traits (Streit 2017, 423, with references). In Chapter 4, it is argued that the interregional networks to the north resulted in small-scale movement of metalworking communities to the south.

[12] It is estimated that two-thirds of the arable land in Egypt is located in the Delta (Kemp 2006, 8).

[13] Wengrow (2006, 25) has proposed initial contact resulted from crossing the Red Sea by boat, citing the presence of domesticated caprid remains 35 km NW of Quseir during early sixth millennium (with references to Goring-Morris 1993, Vermeersch et al. 1994). The argument that cattle were independently domesticated during the eighth millennium on the basis of the evidence from Nabta Playa remains debated between scholars (Wengrow 2006, 48-49, with references).

[14] Stevenson (2016, 429) has also acknowledged that while the Badarian system is now known to have extended south to Elkab and Maghar Dendera there is little evidence to support a reconstruction wherein cereal agriculture played the

Rather, sites appear to reflect evidence that is less suggestive of a permanent occupation, hinting at higher levels of mobility and more diverse subsistence strategies (Wengrow et al. 2014, 103-104). The subsistence economy of Nile Valley groups thus points toward one of flexible, residential mobility, wherein foraging and hunting occurred alongside seasonal cultivation, the movement by which was driven by the "raising and movement of domestic herds" (Wengrow 2006, 131). In the Fayoum, subsistence strategies similarly appear diverse, flexible, and varied by region (Holdaway and Wendrich 2017).

In order to explain this phenomenon and generate a new model for social complexity in the Nile Valley—one detached from previous sedentary-driven narratives—Wengrow (2003a) developed the concept of the *primary pastoral community* to explain the Neolithic Nile Valley, both contemporary with—and in stark contrast to—the lifeways in the Delta. According to this model, the "distinct configuration of herding, mobility, mortuary rites, and the body as frameworks of social experience and reproduction" resulted in the expression of changing relationships with the natural and social world through embodiment and the individual (Wengrow 2003, 134).[15] Such a model pushes back against complexity as a concept tied *only* to the sedentary village economy and offers an alternative framework wherein the state arose out of pastoral communities who placed emphasis on "herding and mobile wealth, the elaboration of portable material culture, and investment in personal and funerary display" (Wengrow 2006, 31).[16]

central role in the subsistence strategies of these communities despite the claims of certain scholars (e.g., Claes et al. 2014, 88, Hendrickx and Huyge 2014, 246-247).

[15] According to Wengrow (2003, 128-129, 133, 2006, 30), his concept of the *primary pastoral community* builds from the earlier argument of Wilson (1960)—who recognized the prominence of mortuary culture and political rule in a landscape lacking urbanization—as well as that of the *primary horticultural community,* developed by Andrew Sherratt (1997, 359).

[16] The Channel Islands Chumash provide a parallel for a politically and economically complex society that was not reliant on agriculture and where portable objects (shell beads) formed part of a prestige exchange system (Arnold 2001). It should be noted that southern Levantine scholars have long acknowledged a pastoral connection with the

While the primary pastoral community is said to be characteristic of groups south of the Delta to Sudan, it does not claim that these groups were united in a shared notion of origins nor identity, nor that pastoralism formed the *only* means of subsistence. Rather, as Stevenson (2016, 430) stated, its utility is as "a means of conceptualizing a ritual milieu in which cultural exchange…was facilitated." As such, it is employed in this study as a framework to explore how mobility was tied to a shared ideology centered on the individual (vs. the home), resulting in the burial ground (vs. the household) as the physical location wherein individuals negotiated social power within the community. Objects worn on—and carried by—the body thus served to display the long-ranging contacts, interactions, and social relations between members of certain corporate groups (Wengrow 2006, 69).[17] The implications of such a model therefore require that we acknowledge the possibility that certain Nile Valley groups travelled long distances in order to participate in social networks and ritualized exchanges, that they procured these objects as a result of their own social ties, returning for burial in the Nile Valley with portable items of display to adorn the body—material symbols of engagement with and participation in the outside world.[18]

contemporary Beersheba settlements (Levy 1981, 1986, 1989). Golden (2010, 186-190) has even argued that the Beersheba system be viewed as a pastoral polity, linking metallurgical production to highly mobile groups. However, when it comes to communities in the Nile Valley and southern Levant, contact is classified as the product of down the line trade, tacitly rendering pastoral groups as intermediaries to sedentary consumers who prized metal more than these mobile communities (e.g., Anfinset 2010, 199). Such interpretations become problematic in light of the *primary pastoral community*, wherein power derived from mobility and participation in external networks.

[17] While the Neolithic was long thought to be a period of egalitarianism, Anderson (1992) demonstrated social differentiation is detected in Badarian funerary assemblages, as burial goods crosscut age and sex groupings. She argued for a two-tiered hierarchy characterized by those buried with goods and those without, reflecting "'economically' distinct groups amongst whom social ranking developed as the result of corporate group control over highly valued resources" (Anderson 1992, 65). The conclusions from the study demonstrates that social complexity was attested during this period, that it occurred between corporate groups, and that it manifested in the funerary assemblage. Wengrow's (2003, 2006) model therefore allows us to nuance these earlier findings by exploring the role of mobility as a vehicle for procuring power.

[18] We can supplement Wengrow's model by drawing on the work of Helms (1993), who argued skilled craftsmanship and the ability to procure objects via long distance exchange are often viewed as transgressing the realm of the ancestors and divine. The result is that these objects are imbued with powers and thus bestow prestige to their owners, resulting in the rise of early elites. Within the *primary pastoral* framework, knowledge of skilled craft paired with a

While one critique of Wengrow's model is that it relied on the funerary data,[19] the approach asks us to confront our own sedentary and also Western biases to rethink the origins of the Egyptian state. It is a novel approach that can shed significant light on the important connection between transhumant groups, craft specialization, and copper consumption. Indeed, the most recent radiocarbon dates for Predynastic Egypt demonstrate the state rose in a short, 700 to 500-year period, reflecting its distinct trajectory when compared with its Mesopotamian neighbors (Dee at al. 2013). It was thus between 3800 to 3100 BC that the Nile Valley communities experienced the following transformations: sedentarization and the beginning of the Chalcolithic (ca. 3650 BCE, Naqada IB/IC), the assimilation of Nile Valley funerary practices in the Delta (ca. 3450 BCE, Naqada IIB/IIC), the invention of writing (ca. 3300 BCE, Naqada IID/IIIA), culminating in the foundation of the Egyptian state during Dynasty 1 (ca. 3100 BCE, Naqada IIIC; Dee et al. 2013, 4). Wengrow's (2003, 2006) model therefore allows us to nuance the trajectory toward state formation and explore how the role of mobility and control over the funerary landscape came to form important vehicles of power in the Nile Valley. We must thus shift our focus to how the restricted knowledge of—and participation in—external social networks contributed to the cooperation, collaboration, and construction of a unique identity both south of the Delta and in southwest Asia. It is argued here that we are provided with a new lens through which we can

community ideal that prioritized mobility may have therefore transformed certain groups *into* elites as a result of such social capital.

[19] Critiques of the work are relatively few and somewhat superficial. For example, one critique shared by two reviewers is the lack of engagement with the French excavations at the major Predynastic cemetery at el-Adaimah (Midant-Reynes 2003), which Tristant (2007, 44) and Brass (2008, 202) argue would have only served to *strengthen the argument*. Furthermore, Brass (2008, 200) stated Wengrow should have engaged more with the literature on embodiment as this would have served to *provide an added level of nuance*. Conversely, Fattovich (2012, 265, n.63) has argued that much of Wengrow's model is speculative but only stated this in passing.

examine the construct of shared ritual practices related to the procurement and consumption of copper and greenstone.

Returning to the question of the role of metallurgy for the construct of elite identity, the mining community appears to form an understudied locus for cooperation and collaboration between geographically disparate corporate groups. During the dynastic period, the Egyptian mining community is known to have been ethnically mixed, composed of individuals from Nubia, Egypt and the Levant (Shaw 1998, 246). Procurement of copper and gold took the form of state-sponsored mining expeditions to the Eastern Desert, Nubia, Sinai, and southern Levant, as well as maritime exchange with communities abroad. While the epigraphic records detail large teams of unskilled labor for certain quarrying and mining expeditions, a core group of specialists were in charge of operations, potentially related through kinship ties (Bloxam 2007). Such evidence speaks to the importance of generational continuity of practice and raises questions with regard to where these individuals procured their knowledge. Shaw (1998, 244) has discussed the nature of mining expeditions, which appear to have been a part-time vocation that operated on a seasonal basis during the winter months. The expeditionary community was also doubtlessly engaged in maritime trade during the spring and summer—the Mediterranean sailing season. Indeed, epigraphic evidence reveals that nautical terms were employed in Egyptian military expeditions attested within Sinai and the Eastern Desert, supporting the hypothesis that this core group travelled abroad (Shaw 1998). During the Predynastic, very little is known about this community and thus interaction must be explored.

When we return to the evidence for interaction between communities in the Nile Valley and southern Levant, there is a need to factor in the day-to-day practices of individuals in contact. With regard to understanding the social processes and relationships that result in new power formations, Stevenson (2016, 422) has critiqued the tendency to approach state formation through an abstracted lens, the result of which marginalizes the people in the process of elite identity formation and ideology (trans)formation. As such, she has asked how the state as an idea was "instantiate(ed) through the interpellation of a range of activities occurring across specific landscapes, diverse peoples, contingent histories, and material things." Her study demonstrates that it was not a linear, evolutionary path toward increasing inequality that led to the formation of the Egyptian state, but rather "overlapping clusters of development" in multiple locations that moved across the landscape (Stevenson 2016, 453). As such, Stevenson has proposed a model for state formation that emphasizes the social (trans)formations that occurred and is used as a framework for exploring what I argue are key phases of interaction to study the transformation of local systems of copper production (Table 1). When we take the above review into consideration, we therefore must specifically think about what daily interactions would have resulted in the formation and maintenance of such an interregional system of exchange. How did new community identities transform? What new practices were necessary for sustained cooperation? When we look to the broader questions explored in this study, we must also include communities to the north of the southern Levant—where knowledge of extractive metallurgy initially entered the landscape—and look for continuity and change in social practice.

In questioning the contact between communities, new regional chronologies from the last decade allow us to refine the timeframe in which economic cooperation took place between communities in Syro-Anatolia, the Levant, the Nile Valley and Delta (Table 1). Of interest here are the synchronization of the chronologies in the southern Levant (Regev, de Miroschedji, and Boaretto 2012) and Egypt (Dee 2014, Dee et al. 2013), attesting to the contemporaneity of social transformations and thus integrated nature of these regional economics. The Badarian now begins at 4500 BC—approximately the same time as the transition to the Late Chalcolithic in the southern Levant, when I propose local systems of copper production intensified. The abandonment of the major Beersheba sites around 4000-3800 BCE coincides with the transition to the Naqada I, when elements that we associate with later Egyptian kingship first appear in the Nile Valley and the typology of copper objects appears similar to that of the southern Levant. Likewise, the transition to the Naqada IIC—when the spread of Nile Valley mortuary practices is first attested in the Delta—maps onto the beginning of the EB IA-IB transition in the southern Levant, when interaction with "Egyptian" communities intensifies, leading to the movement of some groups into the region shortly thereafter. The transition to Dynasty 1 likewise coincides with the end of the EB I/beginning of EB II in the southern Levant, when the Egyptian presence disappears from the southern Levant. Such synchronizations raise questions about the role of participation in these exchange networks for the construct of the early state, both in terms of power structure, political identity, and ideological legitimacy. Importantly, the Egypto-Levantine chronology maps onto changes in the north, wherein we see the rise of the Uruk system of exchange (Table 1). These radiometric dates allow us to begin nuancing interregional interaction and influence by taking a more holistic and synthetic approach to changes that occur in the archaeological record as they pertain to transformations in copper production and community identity.

The review in this section has thus raised several key questions regarding the introduction, transformation and social significance of copper production in Egypt and the southern Levant. With regard to the timeline in which metal is first introduced to the southern Levant, why is there an archaeological gap of several hundred years between the introduction of the Tel Tsaf awl and the first appearance of extractive metallurgy in the Beersheba, especially when it appears the southern Levant was active in the exchange networks of the metalworking north during the late sixth/early fifth millennium? For the Chalcolithic, how do we explain the sudden appearance of a highly specialized system of production run by knowledgeable metalsmiths in the Beersheba region? Given the state of current understanding with regard to complexity and ritual praxis, what role (if any) did metal play in the rise of public cult centers during the Late Chalcolithic? What does this reveal about producer identities and roles in the community? Did the pre-existing cognitive association with greenstone—exploited since the Late Natufian—contribute to the local system of belief surrounding copper? How did the materiality of the production process contribute to the social significance of metal in society? What role, if any, did Nile Valley communities play in the southern Levantine system or copper production prior to the EB IB? How did this contact result in communities potentially viewing the southern Levant as part of the state? If pastoralists were intermediaries, then why can we detect so many similarities in the belief systems between elite communities in the southern Levant and Egypt? What role did metal and mining play in the formation of the early Egyptian state's power and political identity? And why was it politically important for Egyptian kings to leave their mark in the copper mines of the Eastern Desert and Sinai? In order to provide answers to these questions, we must place systems of metallurgical production back into their human environments. It is only then that we will fully understand the specific contexts and conditions that allowed for the introduction, adoption, and adaptation of non-local technological systems into local communities, as well as the social implications of those knowledge transfers for local identities and systems of power.

Outline of Study

This chapter briefly introduced the general objectives, scope, and main thesis of this investigation. The overview presented in the previous section served as a background to the state of the questions explored in the remainder of this study. Chapter 2 presents the theoretical and methodological approaches employed throughout this investigation. In order to understand how identities and worldview would have transformed as a result of the introduction of extractive metallurgy, I combine a social approach to technological systems with a communities of practice framework to investigate the nature of practices that arose through the social processes required in the transfer of technological knowledge. A cross-craft approach to production systems is argued to be key to exploring the transfers of knowledge in the absence of production refuse and exploring how copper production articulated with other material systems of production (e.g., textiles, ivory, stone). Anthropological game theory is engaged to investigate the economic role of metal in the evolution of cooperation between complex stateless societies, providing a lens through which we can better interpret the ritualized practices connected to the economic behaviors of these communities. Given the broad geographic and chronological scope of the study, multi-scalar analysis is engaged to explore the role of metallurgical production in the rise of complexity at the micro and macro scale.

The next five chapters employ a chronological approach to the social transformations tied to changes in systems of copper production and procurement in the southern Levant and Egypt. Chapter 3 argues that we must understand the pre-existing social and symbolic significance of greenstone in order to situate copper production in its proper local context. As such, I provide an overview of the greenstone exchange in southwest Asia to establish the nature of economic cooperation between communities prior to the discovery of extractive metallurgy. Chapter 4 re-contextualizes the introduction of extractive metallurgy into the southern Levant by arguing for the small-scale migration of individuals from metalworking communities in the north during the late sixth/early fifth millennium. Within its local context, I propose copper production came to play a central role in the rise of new power dynamics during the Late Chalcolithic, when mortuary shrines staffed by shaman-type smiths served as the organizing units to coordinate community cohesion during increased population pressures. The result was a cognitive revolution in the social significance of copper and the recognition of the importance of metallurgical production in the funerary economy. I argue that communities bought into this system given the materiality of the production process and the pre-existing social significance of greenstone as a stone of healing. Copper and its system of production thus became the material expression of a belief system centered on the transformation of the individual.

Chapter 5 explores a potential correlation between the appearance of greenstone in Nile Valley burials during the fifth millennium and the intensification of copper production in the southern Levant. Given the importance of mobility in the primary pastoral community, I assert that corporate pastoral groups in the Nile Valley migrated to the southern Levant seasonally (or permanently) to participate in local systems of economic exchange with individuals in the southern Levant during the intensification of copper production. Given the relative dearth of evidence for production in the Nile Valley, I propose that analyzing the techniques employed in the glazing of steatite beads can be used as proxy data to demonstrate transfers of pyro-technological knowledge between Nile Valley pastoralists and the metalworking communities of the southern Levant. It is argued that participation in such joint mining endeavors resulted in the formulation of a distinct set of cohesive practices and communal identity around the mining and smelting of copper ore. Procurement of such knowledge and participation in these networks is maintained to have played a major role in the curation of an emergent political identity and elite system of belief that later contributed to the foundation of the early Egyptian state, wherein mining and metallurgical production came to form an integral source of economic and ideological power in the Nile Valley.

Chapter 6 reexamines claims that the organization of production in the southern Levant underwent major transformation as a result of the collapse of the Chalcolithic settlement system. I demonstrate that many of the practices associated with Chalcolithic metalworking communities begin to appear in both the Delta and Nile Valley by the Naqada I, contemporary with the first part of the EB IA (ca. 3800-3650 BCE). Such continuity is also expressed in the Red Sea region, where contact is attested with Nile Valley groups. The systems of copper production in both the Nile Valley, Delta and southern Levant are examined and it is argued that this period coincides with intensified interaction among pastoral groups engaging in economic cooperation with communities in the north around a burgeoning textile economy and metals trade. In the Nile Valley, this increased economic cooperation with communities in the Syro-Anatolia region resulted in the introduction of new consumption practices and technologies connected with the rise of central places. The possibility of small-scale migration by some Chalcolithic communities into the Nile Valley and Delta is explored and the core symbols that are so often referred to as laying the cognitive foundation of the state are examined within the context of the rise of local ritual practitioners connected with these centers.

Chapter 7 examines how the intensification of eastern Mediterranean demand for copper resulted in local changes in the Nile Valley with regard to political forms of display. It is argued that increasing competition between communities resulted in the rise of claims over both the landscape and mining industry. The cooption of centuries-old symbols that came to form some core icons of Egyptian kingship are argued to be traced back to participation in joint-mining expeditions with the southern Levant dating to the fifth millennium. Evidence for both maritime contact and overland networks are explored and the mechanisms connecting Uruk settlements in Syro-Anatolia with Egypt are examined via the importance of the southern Levant.

Chapter 8 re-examines both the chronology and social identities reflected in the Nahal Mishmar hoard—traditionally dated to the Chalcolithic and viewed as a product of the southern

Levant. In light of the argument put forth in this study, I draw on well-contextualized parallels to re-date several key objects in the hoard and propose a final date of its deposition in the EB IB. I argue that certain pieces in the hoard are key symbols in the formation of the elite Egyptian identity and propose that the hoard was the product of joint-mining community dating back more than a millennium. I also propose an EB IB deposition of the hoard, reflecting a burgeoning Egyptian political identity whose power derived from participation in and knowledge of extractive metallurgy. The study culminates in a discussion on the conclusions presented, calling attention to the need for producer-centered approaches to the study of technological production and demonstrating the need to rethink the role of copper and co-operation with southern Levantine communities in the formation of the early Egyptian state.

Chapter 2. Toward a Social Archaeology of Interaction: Communities of Practice, Economic Cooperation, and the Power of Agent-Centered Frameworks

"*How do people create complex, mutually beneficial co-operative economic organizations in small-scale societies that are not structured by markets or states and that lack money, policing power, contracts, courts, and other forms of social coercion?*" (Stanish 2017, 3)

Agent-Centered Approaches to Technology and Production

In order to implement an archaeology of interaction, we must employ a theoretical and methodological framework that allows the researcher to access the physical manifestations of social exchanges between both individuals and communities. Let us therefore begin with socially oriented, agent-centered definitions of technology. Dobres' (2000, 96) has described technology as the "dynamic web weaving an unlimited number of factors, or threads, into as seamless whole." Similarly, Miller maintains technological systems are "…the context of an outwardly expanding, nested set of actions and relationships: from production itself to the organization of the production process, to the entire cultural system of processes and practices associated with production and consumption" (Miller 2009, 4). These are both broad definitions, lacking boundaries and a prescriptive model for imposing limitations on the data. By approaching technology as a complex, messy web of social interactions, the materiality of a finished object or production refuse thus comes to reflect the nature of social relationships rather than the quality or value of a thing (Brysbaert 2017, 15, Kohring, Odriozola Lloret, and Hurtado Pérez 2007, 101, Jones 2007, 36). Examining production refuse, tools, objects of display and so forth are thus understood as the product of complex interaction between people and their communities. When viewed in this way, technology becomes the window through which we can access the dialectic between the individual and society at large.

Employing these definitions requires the adoption of an agent-centered practice framework that seeks to place people at the center of both their technological systems and our investigations (Dobres and Hoffman 1994, Dobres 2000, 1999, 2001, 2010, Dobres and Robb 2000). As such, the following three assumptions proposed by Dobres are thus adopted here:

1) "technologies are meaningful acts of social engagement with the material world that serve as a medium through which world views, values, and social judgments are expressed tangibly and reaffirmed or contested in daily practice;
2) technological practice produces not only practical knowledge and material things, but also personal and cultural understanding that can serve political ends; and
3) technologies are *fundamentally about people, mindful communities of practice, and social relations of production*" (Dobres 2000, 96, emphasis added)

By adopting these assumptions, we are able to combine analysis of both the social and material elements of production in order to begin identifying the required cooperation between individuals within communities that led to the material manifestation of a finished product. Accordingly, we should recognize the very act of producing as a "verb of action and interaction" (Dobres 2000, 128)—a socially-embodied process that "creates and transforms the self of the artisan in the minds and eyes of his or her family, community and state" (Costin 1998, 7). Investigating the contexts in which metallurgical-related knowledge transfers operated between communities requires examining the embeddedness of production systems in their wider social contexts. We must therefore plan to explore the total production system versus one or two aspects of it (Bayman 1999, Costin 2001, 2005, Burke and Spencer-Wood 2019). It is only when production systems are integrated into their wider social networks that we can tease out the nature of contact between communities. When viewed in this way, we begin to bridge the gap between social identities, production choices, and consumption practices.

Table 2. Model for Investigating Systems of Production (Costin 2005)

Category	Definition
producers	the people who made the goods
means of production	the raw materials, tools, knowledge, and skill necessary to produce objects
objects	the objects made as a result of production systems
organization and social relations of production	the principles through which the members of a production unit are recruited, deployed, and coordinated, and the principles under which producers and consumers interact
relations of distribution	the principles and mechanisms through which produced objects are transferred from producers to consumers
consumers	the people who use/consume the goods, and where relevant, the social institutions that shape or prescribe the use of craft goods

Costin's (2005) framework for investigating production is therefore a useful starting place to begin situating systems of production back in their social contexts. To the extent made possible by the data, investigating a production system requires consideration of at least six categories (Table 2). Within the context of this investigation we must question who producers were and the networks within which they were embedded outside of production loci. Asking the question w*ho were the producers within the community* is important as technology transfers require environments for sustained engagement between skilled individuals and learners through observation if not outright instruction. In addition to understanding the contexts in which producers were embedded, we also need to question how the physical materials required for production were procured. Production materials might include the ore, fuel, clay, wax and/or resins, wood for hafting, metal for recycling, and abrasives for polishing. We should take this a step further by to asking *how might the materiality of the production process been understood by producers*? In addition to the raw materials, however, we also must question how producers obtained their knowledge and thus the principles of recruitment within the production community. Was the craft passed on in the family or kin group? Were only select member of a wider community allowed to participate in production? We can answer these questions by exploring the standardization of techniques, the distribution of refuse and the spatial layout of production loci. These observations must then be contextualized with what is known about social organization of the time and place in which the production system was embedded.

While it is important to understand the social elements of production, we must also investigate the relations of distribution—that is, how finished objects travelled to consumers as well as who were the people that consumed the finished product. Questions therefore arise such as: What was the relationship between producers and consumers? How did producers and consumers come into contact and sustain engagement? What was the power dynamic between these individuals? Was the relationship asymmetrical, or were producers also the consumers? These are the questions we must ask to shift the investigation from the physical manifestation of production to the social relations of production.

A social anthropology of technology must thus investigate not only the techniques and material culture of production, but also the *sociotechnical systems* that allowed a technology to exist in society (Pfaffenberger 1992, 497). Simply put: a sociotechnical system reflects the collective conditions that allow for a technology to exist in society–it is the *chaîne opératoire* of social relations that cumulatively results in the presence and practice of a given technology. New techniques, practices, and innovations will therefore only take hold in society *when there is alignment and coordination between actors and ideologies in the social, economic, legal, scientific, and political context* (Pfaffenberger 1992, 498, emphasis added). The design of an object is therefore part of an integrated social system, which is shaped by a variety of factors that structure the shared repertoire of symbols that give a community its identity (Kaufman 2018, 3). Such approaches recognize the importance of identifying variation in producer identities and status for understanding sociopolitical changes, as a producer's situatedness can influence the form, context and significance of the finished product (Costin 1998, 6). Within this context, recent research has questioned the assumed division between producer and elite, as the act of production can serve as a powerful locus of social differentiation (Brysbaert and Gorgues 2017). We must thus explore the range of possibilities with regard to the relationship between elites and producers, including producers *as* consumers (i.e., *prosumer;* Ritzer 2010).

While technological systems penetrate virtually all aspects of society, this study considers *production* as the physical act of material transformation. Defined as "the actual process of fabrication or creation, including both the material objects involved and the techniques or gestures used" (Miller 2009, 5), when production is characterized as such it places emphasis on "the physical body [which] acts as a thoughtful conduit for developing, expressing, and embodying self/Other/worldly knowledge" (Dobres 2000, 93). As Ann Brysbaert (2017, 16) has stated: the very act of production becomes "fundamentally about connecting materials, people, places, and ideas; it is what makes us human." The act of production thus requires that we consider the bodies present, the contexts in which those bodies would have internalized production-related knowledge, and the various social networks within which producers were embedded.

Cross-Craft Interaction and Technological Interconnectivity

Archaeological investigations into systems of technological production tend to be structured on the basis of the raw material worked rather than functional or ideological groups, e.g., luxury goods, communication, or mining (Miller 2009, 2). As a result, we impose artificial categories on producers and replicate these assumptions through the assignation of occupational labels (e.g., the potter, the weaver, the smith). Such reconstructions are the product of projecting our own capitalist relationship with technology onto the past (e.g., Dobres 2000), wherein the Industrial Revolution resulted in the deskilling of the labor force resulting in a labor pool that became overly specialized. Investigations into production have therefore resulted in material-based studies at the cost of thinking about how these systems articulate and integrate with one another, as well as the way in which innovation in one field instantly transfused and transmitted to other industries (Miller 2009). As part of investigating the networks within which producers were embedded, we must also ask how the technological system articulated with other production arrangements in order to evaluate whether individuals with metal working knowledge were integrated into other production systems, or whether they interacted with other individuals who could work non-metal materials. In the last decade, new trends have started to emphasize the importance of analyzing technological interconnectivity, ultimately allowing us to investigate if production-related knowledge was passed between producers.

Referred to as Cross-Craft Interaction (CCI), this framework advocates for looking at interaction between production systems in order to understand the results of technological change or conservatism (McGovern 1989, 1-2). Ann Brysbaert (2007, 328, *emphasis added*) therefore defines CCI as "the contact between *two or more crafts* with adoptive or/and adaptive behaviour as a consequence, or with the influence of at least one craft upon another within their existing sociocultural system." Given that the underlying objective of CCI is contact between groups associated with certain social and cognitive dimensions (Lemonnier 1986, 147-149), the framework fits into the broader category of cross-cultural interactions due to the fact that influence (either superficial or profound) can be reflected in the material remains (Brysbaert 2007, 328). CCI therefore provides a new way to explore whether we can detect transfers of metallurgical knowledge between communities in the Nile Valley, Delta, and the southern Levant in the absence of production refuse. The application of CCI has been underutilized by scholars in spite of the fact that it has the ability to shed light on numerous aspects of a technological system. CCI can thus provide insight into the division of labor, social differentiation, and the networks within the exchange of materials, ideas, and knowledge moved (Brysbaert 2007, 328). When we begin to think about the ways in which different material industries interacted with one another, we start to open up for discussions on how the transfer or innovation in one field would have instantly infused other systems. This study will therefore seek to identify points of technological overlap in one area or industry that were potentially connected to others as a result of variability in producer identity and skill.

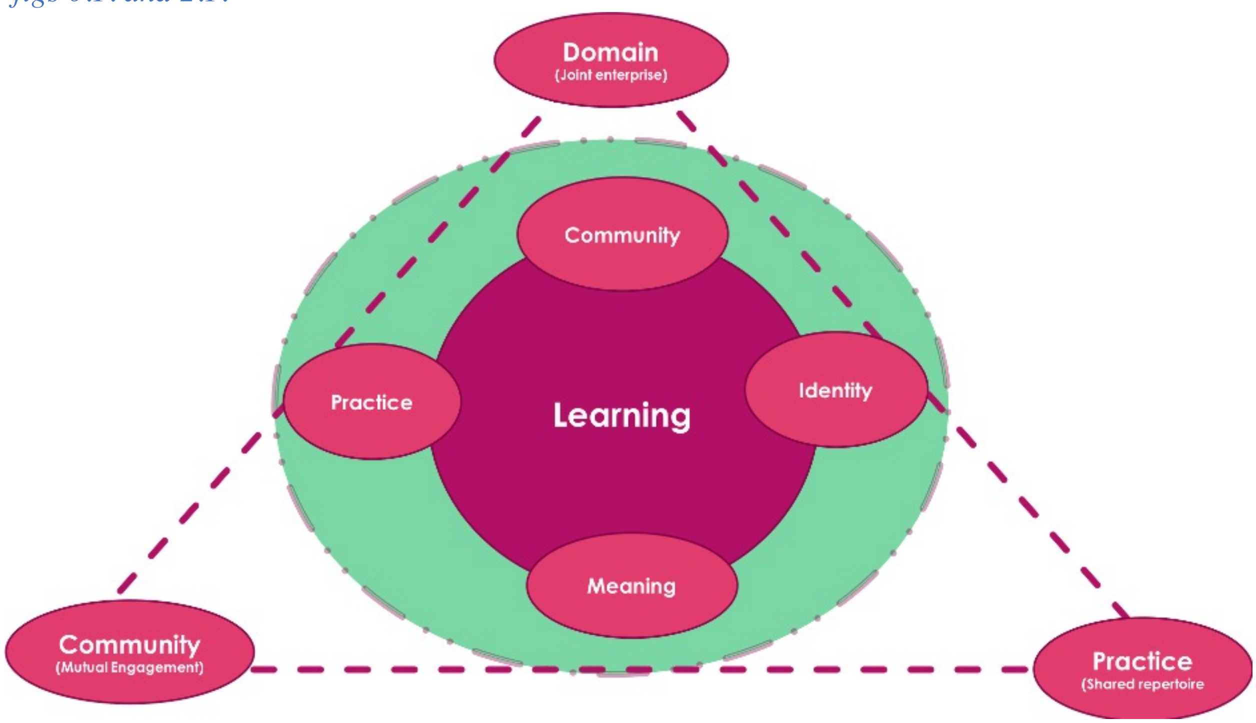
I adopt a definition of technology transfer as the *intentional* training of a new technology outside the origin group who invented it (Stewart Jr. 1987, 72), implying a level of collaboration and social interaction between members of socially differentiated groups. As such, Klimscha (2018, 105, with reference to Rammert 2007, 16) reminds us that production systems are not restricted to the physical act of manufacturing an object for use, but also include the way in which a crafted object was to be used. He states, "Technologies can therefore be understood as being part of a network of social relations in which they are one actor among the various producers and users…technology therefore modifies society, but it is also affected the social conditions in which it can evolve" (Klimscha 2018, 106). In the past decade, scholars have started to implement producer-centered approaches in their investigations into technology and technological interaction in systems of production (Brysbaert and Gorgues 2017, Miniaci et al. 2018), bringing to light the importance of investigating the individual and thus the social networks through which knowledge and skill were transmitted (Brysbaert 2008, 2011, Rebay-Salisbury, Brysbaert, and Foxhall 2015, Foxhall et al. 2016). Explaining the adoption of new technologies, techniques and artifact consumption patterns thus requires examining the knowledge networks within which individuals interacted through a framework that allows for a social explanation of how such knowledge not only travelled but also became embodied by individuals within a community. An agent-centered, cross-craft approach is therefore necessary for understanding the power dynamics surrounding the production process and the social environments in which learning took place. This goal can be achieved when we consider the importance of learning in connection with identity, power, and practice.

Crafting Communities and Constellations of Practice

In order to move toward a producer-centered approach to the study of copper mining and production in the southern Levant and Egypt, the first step is to work from our assumptions about the link between identity, practice, and patterning in the material record. Anthropologist Jean Lave and educational theorist Etienne Wenger argue for the important link between identity and practice and between group membership and meaning (Lave and Wenger 1991, Wenger 1998). Accordingly, when we learn how to do something, we participate in the active process of identity negotiation, wherein to learn is to do, belong, become, and experience a certain worldview (Figure 1, Lave and Wenger 1991). Three assumptions guide their social theory of learning: 1) learning is central to the human identity, 2) learning is a contextual social phenomenon, and, 3) at its core, learning *is* social participation (Wenger 1998, 4). Key to this framework is that knowledge procurement occurs via situated learning, also referred to as *legitimate peripheral participation*. Situated learning is defined as the specific social engagements that provide the proper context for meaning making to take place, resulting in an analytical way to talk about the processes by which individuals become integrated into a community of practice (Lave and Wenger 1991, 14). What constitutes legitimate knowledge thus becomes that which is "instantiated, learned, and reaffirmed through personal/collective bodily engagement with material things," developing into "systems of representations" (Dobres 2000, 112, with reference to Lemonnier 1989, 1990, and 1992). Technological and stylistic choices therefore represent a shared view of how things are supposed to be made, used, and look (Lemonnier 1993, 2-3, Dobres 2000, 126). It follows that the way in which a producer chooses to act on the material world is seen as the physical representation of underlying cognitive structures that have been learned through participation in a specific community of practice.

A Community of Practice (CoP) thus exists whenever individuals sustain engagement with one another around a joint enterprise, resulting in a shared repertoire of practices, symbols, and artifacts linked to communal group identity to signal membership (Wenger 1998, 72-85). Aspects of the repertoire might include stories or rituals, certain artistic styles, the way an artifact is made or used, tools, memories of historical events, or even mutually-held beliefs about what it means to be a member (Wenger 1998, 82–84). It is through the shared repertoire that archaeological investigations can access the material correlates of these interactions and begin to draw inferences about how certain objects might have reflected participation within a given CoP, providing a window into the nature of joint enterprise. Because communities of practice develop in larger historical and social contexts, collective processes of negotiation must take place in order for the community to perpetuate itself. Patterning in the material record of production refuse or consumption patterns therefore not only implies that an individual learned how to manufacture or use the object in a CoP, but also that certain aspects of their internalized identity has been transformed as they became a member of that group via participation and thus practice. This is important as it allows for inferences to be made about the social participation and identities of producers and consumers, which must then be contextualized within their wider environment. However, we must be cautious in the way in which we construct identity, which is often formed on the basis of what we *assume* to be natural indicators (e.g., gender, ethnicity, and religion) but may not have been the case for those in the past (Yanagisako and Delancy 1995). As such, this study will favor an approach that accesses the individual through the collective (Díaz-Andreu et al. 2005, 1, Insoll 2007), recognizing that the very notion of unique individual identity is a recent construct. By employing the CoP framework, a group approach to individuality will therefore be used as a means to examine the connection of various dimensions of producer identity to the larger social order.

Figure 2. Elements of a community of practice. Composite diagram by author, after Wenger 1998, figs 0.1. and 2.1.



In this study, the procurement, production, and consumption of copper and other metals forms the enterprise around which individuals engage one another. Mining and metal-producing communities in the Nile Valley, Delta, and the southern Levant will thus be investigated through a situated learning and community of practice framework to examine the connection between metal and how collective identities and local power were constantly (re)negotiated and reified as new production-related techniques became adopted, adapted, or rejected by the group. When viewed in this way, patterns in production refuse and consumption practices offer a clear window into participation within a community of practice. With regard to the procurement process, this includes examining the physical ways in which objects were produced, the techniques and tools employed in the mining process, and the locations which were selected for raw material procurement. However, it also involves taking into consideration how the transformation of the physical landscape forged the social one. How was mining and smelting metal from its ore understood? Was it viewed as a purely economic activity for exchange and prosperity, as part of coercive strategies, for ritual or cultic purposes? Was it viewed as a necessary for the perpetuation of the community? With regard to technological process, examining changes in the shape of furnaces, tuyères, and crucibles—material used during the production process—can shed significant insights the social factors driving changes to the system of production (Yahalom-Mack 2019, 73). However, merely locating place of origin and the attestation of new techniques is no longer enough. We must seek to contextualize specifically new practices became integral to a shared community identity.

In order to analyze how outside practices, technologies, or objects once foreign to a group can become integral to the identity of that CoP, it is argued that through production processes there is an arena for negotiation and change to bring about shifts in identity, ideas, values and social relations. This is due to the circular process of meaning-making that takes place during production, wherein the objects we construct make us in the process (Lumsden 2008, 22, Childe 1936), with reference to Tilley 2001, 260; Gosden 2006, 433). As Costin has argued, examining the intersection of production and identity allows us to "consider with greater clarity both the structure of productive relations and *the social implications of those structures*" (1998, 4, emphasis added). While invoking trade or migration to explain the introduction of new practices acknowledges that people were indeed present during transfers of technological knowledge, such explanations tend to serve as catchalls. The result is a neglect to investigate the more nuanced, context-specific relationships that must have been fostered through collaboration around a joint-enterprise, the social environments where production knowledge became embodied, *and the implications for community identity and power dynamics*. We must thus also engage more than just the production refuse by employing a holistic approach to situated production in the wider community.

One of the key aspects of a CoP framework is thus the diversity inherent among the group's members. This includes diversity in their levels of familiarity and mastery of the sociocultural, context-specific practices, but also the complex traditions and identities embodied by each of the community's members. This could include a mining community, a group of metal workers, pastoralist in communication: any context that requires learning to sustain a joint enterprise. As new members enter the group, they may introduce new practices, stylistic designs, or concepts about what it means to be a member of that community, resulting in an ongoing process of renegotiating the group's identity (Wenger 1998, 143–222). It is this ongoing process of integrating newcomers combined with the diversity inherent within the community's members that is integral to examining the social contexts in which outside practices become localized. Such an approach is important for thinking about the ways in which the spread of extractive metallurgy across southwest Asia and parts of Europe transformed local communities.

When we investigate technological interaction through a CoP framework, we move away from approaching identity through the lens of cultural homogenous labels (e.g., Egypt vs. the southern Levant) and toward an investigation that approaches identity through the context-specific environments in which the various elements of an individual's personhood were learned. There is a tendency to draw too hard of a line between the identities of individuals in the southern Levant and Egypt. In reality we know that pastoralists transgressed geographic boundaries; claims of trade thus homogenizes the complex interactions and identities played out on the ground. Within the primary pastoral framework we are able to explore the possibility that Nile Valley corporate groups—the ancestors of the later Egyptian state—were in direct contact with the metal working communities in the southern Levant during the fifth and early fourth millennium, argued throughout this study to be the context in which these groups learned how to smelt metal from stone. It is then the practices required to sustain such interaction that would provide a body of shared practices later co-opted by the body of the Egyptian king, rendering claims over industry and production. The benefit of a CoP framework in approaching social interaction and technological knowledge transfer is that we are therefore able to begin probing the social networks and power structures within which producers and consumers were embedded.

In order to avoid examining social interaction solely through the lens of cultural homogeneity, however, we must once again seek to employ a fluid definition of society that connects collective identity and their community goals (joint enterprise) to systems of power. As such, I adopt here sociologist Michael Mann's definition of society, which posits that societies are not bounded, unitary totalities or systems glued together by some ultimate form of primacy. Rather, they comprise various, messy overlapping and intersectional sociospatial networks of power *made up of individuals interacting around coinciding objectives* (Mann 1986, 1-2, emphasis added). In order to achieve their goals, Mann (1986, 4) proposed that individuals will organize themselves into ideal political, ideological, economic, or military power networks. Such a definition places emphasis on social interaction and collective motivation as a prime mover in social cohesion, acknowledging that societies are not totalities nor geographically bounded "systems" that structure individual action. Rather, it is human agents and their desires (i.e. joint enterprise) that construct webs of interaction, in turn resulting in arrangements of social (inter)dependency. Societies thus become messy webs of social interactions and competing desires constantly in flux. In what may be viewed as a reductionist viewpoint, societies thus become overlapping communities and constellations of practice. In this study, I argue the networks through which knowledge of extractive metallurgy travelled forged new power structures, systems of belief, and social relationships that would last for millennia.

The construction of every society will theoretically be unique given the historical environment in which coalition building takes place and power becomes institutionalized. Factors can include geography and environment, trade relations, ideology, past events, individual motivations, et cetera, all factors which can combine in any number of ways rendering irrelevant the applicability of universalist models for production, state formation, social complexity and so forth. When paired with a CoP framework, Mann's framework for the emergence of social power becomes useful for investigating the contexts in which knowledge was transferred, the power structures within which producers were embedded, and the contexts in which complexity manifested as it asks that we explore the individuals within specific forms of economic cooperation. For the geographic and chronological scope of this study, such an approach allow us to move away from exploring interaction of "Egypt vs. Canaan" as binary cultural categories and begin thinking about how identities and power dynamics were forged via the economic cooperation of non-related individuals in increasing complex relationships around mining and copper production.

Economic Cooperation in Complex Stateless Societies and the Ritualized Economy

This study employs anthropological game theory (AGT) in order to explain the ritualized behaviors that transpired as a result of economic cooperation between communities. Given the chronological scope of this study, AGT is a useful framework specifically to explore the ways in which communities develop norms of cooperation to sustain contact with one another in the absence of political coercion, which is a unique marker of the state (Stanish (2017, 2). According to Stanish, "small-scale societies in which people build special places as a means of organizing their economic and cultural life as *complex stateless* ones" (2017, 2). According to this model, the absence of institutionalized coercion results in community sanctioned "managerial leaders," or individuals who assume prosocial roles that "are rewarded with prestige and other resources" (Stanish 2017, 167). These individuals are able to achieve status and wealth within the community through employing magic and taboo as informal coercive measures (Stanish 2017, 93). The community thus plays a key role in allowing these individuals to achieve and maintain their position, which is made feasible by the hosting of public events linked to ceremonies perceived as integral for the perpetuation of the community (Stanish 2017, 3). These can likewise include feasts or funerals. This model contrasts with chiefdom or state societies as those forms of complexity rely on coercion to foster social rank and hierarchy, typically through control over resources. One of the characteristics of complex stateless societies is the ways in which economic behaviors are legitimized (i.e., magic and taboo), which tend to counter what Western economics would tell us is "rational." As such, Stanish (2017, 3) developed the concept of social rationality, defined as "a behavior that may seem irrational from an economic perspective (that) can be quite rational from a social one insofar as that behavior is ultimately benefitting the actor." What this means is that explanations for archaeologically attested phenomenon must be explored through the lens of ritual, magic, and taboo, not Western economic theory rooted in assumptions about trade for profit. AGT is therefore useful for this investigation as it allows for us to begin looking at the economic behaviors that surrounded copper production but were heavily ritualized and structured around informal coercive measures and then explore how these change as a result of early state formation.

As critiqued by Schortman and Urban (2004, 186), purely economic explanations such as supply and demand thus tend to structure our interpretations—the product of Childe's (1950) overly simplistic model essentially equating the state with urbanism.[20] While they acknowledge the important link between production systems and long-term economic processes, they also challenge the notion that production was purely an economic activity meeting market demand (Schortman and Urban 2004, 186). In a complex stateless society, production and exchange is enacted through the reciprocity and redistribution of goods that were perceived as having utility for the community vs. market exchange value (Stanish 2017, 95). Assumptions about sedentism and surplus have thus driven investigations into the political economy in the Egyptian state,[21] downplaying the potential role of pastoralists as producers.[22] Claims that pastoralists "traded" goods between settled communities must be revisited given the lack of formal markets and institutionalized coercion. Rather, specialists/artisans are viewed as active agents in structuring society. The lack of investigation into metal producers as agents of power in Egypt is thus significant, as Kassianidou and Knapp (2005, 232) state "miners and metalsmiths often use ideology as a means to maintain, resist, or change their power base within a society." Indeed, Whitney Davis (1981, 229) has discussed how "Social groups exercising [something] other than elite political or economic power—for instance, religious, ritual, artistic, or biological power—may command access to certain resources and directly or indirectly constitute craft specialty." This

[20] Also see Wailes (1996).

[21] As defined by Wells (2006, 267), political economy is "a broad theoretical framework that attempts to account for the processes by which surplus goods and labor are channeled through social systems to create material wealth and finance political institutions… often invoked to explain the role of elites in expropriating resources (material and nonmaterial) from the broader population through manipulation of the social and demographic environments."

[22] The assumed role of agricultural surplus in the structuring of craft production has been challenged by New World archaeologists, wherein the Chumash of the Channel Islands formed a complex chiefdom without agriculture and had a portable exchange network of shells (Arnold 2001, 1987)

is important when we consider that one-way emergent elites legitimized power was by their ability to overcome distance and procure valuable resources from abroad (Kassianidou and Knapp 2005, 238, Knapp 1998, Broodbank 1993, Helms 1993)—which is the foundation of power for the primary pastoral community. Budd and Taylor (1995) have thus argued that we adopt a broad social-developmental perspective that considers the social aspects of production–specifically, ritual and magical dimensions–in addition to traditional approaches, which tend to focus on economic factors (e.g., production costs, profit, etc.).

The ethnographic record reveals many accounts of ritual as the driving force behind economic intensification and different parts of the production process (e.g., Spielmann 1998, 2002, 2008; Childs 1998, 113–116; Childs and Killack 1993; Costin 1998, 7). One of these ways is the role of feasting in small scale societies (Spielmann 1998, 2002, 2008). In pre-industrial metalworking communities, there is often a complex system of taboos and beliefs about who participates in each step of the production process (Gošić and Gilead 2015b, Eliade [1962] 1978). In some small-scale or communally organized societies, technological knowledge is intimately connected to the basis of leadership as well as an ability to gain favor among one's peers (Dobres 2000, 120-121). One way to examine whether the possession of metallurgical knowledge may have formed a source of power is to investigate how aspects of production were reflected and retained in elite circles. This includes iconography employed in production communities—for example, costumery or shared objects of display—as well as the way in which production-related knowledge may have manifested in new contexts. Within a CoP framework this means that we must not limit ourselves to items cast in metal but rather explore elements of the entire shared repertoire that led to the construct of a group identity and community participation—this can include bodily ornamentation, ceramics, figurines, weapons, etc. We might also look for the more intangible elements of a shared repertoire—the semiotic associations to certain material use in the production process (e.g., clay and wax used for casting, to the material symbolism of greenstone). As I will later argue in this study (see Chapters 6-8), certain aspects of the Egyptian king's regalia and titulary should be connected with copper production as a necessary component of a belief system centered on the role of greenstone in the regeneration of the community—the king thus performed as chief ritualist for the state.

Of relevance to considering the role of magic and taboo as a regulating mechanism in complex stateless societies, ritual performance can provide a venue for negotiations of power and identity within the community (Stanish 2017). The presentation of one's ability or knowledge of production, or alternatively how that knowledge allowed them to oversee certain rituals perceived as beneficial for the community can thus be a source of individual power sanctioned by the community. As a total social act (Mauss 1966, 2006, vii), technology is thus entrenched in the dynamics of power, "whereby groups and/or individuals (can) influence the actions and/or beliefs of others, whether intended or not and regardless of their success or failure" (Dobres 2000, 113-114). The very notion of restricted knowledge in Egyptological circles was discussed by John Baines (1990) with regard to how decorum in funerary contexts negotiated the power and identity of elite. In dynastic Egypt, the restricted knowledge of metallurgical production and procurement is reflected in the expeditionary community, wherein only a core group of specialists participate in mining certain regions through generational continuity of practice (Shaw 1998; Bloxam 2007). In a similar way that the knowledge of metallurgical production lived on in closed circles, during the dynastic period so too did the restricted knowledge of certain craft industries. Only recently has attention been given to the display of restricted production-related knowledge of elite craftspeople. As demonstrated with the Dynasty 11, the master craftsman Irtysen boasts of his knowledge of very complex technical processes invoking both metal, word, and writing (Stauder 2018). Indeed, carpenters during the dynastic period are known to have employed performative rituals to activate the coffin for regeneration into the afterlife (Arbuckle MacLeod forthc.). Such practices create cohesion through the restricted knowledge of production by group members.

One such institution that appears to have been tied to craft mysteries is the House of Gold, where priests were engaged in the construction of cult statues (von Lieven 2007). Grimes (2018) has recently argued that the origins of Greco-Egyptian alchemy can be sought in the secrets of the Egyptian priesthood, where priests served as smiths connected to the House of Gold. That metalsmiths formed elite members of the Egyptian court during the Middle Kingdom (Irtysen) and into the late first century begs the question of the role of metallurgical know-how when the technology was first introduced. As discussed in Chapter 1, Amzallag (2019) has recently argued that the esoteric knowledge of metallurgical production became detached from the wider community at some point during the Bronze Age. However, we can still catch glimpse of its importance as reflected in mythology— a cultural memory preserved by the elite. How did this come to occur? Is it possible that through processes of masking certain forms of knowledge we have missed key symbols tied to metalworking communities? I argue that yes, we have.

With regard to the ritual surrounding the material aspects of production, ethnographic studies illustrate a producer’s beliefs about the material they worked could contribute to the techniques they employ or the ideological system surrounding how the material was worked. For example, Dobres (2000, 101, with reference to Lechtman 1977, 1984a, 1993) discusses how Moche smiths employed an intensive annealing process in order to result in a golden appearance, wherein the artists’ attitudes and beliefs about the material influenced the decision to employ more time-consuming techniques. In non-Western, pre-industrial economies, certain materials can therefore possess magico-religious significance connected with the materiality of production. As is argued throughout this study, such was the case of greenstone (i.e. copper ore), which was viewed as a stone of healing, of transformation, and of portability. As early as the PPNB the stone was tied to an ideology centered on regeneration and fertility (Bar-Yosef Mayer and Porat 2008, 8549). Indeed, the development of metallurgy is believed to have derived from the exploitation of certain stones because of their green and dark-green color (Radivojevic et al. 2010). Prospectors and miners were thus intimately familiar with the landscape, relying on the color of gossans or certain fauna to indicate a potential ore source (Constantinou 1982). We may thus seek to understand how the natural landscape came to condition the social landscape (Kassianidou and Knapp 2005, 233). New models are thus in development to examine how production choices were the result of color exploitation (Radivojević et al. 2017), punctuating the fact that metallurgical production choices are driven by social values and beliefs vs. purely functionalist desires (Kaufman 2013). That said, it will be argued that the functional healing properties of greenstone—a transregional pharmacological industry of sorts that prioritized the health of the community—played a key role in the transformation of copper into a life-cycle metaphor.

Multi-Scalar Approaches to Metallurgical Production and the Transmission of Knowledge

In order to understand the adoption of certain technological practices over vast geographic locales, we must attempt to identify the daily practices that shape and reinforce community social structure (micro-networks), how those interactions lead to transformation in the nature of cooperation between communities of practice (meso-networks), and how the interactions and practices of communities that were bounded by specific practices result in transformations at the regional level (macro-networks) (Knappet 2011). How do we actually achieve this? Dobres (2000, 13) has advocated for shifting our focus from the technical processes by which objects were produced to "the social artifice and interpersonal relations of production by which [objects] were made, used, and given value, without compromising rigorous analytic attention to the physical traces of prehistoric technologies extant in the archaeological record." Of relevance to this charge is the work of Sheila Kohring, who has proposed that using a multi-scalar approach to the study of social interaction, operating on the assumption that the relationships leading to inequality should manifest themselves in all products of society (Kohring 2011, 148).[23] She posits that "material culture provides a clear way of linking scales of analysis from the local to the macro scale and lets us address social complexity, as nested sets of relations, at these different scales" (Kohring 2011, 146). When we turn to the archaeological evidence of metallurgical production, we might seek to ask what processes needed to happen on the ground for the copper axes to signal participation within a CoP (Klimscha 2017). These symbols had to be learned through participation in a specific system, which raises questions about the collective goals shared by individuals in contact.

Employing a multi-scalar approach to social interaction therefore allows us to better analyze the social processes that led to the formation of new elite identities, the relations between producers, distributors and consumers, and the networks through which technological knowledge travelled. Examining variability in the production and consumption patterns at the local scale "not only links to broad-brush social structures, but also simultaneously provides rich detail about how these are formed in individual's and groups' lives" (Kohring 2011, 148). By investigating how social interaction and complexity operates at multiple scales through a technological and contextual analysis of the shared repertoire of a community of practice, we can thus better

[23] Kohring expounds, "1) Agents and the structures within which they are embedded form a recursive relationship (Bourdieu 1977). Basically, our daily actions reinforce the macro-scale 'sedimentation of traditions' (Bourdieu's phrase); 2) Micro-scale complexity is best understood as through examining the points where different social networks and paths intersect during the course of daily practice. This is employing Goffman's (1963) concept of encounter, the repetition of interlacing relationships within a network allows for integration of society; 3) Recursive process-structuration-involved in maintaining social institutions (Giddens 1984)."

understand the social networks that lead to complexity and formation of a shared group identity at a more macro-scale.

Key to this approach is the recursive nature of agency and structure, or how individual relationships and small, intense local networks are dialectically connected to wider social organizational structures such as hierarchy (Kohring 2011, 146). Contextually rich details at the micro-scale thus inform us about daily practices, events, and actions that form structures, institutions, and social construction of society on a more macro-scale. Such an approach posits that like its human agents, material culture is simultaneously embedded in different social relations as it is the physical manifestation of various individual and community engagements. When paired with a CoP framework, the material correlates of interaction become reflective of the shared repertoire of symbols marking cooperation between individuals collaborating around a mutual goal. We must therefore seek to examine the material record as reflective of social relationships taking place at different scales, establishing a hierarchy of data in the sense that each relationship affects and shapes the more macro-scale relationship. Kohring (2011,158) argues that the manufacture and distribution of the material for elite consumption would have involved various social dynamics within the community outside of elite activity itself. Given that production systems are social systems, when a new material or object is introduced into any local community, there is a reliance on “existing social knowledge systems to imbue their use with meaning and validity” (Kohring 2011,158). Employing a multi-scalar approach to the study of metal production in the construct if social complexity therefore relies on variability in local communities in the way objects are made and used. By seeking to explore the daily interactions and how they manifest at the community level, we can begin to better understand the social relationships and processes that led to regional systems of production.

Challenges and Limitations of Study

The objective of this study is to investigate the social significance of the introduction and subsequent transformation of extractive metallurgy in the southern Levant and Egypt. Given its broad scope, however, we are presented with several challenges and limitations that must be addressed before we begin the investigation. The first constraint regards the available data to study a total production system. The evidence for mining and metallurgical production in the Nile Valley, Delta, Sinai and the southern Levant is characterized as variable at best. As the birthplace of archaeometallurgy, investigations into the origins, structure, and transformation of the system of metallurgical production in the southern Levant have resulted in a relatively rich knowledge base on the geology of the mines, ore selection strategies, crucible and furnace technology, producer choices, and exchange networks. This means that we can track changes in producer choice, shifts in procurement strategies, and so forth. Conversely, the available data from the Nile Valley and Delta is much more sparse. The nature of the evidence is such that we can explore consumption practices but the relative dearth of analytical studies hinders our ability to say if the metal was local or imported, what techniques were employed, if the isotopic signature can be correlated with mining activity in a specific region, etc. We thus understand substantially more about producer choices, exchange networks, and consumption patterns in the southern Levant than in Egypt during certain periods in this study.

Given the distinct nature of regional research datasets, this lack of standardized data collection has resulted in our inability to compare variables. While recent studies are starting to map the lead isotope ratios in the Eastern Desert and Sinai (Abdel-Motelib et al. 2012, abd el-Rahman et al. 2013), we still lack a complete picture of the mineralogical composition of the Arabian peninsula, Sinai, and the Eastern Desert, resulting in the need to temper our conclusions with regard using lead isotope data to construct narratives solely on the basis of archeometallurgical studies on provenance or material composition (Ben-Yosef 2018). Various lines of proxy data must thus be employed to begin building up a social environment that provides contextual basis for our interpretations. In order to address this limitation, this study requires fluid and flexible boundaries with regard to the nature of the data invoked.

Another challenge we are confronted with concerns detecting the presence of women and children as actors within the production system. As part of studying a production system in its social context, we must factor in all bodies that participated in the production community and the potential roles they played. How can one identify gender, age and skill in the previously published archaeological record? Ethnographic evidence tells us of the important role of women within mining communities in diverse geographic regions and points in time (Pfaffenberger 1998). In order to include women in our investigations, the first step is to work from the assumption that *they were present* (Stig Sørenson 1996). Archaeologically, we can then use traditionally gendered objects—cooking pots, weaving tools—to explore their potential role women played in connecting communities as well as participating in the system of production. Indeed, women are known to have played a key role for establishing kinship ties between communities around exchange throughout the Bronze Age (Podany 2010). Women are therefore known to have been key figures in fostering intercultural contact between communities. We are thus *required* to acknowledge their existence and ask what role they may have played in the technological system of metallurgical production. In the same way that we must go into the investigation with the assumption that women were present in some capacity, so too we must acknowledge the important role of children in the intergenerational continuity of practice.

This brings us to the challenge of identifying the contexts in which learning took place in the absence of micro-level data, i.e., the evidence of daily interactions. The contrasting datasets to study metallurgical production in the Nile Valley and southern Levant do not allow for us to pinpoint interaction through *production refuse*. It thus becomes hard to then investigate the contexts in which learning took place—which would have required daily participation. One way to address this challenge is to look at the meso-level—that of the community. Within the context of a CoP framework, participation will manifest in the shared repertoire of symbols that mark community membership. In addition to the CoP approach, through cross-craft interaction we might be able to identify when changes in one local production system correlate with another one industry.

The last major challenge to address regards the symbolic associations of metallurgical production. In the absence of contemporary epigraphic data, how can we identify how communities understood the production process? In order to hypothesize about the social significance of production, situating production within the broader landscape becomes key. We might look to see how the system articulated with other production systems as well as explore the materiality of production process and hypothesize about how this was understood as reflected in later epigraphic sources. For example, if we can connect metallurgical production to ritual display and demonstrate that metal objects were produced specifically for interment with the deceased, we might begin to ask whether the materiality of production was connected to broader systems of belief in the afterlife. We would also then seek to understand the relationship to the production system and mortuary beliefs and ask how they may have been related. While we must acknowledge the challenges and potential limitations of this study, I argue the theoretical and methodological approach employed allows for most of them to be addressed. The approach specifically seeks to provide a broad window through which we can peer into the social aspects of production. In order to gain a full picture of the role of metallurgical production in southern Levant and Egypt, we must seek to explore the larger picture through a synthetic holistic lens.

Chapter 3. Prelude to Metallurgical Production: Investigating the Social Significance of Greenstone

Research from the last decade is changing our collective understanding of the context and timeline in which the first metal was introduced into the southern Levant. Copper metal is smelted from copper minerals such as malachite and chrysocolla, thus, to understand the contexts where southern Levantine communities learned extractive metallurgy, it is first necessary to establish the nature of greenstone exchange in southwestern Asia. As discussed in Chapter 1, the term greenstone is employed here as a catchall word applied to any green-colored mineral or rock. We can thus consider it as an umbrella term under which copper minerals are classified. Greenstones can range in color from blackish-green (e.g., chalcocite) to almost blue (e.g., plancheite) and include both copper-bearing minerals such as azurite, chrysocolla, malachite, turquoise, paratacamite, chalcocite, chalcopyrite and bornite, as well as non-copper bearing minerals like amazonite, apatite, fluorapatite, and chlorite (Figure 3). It is therefore important to recognize that while all copper minerals are greenstone, not all greenstones are copper-bearing minerals.[24] Surveying the greenstone trade becomes important not only for establishing the social networks through which such stones were exchanged, but also for exploring pre-existing semiotic associations that surrounded copper-bearing greenstones prior to the discovery of extractive metallurgy. As is argued throughout this study, the healing properties of greenstone played a key role in contributing to the social significance of copper, wherein it will be argued that the materiality surrounding the smelting, casting and recycling of copper came to form a life-cycle metaphor for communities in the southern Levant and northeast Africa. Such a belief was only possible given the social

[24] Unless otherwise noted, after this chapter I will use greenstone to refer specifically to copper minerals in discussions of copper production.

significance of copper-bearing greenstone during the Neolithic. As such the investigation must be begin with a review of the origins and transformation of the greenstone production in southwest Asia.

Realizing the Importance of Greenstone

It is important to recognize that the cognitive significance associated with the greenstone had existed for millennia prior to the discovery of extractive metallurgy. The modification and subsequent use of greenstone in southwest Asia—and the southern Levant, more specifically—dates back to the Late Natufian (ca. 11,500 BCE) when different green-colored minerals were carved into beads and pendants to be worn on the body (Bar-Yosef Mayer and Porat 2008). Before the late twelfth millennium, mobile corporate groups produced bodily ornaments almost entirely from a range of red, yellow, brown, black, and white colored minerals; the introduction of greenstones therefore marked a cognitive shift for southern Levantine communities during the Late Natufian, when groups became increasingly sedentary (Bar-Yosef Mayer and Porat 2008, 8548). This newfound importance of greenstone is attested by the seemingly sudden exploitation of apatite, fluorapatite, malachite, turquoise, amazonite, and possible chrysocolla, all carved into cylindrical beads of varying sizes as well as double-pierced pendants (Bar-Yosef and Porat 2008, table 1). The importance of procuring these bright colored stones is suggested by the establishment of long-distance exchange networks, attested by the distribution of greenstone ornaments hundreds of kilometers from the nearest source (Bar-Yosef and Porat 2008, 8548-8549). For example, the presence of turquoise beads at Gilgal II in the southern Jordan Valley proposes a hypothetical link with western Sinai where turquoise occurs naturally (Bar-Yosef and Port 2008, table 1). Additional evidence for the role of interregional exchange networks is provided at Eynan located in the Huleh Valley, where the possible attestation of chrysocolla suggests connections with Feinan, the Wadi

Arabah, or Sinai. The exchange of portable material was not limited to the southern Levant, however, as the presence of over 350 pieces of obsidian at Eynan was sourced to Göllü Dag East in central Anatolia (Khalaily and Valla 2013). By the Late Natufian we can thus conclude that greenstone played an important role in connecting communities within the southern Levant and Sinai, as well as integrating the region into a broader interregional exchange network to the north via the import of obsidian.

Figure 3. Variety of greenstone minerals and native copper mentioned in the text.

While the Late Natufian marked a cognitive transformation in the initial exploitation of various greenstones, the PPNB/ninth millennium[25] is characterized by the intensified and specialized production specifically of *copper-bearing* greenstones. It is during this time that

[25] The dating of the PPNB to the 9th vs. 8th millennium follows the radiocarbon dates from the excavations at Tell Aswad in the northern Levant, wherein the start of the PPNB is dated between 8700-8200 BCE (Stordeur et al. 2010, 42).

communities in the Balkans, Anatolia, and Iran also began exploiting and exchanging copper minerals alongside native copper (Hauptmann 2007, 255 with references). Roberts, Thornton, and Pigott (2009) proposed that the manipulation of greenstone and native copper reflected a newfound desire on the part of Neolithic agricultural communities to adorn the human body with colorful ores and native metal, marking the first stage in the development of metallurgy. Whereas copper minerals must be subjected to heat and a fluxing agent to free the metal from the unwanted elements in the ore (i.e., smelting), native copper is the unadulterated, naturally occurring form of this base metal. Given that native copper appears in smaller quantities alongside—and typically on the surface of—copper mineral deposits, by the ninth millennium it was surface mined alongside other copper minerals, obsidian and various stones like galena (Yalçin 2017, 318, table 8.1). Some scholars have proposed that the heat required to shape native copper led to experimentation of fire with the ores laying the experimentation to lead to discovery (Craddock 2000, 153). While extractive metallurgy arose in regions with native copper exploitation, models advocating that the smelting of copper ore was discovered via the melting of native copper (Wertime 1973) are now viewed as outdated (Thornton et al. 2010, 306). Indeed, there is no evidence to suggest that native copper was melted during this initial stage of development. During its first three millennia of use, native copper appears to have been collected and treated as another type of stone, though surely its malleable nature set it apart.

The techniques applied to native copper by ancient producers reveals that they understood it was inherently different in nature. According to analysis on the native copper bead at Çayönü Tepesi in southeastern Anatolia dated to the ninth millennium (Özdoğan and Özdoğan 1999, Maddin, Stech, and Muhly 1991, Maddin, Muhly, and Stech 1999), the producer had hammered, annealed and then rolled a piece of copper to shape (Pernicka 2014, 448, with references). The use of fire after hammering is noteworthy, as it reflects the producer's knowledge that the metal becomes brittle the more it is worked and must be subjected to heat in order to render it soft and ductile again. The discovery of the Çayönü Tepesi native copper bead alongside a number of carved malachite beads reflects a larger trend in the Balkans and Anatolia wherein the secondary copper mineral cuprite occurred alongside native copper (Hauptmann 2007, 255). Native copper was traded out of Anatolia by the eight millennium, wherein it us attested at Haçilar in western Anatolia, at Tel Ramad in the northern Levant (France-Lanord and de Contenson 1973), and at Ali Kosh in Iran (Smith 1969), reflecting its integration into the pre-existing networks connecting communities across southwestern Asia. From a late sixth millennium context at Can Hasan in eastern Anatolia, a native copper macehead was hammered to shape (French 1962, 33, Yalçin 1998), reflecting a potential expansion in the uses of the material.[26] While the transportation of native copper over such great distances is argued to have occurred in connection with the trade in obsidian (Thornton et al. 2010, 310), it is important to note that the shift toward exploiting copper-bearing minerals *specifically* in the southern Levant correlates with the first exploitation of native copper and copper minerals in the north. We might then ask why these changes occurred contemporaneously.

The intensification of the use of copper minerals in the southern Levant during the PPNB suggests the region participated in a shared landscape of knowledge exchanged with northern communities. Indeed, the addition of serpentine to the greenstone assemblage suggests contact between the southern Levant and Syria or Cyprus (Bar-Yosef and Porat 2008, 8549), demonstrating the social networks in which these communities participated. Locally,

[26] Stone maceheads date back in southwest Asia to the late tenth/early ninth millennium BCE at Hallan Cemi in Anatolia (Shuicheng 2018, 262).

intensification of copper-bearing greenstones is demonstrated by the rise of PPNB settlements located close to copper mineral sources in the Wadi Arabah. These sites included Wadi Fidan A, Wadi Fidan 11, Wadi Ghwair, Beidha, Basta, Uvda Valley, and Nahal Issaron, all of which contained greenstone artifacts (Hauptmann 2007, 256-257). At Feinan, Hauptmann (2007, 257) reports groups collected a range of green-colored copper silicates such as chrysocolla, plancheite, and paratacamite from both the Dolomite Limestone Shale (DLS) and the edge of the MBS. Farther south in the Wadi Arabah, an unpublished C14 date from Mine S27 in the Timna Valley attests to exploitation of the region for its green-colored copper minerals (Avner 2002, 41, n.8)—a proposal supported by the presence of greenstone artifacts dated to the PPNB at nearby Nahal Issaron (Hauptmann 2007, 147). Indeed, it is during this period that we see the construction of various open-air cult sites around the Elat Mountains and in the southern Negev, suggesting a new symbolic connection to the landscape itself (Avner et al. 2014).[27]

In addition to this shift to exploit copper minerals specifically, evidence to support the sharing of knowledge between geographically disparate communities is attested by the adoption of pyro-technology across southwestern Asia. The widespread production of lime plaster was used in both practical and magico-religious contexts: incorporated into architecture as well as used to plaster the skulls of certain deceased members of the family. In the southern Levant, analysis of the plaster from the cave at Nahal Hemar demonstrated it was used for a range of ritual purposes that included ancestor statues, basketry, animal figurines perhaps used in hunting magic (Goren,

[27] The importance of these new PPNB open air cult sites is connected to the role of pastoral groups from the desert regions, who contributed to the later prehistoric cultic landscape of the southern Levant and Sinai. Avner (2018) convincingly argued that the cultic life and system of belief during the Chalcolithic and EB originated in the pastoral nomadic desert.

Segal, and Bar Yosef 1993). Of relevance here is the use of plaster to produce colorful, glittering beads using ore from the Wadi Arabah (Goren, Segal, and Bar Yosef 1993). Indeed, at Tel Tif'dan/Wadi Fidan 1 in the Wadi Feinan (Figure 4), hundreds of unfinished and finished beads indicate a locus of specialized production, presumably for exchange (Levy 2007). The importance of Feinan copper minerals is confirmed by analysis of various greenstone beads in the southern Levant, many of which were made from copper minerals originating from Feinan (Hauptmann 2007, 258, with references). As new conceptions of territoriality may have arisen alongside sedentary communities, it is possibly that certain groups began to control production in the region by the PPNB. While finished beads from Feinan were exported as exchange, raw copper minerals were also collected and transported great distances to various sites for manufacture. From Yiftahel in the Lower Galilee—hundreds of kilometers from Feinan—unworked pieces of copper mineral were attested alongside evidence for bead production (Garfinkel 1987), revealing that the material itself was viewed as socially significant. While the importance of greenstone during the PPBN is known, little is understood about the social importance of these green colored minerals.

Rethinking the Social Significance of Greenstone

In order to explain the newfound significance of greenstone during the Late Natufian and subsequent Neolithic, Bar-Yosef Mayer and Porat (2008, 8548) correlated the shift in procurement strategies with an economic change in subsistence—namely, the rise of agriculture. According to their proposal, the increased birth—and mortality—rates in newly sedentary communities resulted in the need for a coping mechanism to ensure the perpetuation of the collective. While the exploitation of medicinal plants would have formed an integral role in ensuring the well-being of the community, they argue the increased reliance on safeguarding group fertility and generational continuity resulted in need for "symbolic practices and the use of apotropaic artifacts" (Bar-Yosef

Mayer and Porat 2008, 8549). Given a long tradition dating back to the Middle Paleolithic of assigning agency to beads and pendants, they proposed that greenstone beads were thought to perform protective rites and thus cognitively became associated with "the green of young leaf blades, which signify germination and embody the wish for successful crops and for success in fertility" (Bar-Yosef Mayer and Porat 2008, 8549). Wearing greenstone beads and pendants consequently became one of the many ways in which early sedentary groups attempted to assert control over the chaotic, ensuring fertility of crop and community and securing safety in the face of the unknown. This proposal has been widely accepted as an explanation for the widespread Neolithic adoption of this practice across Eurasia and the Eastern Mediterranean, however I argue it downplays the more practical, pharmacological properties of copper-bearing minerals. As such, it is hypothesized here that the intensification of greenstone during the PPNB may have been the result of communities realizing the healing properties of copper-bearing greenstones. The result was a transformation from symbolic associations of various greenstones with regeneration, regrowth and renewal into more practical, functionalist ones where greenstone became the stone of healing.

Copper minerals are known throughout antiquity to have had powerful antiseptic properties revealing their restorative properties (Forrest 1982, 200). The effectiveness of certain copper-bearing greenstones was tested by Majno (1975, 113), who conducted a series of experiments using chrysocolla, malachite, and the scrapings from a copper patina to investigate the antimicrobial potential of each on infected wounds. He found that while both chrysocolla and malachite were efficient in fighting off bacterial infections, the scrapings from the copper patina were particularly effective in destroying microbes (Majno 1975, 113). Indeed, copper is such a successful antimicrobial that it is employed by medical professionals today to fight against staphylococci

(Espírito Santo, Quaranta, and Grass 2012). While Majno's experiments and the contemporary uses of copper in the medical field reflect a modern knowledge of the pharmacological benefits of copper minerals, epigraphic evidence from antiquity suggests communities were also well-aware of the healing properties of certain greenstones.

Given its proximity to the southern Levant and participation in the Neolithic greenstone trade, of interest here are dynastic-period medical texts from Egypt that refer to the importance of a restorative green pigment called wadj (*wꜣḏ*) used in a range of treatments. Majno (1975, 111-112) identified *wꜣḏ* with malachite and chrysocolla—two minerals from which copper is smelted in the Eastern Desert, Sinai, and southern Levant—and *wꜣḏ ḥmty* (=wadj of the copper) with the green patina from corroded copper. While *wꜣḏ* later came to be used as an adjective to qualify certain things or objects,[28] Warburton (2014) has pointed out that the word is often marked with a classifier signifying stone, reflecting an association with a hard material vs. an abstract color category. It appears the Egyptians thus reserved the word *wꜣḏ* for copper-bearing greenstones, a semiotic association that suggests early communities in northeast Africa understood the healing properties of specific green-colored *copper* minerals.

While there is no evidence to support such a differentiation took place during the Late Natufian, various lines of evidence during the PPNB suggest communities understood the difference between certain greenstones that were copper-bearing and ones that were not—potentially the result of the location in which they were collected. The first line of support for this proposal is provided by the intensification of settlement around the mines at Feinan and Timna, the specialized production at Tel Tifdan, and materials analyses that suggest a majority of the beads

[28] E.g., *wꜣḏ wr*, translating to "the great green" in reference to the Mediterranean Sea.

in the southern Levant derived specifically from Feinan. Given the pre-existing Late Natufian networks connecting the southern Levant with Anatolia, it is noteworthy that the shift to exploit copper minerals in the southern Levant occurred around same time northern communities in Anatolia began utilizing copper minerals like malachite alongside native copper. Such a chronological timeline does not appear to be coincidental and thus suggests a shared landscape of knowledge about the healing properties of these stones, with native copper no doubt performing the most effectively. Indeed, its inherent qualities—ductile, malleable, and great at conducting heat—no doubt set it apart as a magical stone of sorts, able to take on new shapes with the aid of fire and potentially able to perform certain medicinal remedies. Its physical manifestation in the same outcrops as secondary copper minerals such as cuprite and malachite would have created a cognitive and physical connection to these minerals long before individuals discovered how to extract metal from stone. Given the evidence for contact between communities via the obsidian trade, it is possible that news would have spread to other regions. In the southern Levant, we can test the hypothesis.

If the targeted specialization of copper-bearing greenstones was the result of discovering their natural regenerative properties, it is hypothesized that a shift would have occurred in the consumption practices. Specifically, we would expect to see ground green pigment applied *to* vs. worn *on* the body—a necessary step to ascertaining the healing properties of the stone. Support for this proposal may be found in the application of green pigments to decorate around the eyes of the cultic masks at Nahal Hemar Cave near the Dead Sea (Bar-Yosef and Alon 1988) and the plastered statues from Jericho and ‘Ain Ghazal (Golden 2010, 81, Schmandt-Besserat 2018). Analysis of the pigment from the `Ain Ghazal statues revealed it was in fact made from copper silicates (Tubb 1985). While the green pigment for application to the masks was made from copper silicates, the beads at `Ain Ghazal were made from the non-copper-bearing greenstones fluorapatite and calcite (Hauptman 2007, 258). This contrast between copper silicates used in the application of the pigment to the eyes of the statues and non-copper bearing greenstones were used for the body is thus argued to be important. Further evidence that copper minerals specifically were reserved for application to the body is attested at Beida, where Hauptmann (2007, 258-260, fig. 8.4) has proposed a "deliberately shaped roll of powdered Cu silicates, Cu chlorides and malachite a few centimeters long" be identified as a cosmetic application stick.[29] When we combine the intensification of production at Feinan and possibly Timna—two locations where copper minerals occur—with the evidence that copper minerals were now applied *to* the body vs. only worn *on* the body, it is proposed here that such differentiation reflected a knowledge of the medicinal properties of copper minerals.

Whether this knowledge was transferred from south to north or vice versa is beyond the scope of the discussion. What I wish to highlight here is that communities in the southern Levant participated in the sharing of knowledge about—and the production of—greenstone. While the different physical and social environments no doubt led to local transformations and associations with the material, it is thus by the PPNB in the southern Levant that we can propose certain greenstones came to be prioritized for their practical—vs. purely symbolic—healing properties. While more research is needed to support this hypothesis, the practical and pharmacological uses of copper-bearing minerals may provide nuance as to why these stones were prioritized by Neolithic communities. Situating the social significance of greenstone in the realm of the practical vs. symbolic is important as we may better understand the cognitive associations that early

[29] Note that the use of the term "cosmetic" here is not meant to trivialize the application of such ideologically charged and functionally significant material to the body.

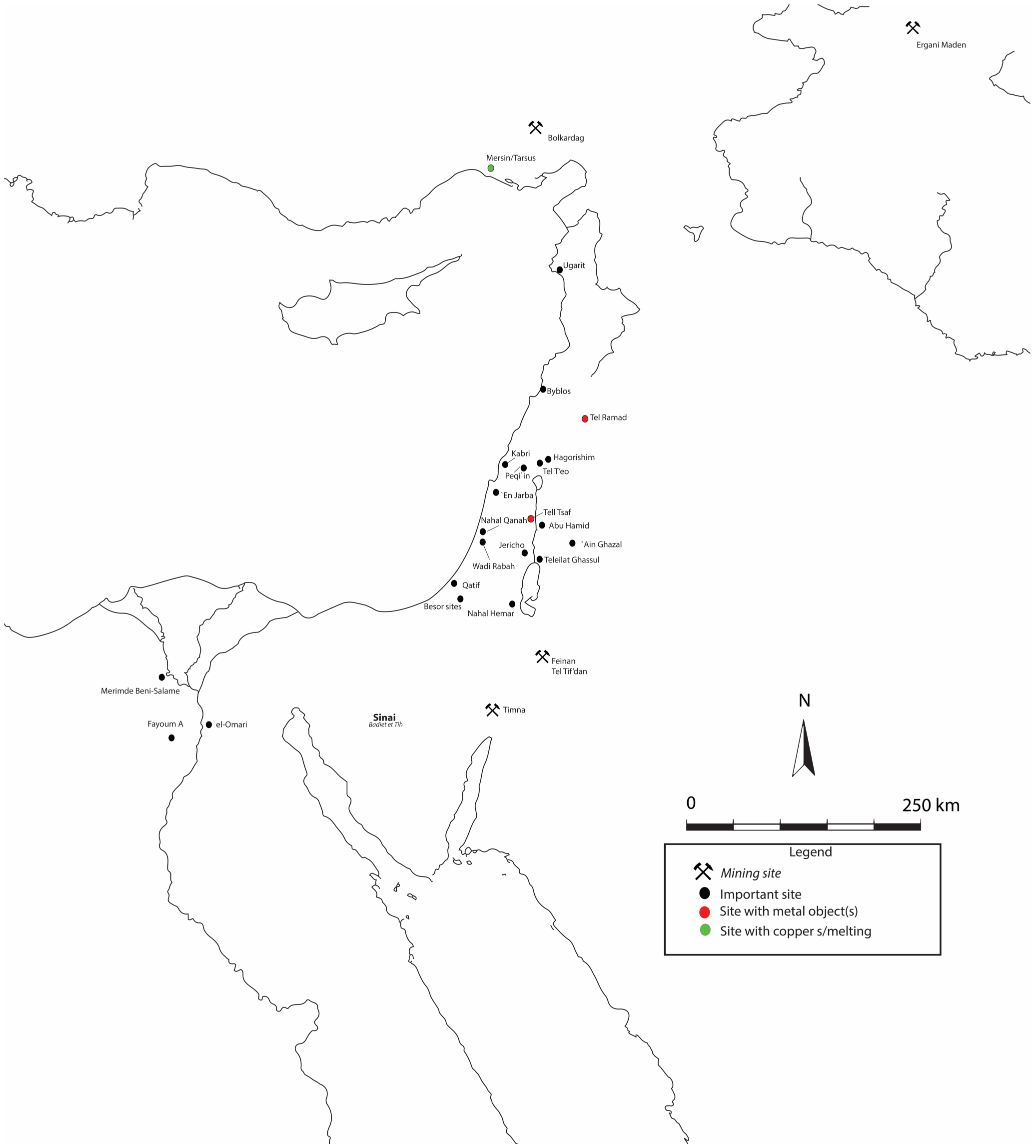
communities had with the material prior to the discovery of how to extract copper from this stone. While greenstone became the stone of healing by the PPNB, it morphed into the stone of transformation by the sixth millennium.

Transforming Greenstone via the Discovery of Extractive Metallurgy

While communities across southwestern Asia possessed a knowledge of copper minerals, mining, and even the ability to command fire for the production of lime plaster by the Late Neolithic, it is not until the late sixth millennium BCE that we are provided with undisputed evidence that individuals in the Balkans discovered how to extract copper metal from certain greenstones (Radivojevic et al. 2010).[30] The discovery of smelting—that is, how to extract metal from stone via the use of pyro-technology—thus resulted in yet another cognitive shift wherein green-colored copper *minerals* transformed into green-colored copper *ores* (Radivojevic and Rehren 2015, emphasis original). Despite the Balkan evidence, debate persists on the discovery of extractive metallurgy with regard to the nature of discovery and place of origin. The argument centers on whether the technology was discovered only once and diffused to all other regions (Wertime 1964, 1973, Roberts, Thornton, and Pigott 2009) or was discovered by various communities independently and evolved locally (Renfrew 1969, Radivojevic et al. 2010, Radivojevic and Rehren 2015). Of interest to this discussion is the chemical composition of a recently discovered late sixth millennium cast copper awl in the southern Levant, which points to the Caucasus as the origin of the metal (Garfinkel et al. 2014). If the dating and analysis of the awl are correct, it suggests extractive metallurgy was also practiced in the Caucasus at approximately the same time

[30] Prior claims that the earliest metal-related production refuse were attested in mid-seventh millennium contexts from Çatal Höyük (Mellaart 1964) are now refuted. The "metallurgical slag" appears to have been the accidental reduction of copper minerals with metal beads fashioned from native copper during a destructive fire (Radivojevic et al. 2017).

Figure 4. Late Neolithic (6000-4500 BCE) system of metallurgical production. Map by author.



as the evidence from the Balkans. Indeed, it appears the knowledge was widespread by the turn of the sixth millennium as evidence from Tal-i Iblis in attests to the local practice of extractive metallurgy (Thornton 2009, with references). Given the unlikelihood that each region happened upon the same discovery independently during the sixth millennium, I accept the proposal by Roberts, Thornton, and Pigott (2009) that extractive metallurgy was likely discovered only once and subsequently spread across Eurasia via the movement of individuals with metal working knowledge.[31] While the geographic origin of the community who made the discovery remains unknown—and even if there were potentially more than one point of origin—the pre-existing exchange networks connecting these three regions points to the likely that the introduction and spread of this knowledge took place among communities already in contact (Roberts, Thornton, and Pigott 2009, 1013).

One avenue to explain the spread of this knowledge is the greenstone trade. Here, specific observations made about the use of ores in the Balkans are important as the ores selected for smelting were the same ones that had been exploited for a millennium prior. The implication is that the same community that exploited greenstones prior to the introduction or discovery of extractive metallurgy was the same community that smelted copper from these very stones during the late sixth millennium. In order to explain the presence of smelting, Radivojevic and Rehren (2015) argue that "the consistent selection of black and green *minerals*, which turned into *ores* around 5000 BCE speaks of a unique technological trajectory of Balkan metallurgy, which reinforces assumptions of its independent evolution." The argument in favor of independent origins is difficult to prove nor disprove when we consider the broader evidence for early smelting across Eurasia: it is as possible that this discovery spread from the Balkans east as it is that the discovery was made in Iran, Anatolia or the Caucasus and spread west. The question is not of central concern to this investigation. Rather, what is of interest here is the continuity of practice with regard to mining greenstone from the same region for over a millennium. It was thus the same community in charge of greenstone procurement during the seventh millennium that procured this new knowledge of how to extract metal from the same stones their ancestors likely exploited. Considering that the transmission of metallurgical knowledge appears to have taken place between

[31] For a recent overview of the discussion, see essays in Roberts and Thornton (2014).

communities in contact, we must consider the pre-existing system of greenstone production played a factor in the integration of copper metallurgy at the local level. As various communities experimented with their local ore sources upon the introduction of this new technology, unique technological trajectories and production systems evolved independently as local systems of greenstone production transformed. The discovery of extractive metallurgy during the sixth millennium thus resulted in a revolution of sorts, initiating social change over thousands of kilometers through the interaction between communities around the exchange in obsidian, native copper, possibly greenstone and other objects such as ceramics. Given the participation of certain southern Levantine communities in these networks during the late sixth/early fifth millennium (Streit and Garfinkel 2015), we might ask if the same social processes that led to the spread of this knowledge from the Balkans in the west to Iran in the east was also transmitted to the south. It is here that we must thus revisit our original question: Did such interaction lead to the introduction of extractive metallurgy in the southern Levant earlier than previously assumed?

Chapter 4: From Rocks to Metal: Recasting the Introduction of Extractive Metallurgy and the Forging of a Life Cycle Metaphor in the Southern Levant (ca. 5000-3800 BCE)

"We should say that the 'sole focus on technology,' while it is the prime force to be understood, is not sufficient for understanding the role of copper technology within society. Social relations must be understood in order to put copper production in context" (Milevski 2012, 117)

While the discovery of extractive metallurgy appears to have taken place sometime during the sixth millennium in an unknown community in Eurasia, in the southern Levant the earliest evidence of extractive metallurgy dates to the last quarter of the fifth millennium—almost a millennium after the evidence of smelting in the Balkans, Iran and potentially the Caucasus. Unfortunately, in the southern Levant the transition from the Neolithic to the Chalcolithic is still being refined (Gilead 2009). The result is that we understand very little about the initial introduction of extractive metallurgy into the region. In the discussion that follows, I argue that the participation of southern Levantine communities in northern networks provided the social framework through which the knowledge of extractive metallurgy was integrated into local communities during the late sixth/early fifth millennium. As in other regions, the sharing and learning of such technological knowledge would have most likely involved the small-scale movement of individuals from the north into local communities via pre-existing networks.

In the previous chapter I proposed that the communities into which individuals with metalworking know-how integrated likely have had a pre-existing tradition of working local copper-bearing greenstone. In order to support this proposal, I begin this chapter with an in-depth review of the conventional evidence used to interpret the system of Chalcolithic metal production.

Next, I integrate recent research from the last decade into this pre-existing framework to demonstrate the probability that the southern Levant was very much a recipient of the same social processes that led to the spread of extractive metallurgy during the late sixth/early fifth millennium into the Balkans and Iran. Given this new proposal, I argue that the traditional evidence used to study Chalcolithic copper production represents the *intensification* of a pre-existing system in the landscape. I connect the economic impact of metal production to its ritual importance in mortuary rites of passage, framing it as connected to the rise of community cult/mortuary centers during the late fifth millennium. Building from previous proposals that metalsmiths served in shaman-like roles during the Chalcolithic, these agents of transformation were the managerial leaders who coordinated community ritual. Within this context, the materiality of the copper production process is argued to form a life-cycle metaphor that complemented both the pre-existing system of belief centered on the regeneration of the individual, as well as the healing properties of greenstone long known since the PPNB. While it is argued that the sociotechnical system of metal production during the Late Chalcolithic in the southern Levant played a critical role in shaping the early cosmology of the Nile Valley, this chapter will focus only on the southern Levant's connections with the north. A more thorough discussion of Nile Valley interaction and cooperation in the southern Levant during the Late Chalcolithic is provided in Chapter 5.

Current State of Chalcolithic Metallurgy

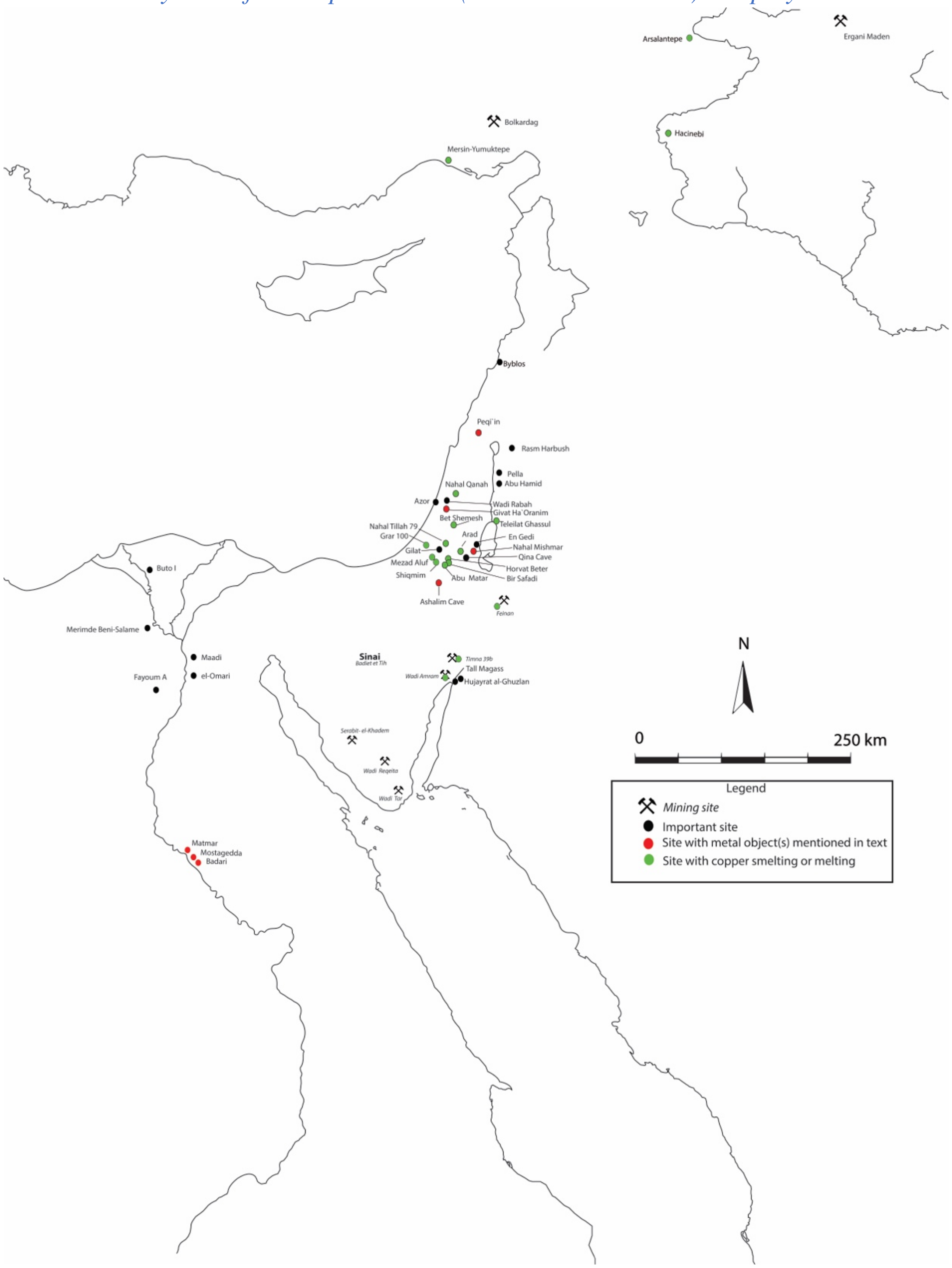
Research from the last decade is changing our current understanding of metallurgical development in the southern Levant. While it was originally believed the earliest imported metal object dated to the mid-fifth millennium, as previously discussed we can now push back the introduction of cast copper objects to the late sixth/early fifth millennium. Excavations at Tel Tsaf in the central Jordan Valley led to the recent publication of a cast copper awl dated sometime between 5250-4750 BCE, when the site was occupied (Garfinkel et al. 2014, Streit and Garfinkel 2015, table 1). The awl is believed to have been buried with a 40-year-old woman in a flexed position, interred in a grain silo with an ostrich eggshell bead necklace comprised roughly 2,500 beads placed at her waist (Garfinkel et al. 2014, 2). Given that the burial is the most prestigious currently known in the region, the woman is believed to have belonged to a prominent group in the community in charge of agricultural surplus (Garfinkel et al. 2014, 2, 5). The date of the awl renders it contemporary with evidence for extractive metallurgy in the Balkans and Iran. While analysis of the metal suggests an origin in the Caucasus, the typological parallels are linked to awls circulating within the Ubaid sphere of exchange (Garfinkel et al. 2014, 4-5), in which the community at Tel Tsaf is known to have participated (Streit and Garfinkel 2015). The excavators have concluded that the awl shows that copper objects were first imported to the region via long-distance trade, forming the first stage of metallurgical development prior to the introduction of extractive metallurgy (Garfinkel et al. 2014, 4-5). The Tel Tsaf awl has therefore provided a chronological anchor for the introduction of metal as a known material into local communities during the late sixth/early fifth millennium. It is therefore noteworthy that the next time metal is attested in the region archaeologically, it is several hundred years later and appears connected to a highly developed system of production concentrated in the Beersheba region during the late fifth to early fourth millennium.

The uneven distribution of both metallurgical production refuse and finished objects led Golden (2009, 2010; Rowan and Golden 2009, 11) to propose dividing the Chalcolithic into an early, pre-*metallic* phase and a later *metallic* phase. According to this model, the so-called "pre-metallic" phase is characterized by the appearance of sites with Chalcolithic features but very little to no copper artifacts, such as Teleilat Ghassul (Mallon, Koeppel, and Neuville 1934) and the major cult center of Gilat (Levy 2006). Golden (2010) proposed assigning violin-shaped figurines and decorated long-stemmed ceramic vessels referred to as cornets (Figure 17:1) to the pre-metallic phase, arguing these two artifacts are characteristic of communities who did not practice metalworking. While their function remains enigmatic, cornets are attested in some domestic contexts and cave burials but appear concentrated primarily in cultic buildings at Teleilat Ghassul, En Gedi, and Gilat. Golden (2010, 75) has noted that cornets tend to appear in contexts lacking copper and proposed that they either belonged to a different system of ritual and/or social activity, or "that copper first came to the region as cornets were going out of style." As such, cornets have come to be little associated with metallurgical production. Indeed, with the discovery of the Tel Tsaf awl, Golden's model for such a division requires revision.

In order to provide the contextual backdrop for the earliest attestation of extractive metallurgy in the southern Levant, we must briefly discuss the social environment of the Late Chalcolithic. The second half of the fifth millennium was a time of social transformation for communities in the region, reflecting both change and continuity with the Late Neolithic. The period is characterized by a marked population increase, resulting in the movement of people into previously unoccupied habitation zones; an intensification of agricultural production leading to an abundance of resources; the introduction of horticulture; and the intensified exploitation of animals for their secondary products (Rowan and Golden 2009). Continuity with the preceding phase includes various elements of the flint and ceramic assemblage (Rowan and Golden 2009) as well as burial practices (Rowan and Ilan 2014). With regard to mortuary rites, one of the characteristic hallmarks of the period is the diversity of funerary practice (Rowan and Ilan 2007). Given the physical variability of the landscape, such ritual diversity was no doubt linked to the rise of regionalized systems of economic specialization linked to local traditions of craft specialization. We therefore see carved basalt bowls and cultic pedestals from the Golan and Galilee (Chasan, van den Brink, and Rosenberg 2019), tabular scrapers for the processing of wool in the Jordanian plateau (Anfinset 2010, 50 for discussion and references), and the cultivation of olives (and olive oil?) in the Shephelah (Stager 1985, Zohary and Hopf 1993). It is against this backdrop of regionalized economic specialization that we see the sudden appearance a well-developed system of extractive metallurgy in the Beersheba region during the second half of the fifth millennium (Perrot 1955; Levy 1987; Shugar 2000; Golden 2010). This new system of production also appeared alongside a local tradition of specialized ivory carving with parallels in the Nile Valley (Perrot 1959), potentially reflecting collaboration between geographically disparate communities.

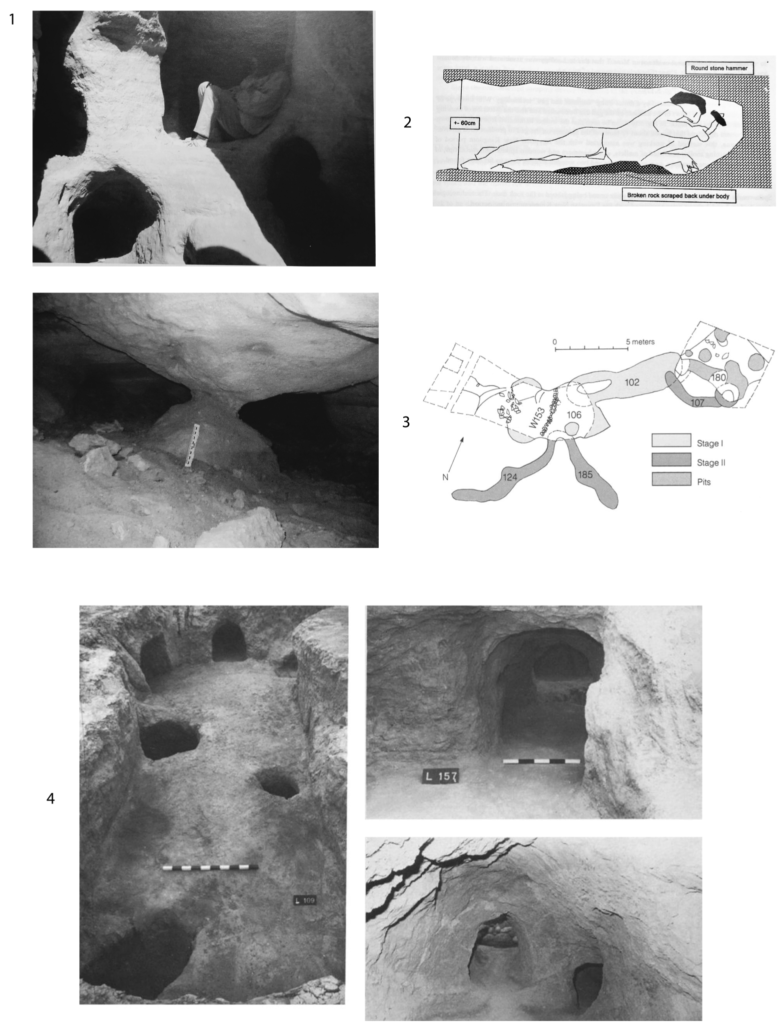
It is during the Late Chalcolithic that production appears concentrated in the Beersheba basin, seemingly attesting to its economic importance for communities in the region (Figure 5). Production refuse is found in sites clustered around Abu Matar (Perrot 1955a, b, c, Shugar 2000, Golden 2010) and Shiqmim (Levy 1987, Shalev and Northover 1987, Golden, Levy, and Hauptmann 2001) with smaller satellite sites also attested at Mezad Aluf (Golden, Levy, and Hauptmann 2001, 959-960), Neve Noy (Eldar and Baumgarten 1985), Horvat Beter (Dothan 1959a), and Nevatim (Gilead and Fabian 2001). These settlements are characterized by seemingly

Figure 5. Chalcolithic system of metal production (ca. 5000-3800 BCE). Map by author.



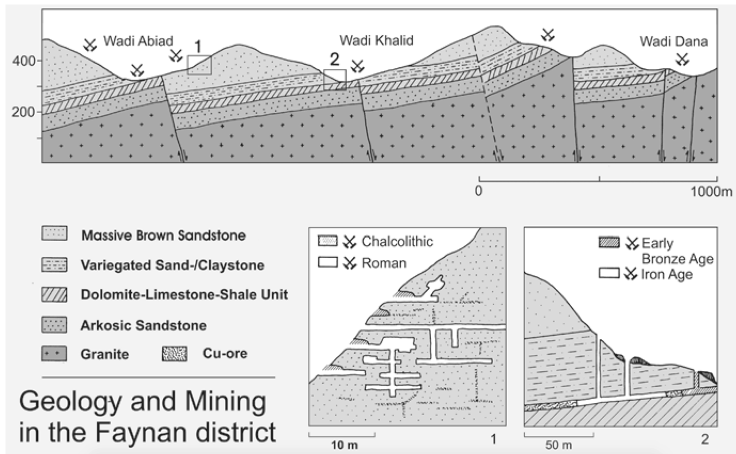
intrusive subterranean spaces, where evidence of smelting and casting was located above and below ground (Figure 6:4). The subterranean units were carved by sinking vertical shafts into the loess that then opened up into underground galleries; access to which was granted by foot holes carved into the sides of the shafts, allowing one to climb up or down (Eldar and Baumgarten 1985, Levy and Alon 1987, Perrot 1955a).

Figure 6. Similarities between subterranean spaces in Beersheba settlements and Timna mines during the Chalcolithic and EB I. 1 and 2: Timna shaft and gallery mining techniques and example of pillar (Shaw and Drenka 2018, figs. 5.7, 12, and15); 3-4: Neve Noy subterranean units and plan (Eldar and Baumgarten 1985, 136-137).

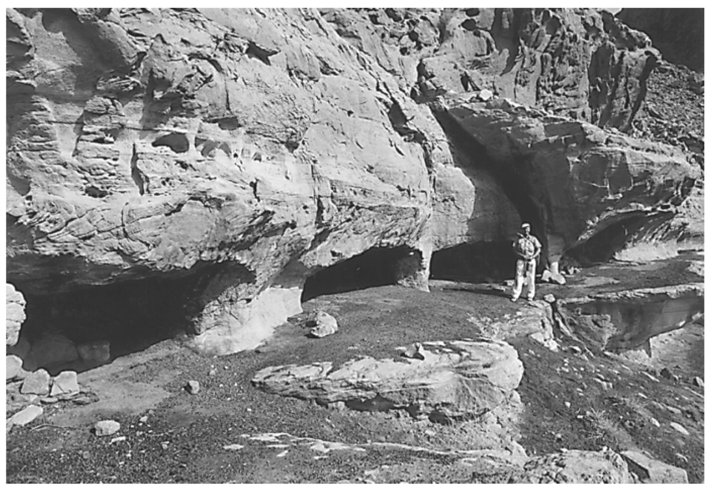


It was these subterranean structures that led to early proposals that the community was not local to the region. As a result of his excavations at Abu Matar, Perrot (1955a, 1955c, 1955b) believed the Beersheba communities originated east of the Jordan River. Following his interpretation of the site's stratigraphy, he argued that immigrants unfamiliar with the local landscape carved rectangular subterranean chambers into the loess soil in the site's earliest phases (Level I-II); after these quickly collapsed, the community rebuilt smaller, oval galleries with several rooms attached (Level III). After another period of abandonment, Level IV was marked by rectilinear mudbrick structures built on stone foundations above ground coinciding with the reoccupation of the site (Perrot 1955c, 184-187). Salvage excavations conducted by Gilead, Rosen, and Fabian (1991, 178) could only detect two levels of habitation and in each the subterranean and surface structures were inhabited contemporaneously, leading to the rejection of Perrot's stratigraphic classification and thus immigrant proposal. At nearby Shiqmim, similar co-habitation of both subterranean spaces and above-ground structures is attested (Levy 1993, 68, cited in Rowan and Ilan 2007, 101), speaking to a communal architectural tradition. With regard to the supposed non-local origin of these communities, both the ceramic and flint assemblages in Beersheba suggest the community had roots in the landscape dating back to the Late Neolithic (Rowan and Golden 2009, 3 with references). Indeed, such continuity extended to the supposedly intrusive subterranean structures, which Ilan and Rowan (2014, 101-102) have connected to the Late Neolithic practice of cave burials as places of ritual significance. Moreover, the structural parallels to the shaft-and-gallery mines at Timna are striking (Figure 6:1-2). It is thus noteworthy that the Beersheba communities appear to have only exploited the ore sources at Feinan, where hafted stone hammers and hand stones were used to carve adits and scoops into the side of a hill, following the mineralization horizontally up to 10m (Figure 7).[32]

Figure 7. Chalcolithic and EB I mining technology employed at Feinan (Hauptmann 2007, figs. 5.43 and 5.46).



1. Chronological development of mining technique employed in relation to geological unit exploited (after Hauptmann 2007, fig. 5.46)



2. Umm el-Amad depicting adit into horizontal exposure, Chalcolithic based on similarity at Qalb Ratiye (after Hauptmann 2007, fig. 5.43)

When we turn to examine copper production in the Beersheba settlements, the local system appears highly developed. Ore was mined from different regions in the Feinan and then transported

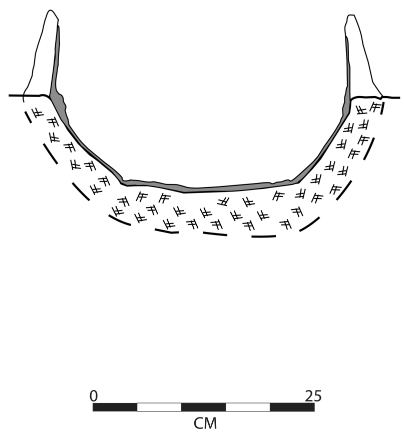
[32] See Hauptmann 2000, 97; Hauptmann and Weisberger 1987, 424, Baker and Mattingly 2008, 103.

back to the Beersheba region where it was sorted and crushed into smaller pieces in preparation for smelting both in subterranean units as well as above ground spaces (e.g., Golden 1998, 2010; Shugar 2000, 2003, 2018). While ore was exploited from Feinan, the procurement strategies of producers appear to have been diverse, as analysis of the ore from Abu Matar and nearby Nevatim reveals at least five distinct types that cluster into two groups (Shugar 2018). The first group contains four distinct ores mined from several different areas in Feinan that range in both copper content (17-53% Cu) and color (Shugar 2018, 279-288), raising the possibility that such diversity was the product of prospection efforts to better understand ore from different regions. Evidence that the producers possessed expertise in the material properties of copper ores is suggested by the possibility of roasting and using a flux at Abu Matar. At the site, one of the ores contained a high amount of sulfur, which may have required roasting it first to remove the sulfides and improve the efficiency of the smelt (Shugar 2018, 284, Type 3).

Support that some of the producers in Beersheba understood the importance of roasting copper sulfides prior to smelting them is attested in a subterranean structure at Abu Matar. Golden (2010, 132-133) identified Locus 218 at the site as an ore preparation room given the presence of an anvil, grinding stones, a heating installation and a high concentration of ore but no crucibles nor slag. We can infer that the presence of a heating installation implies producers may have roasted certain ores (or all ores) prior to smelting, potentially pointing to an established knowledge of—or tradition working with—sulfidic ores. While many ores were self-fluxing, hematite lumps at Abu Matar also suggest that producers were aware of using iron oxides as a fluxing agent

(Shugar 2018, 284).[33] When combined, the local procurement strategies alone reveal the high level of expertise these individuals had with extractive metallurgy and working copper minerals.

Figure 8. Chalcolithic pit furnace from Abu Matar (after Golden 2010, fig. 21.2).



The expertise of the Beersheba producers is likewise attested by the smelting and casting techniques they employed. Once the ore was prepared, it was then placed into handmade hemispheric crucibles measuring 8-12 cm in diameter, loaded with charcoal, and heated from above using blowpipes (Figure 9:1-5; Golden 2014, 564).[34] At Abu Matar, crucibles were found in pit furnaces —one of which contained a tuyère (Figure 8)—both in subterranean units as well as clustered in an above-ground courtyard workshop (Golden 2010, 128-136). The furnaces were composed of pits 30 cm in diameter, dug 30 to 40 cm into the ground lined with reed mats and

[33] It should be recalled that a fluxing agent is an additional material (e.g., iron ore) added to the smelting charge in order to better foster a reducing environment, aiding in the separation of the metal from the gangue/host rock.

[34] Shugar (2000, 200-201, fig. 5.04) has published one tuyère from Abu Matar that was discovered in one of the furnaces. The presence of this tool indicate a bellow or blowpipe was used to introduce air into the charge through a hole in the furnace wall in at least one case. Tuyères have also been found in pre-Uruk levels at Hacinebi (Stein 2001, 277).

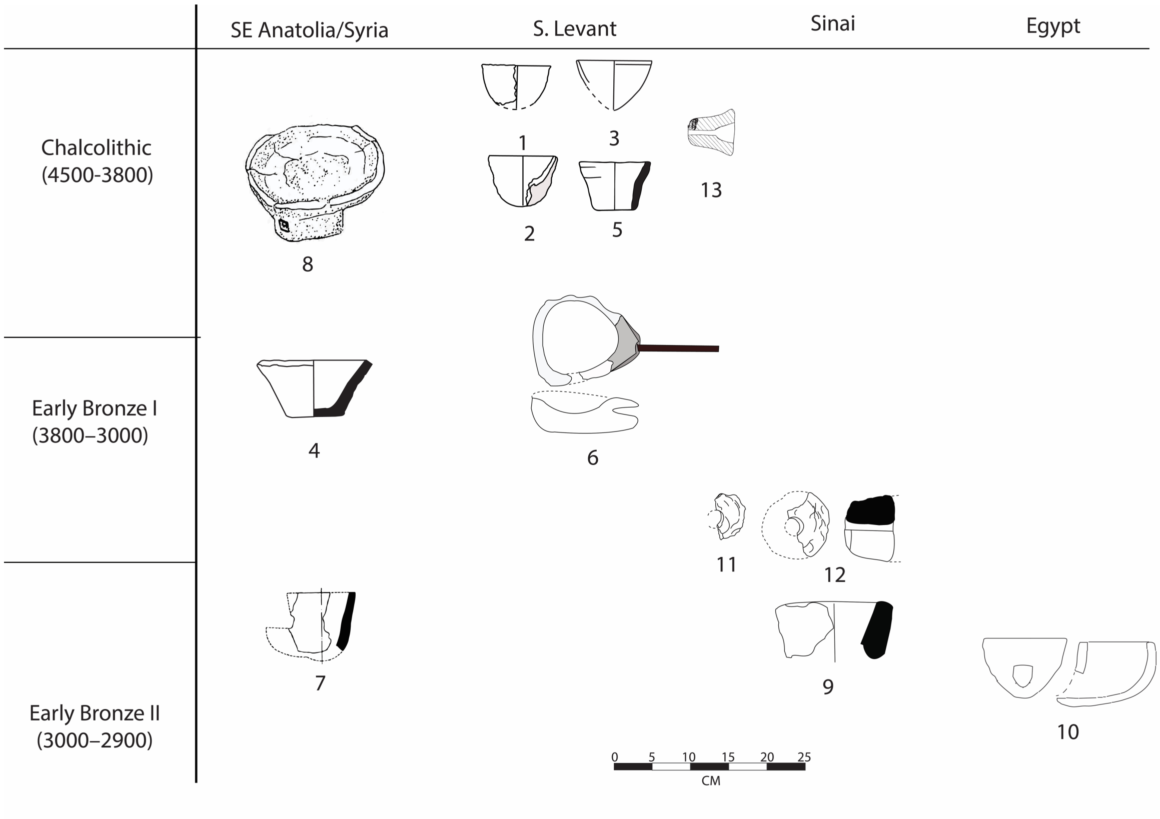
encased by a 10 cm high ceramic wall/collar, possibly covered with a lid of sorts, almost like an oven (Figure 8, Golden, 2010, 120,122, 2014, 563–564, fig. 21.2). Given the low redox conditions, however, the slag would have been highly viscous and is estimated to have trapped up to 50 wt% Cu in the form of copper prills (Thornton 2009, 304, with reference to Hauptmann et al. 1993, 568, Shugar 2003). In order to retrieve the trapped prills, the slags were crushed, the prills collected, and then melted in a crucible for casting. Analysis of the prills matched the ores from Feinan, confirming local ores were smelted on site (Shugar 2000, 2018). After the ore was smelted and the copper prills retrieved from the slag, they were cast into open, one-sided ceramic molds used for the manufacture of axes, adzes, awls, and chisels. Metallurgical analysis reveals producers hammered and annealed the finished tools after cooling, reflecting familiarity with the material's properties (Shalev and Northover 1987, Shalev 1991, Golden, Levy, and Hauptmann 2001). The tools were prepared as if they were to be used, however evidence of use wear demonstrates they were never employed as such, raising the possibility that these copper tools may have been part of a ceremonial use (Tadmor et al. 1995).

While a developed system of production is attested locally, the Beersheba producers also participated in long-distance exchanges with northern metalworking communities, from which both ore and complex polymetallic metals were imported. Evidence that ore was imported to be smelted locally is attested at Abu Matar, where one of the types of ore overlaps with a source at Kaman-Kalehöyük located in central Anatolia (Shugar 2018, 288-290).[35] The presence of *ore* from

[35] Other possibilities for the source of this ore could also be in the Anarak region in central Iran, Anatolia, or Azerbaijan (Shugar 2018, 288-292).

Anatolia is significant, as it suggests continuity of practice with the Neolithic system of greenstone exchange wherein copper-bearing stones were exchanged over vast landscapes. Arsenic prills were

Figure 9. Crucibles and tuyeres in southwestern Asia and Egypt (ca. 4500-3800 BCE). Not to scale. See Table 5 for references. Images adapted by author.



also discovered in the fayalitic slag from some of the crucibles at the site, leading to the proposal that arsenical ores were intentionally alloyed with local copper (Shugar 2000, 221; Shugar and Gohm 2011). Given that arsenic in quantities exceeding 1% wt will produce a silvery color when compared to "pure" copper, Shugar (2000) proposed that arsenic-rich ores were therefore intentionally smelted in order to retrieve the silvery prills from the slag. This technique was employed in order to lower the melting temperature of the cast, which would have resulted in a longer pour time—something needed for casting complex forms (Shugar and Gohm 2011, 133).

Arsenic-rich ores are known from southern Sinai at Wadi Tar, which was proposed to have been a site exploited during the Chalcolithic (Ilani and Rosenfeld 1994, Hauptmann, Begemann, and Schmitt-Strecker 1999), 10). Indeed, recent analysis demonstrates Sinai copper from the Um Bogma region (Figure 5) was exploited as attested in the early fourth-millennium at Maadi (Abdel-Motelib et al. 2012). As such, we cannot that discount ore from the Sinai was mined by groups from these regions, however more evidence is needed. Indeed, Shugar (2000, 223-224) proposed that such arsenic-rich ores were imported from somewhere abroad, perhaps Anatolia, supporting a model for the trade in greenstone between metalworking communities. Such a production technique implies that the functional properties were also valued and that producers had a thorough understanding of the material properties with which they worked.

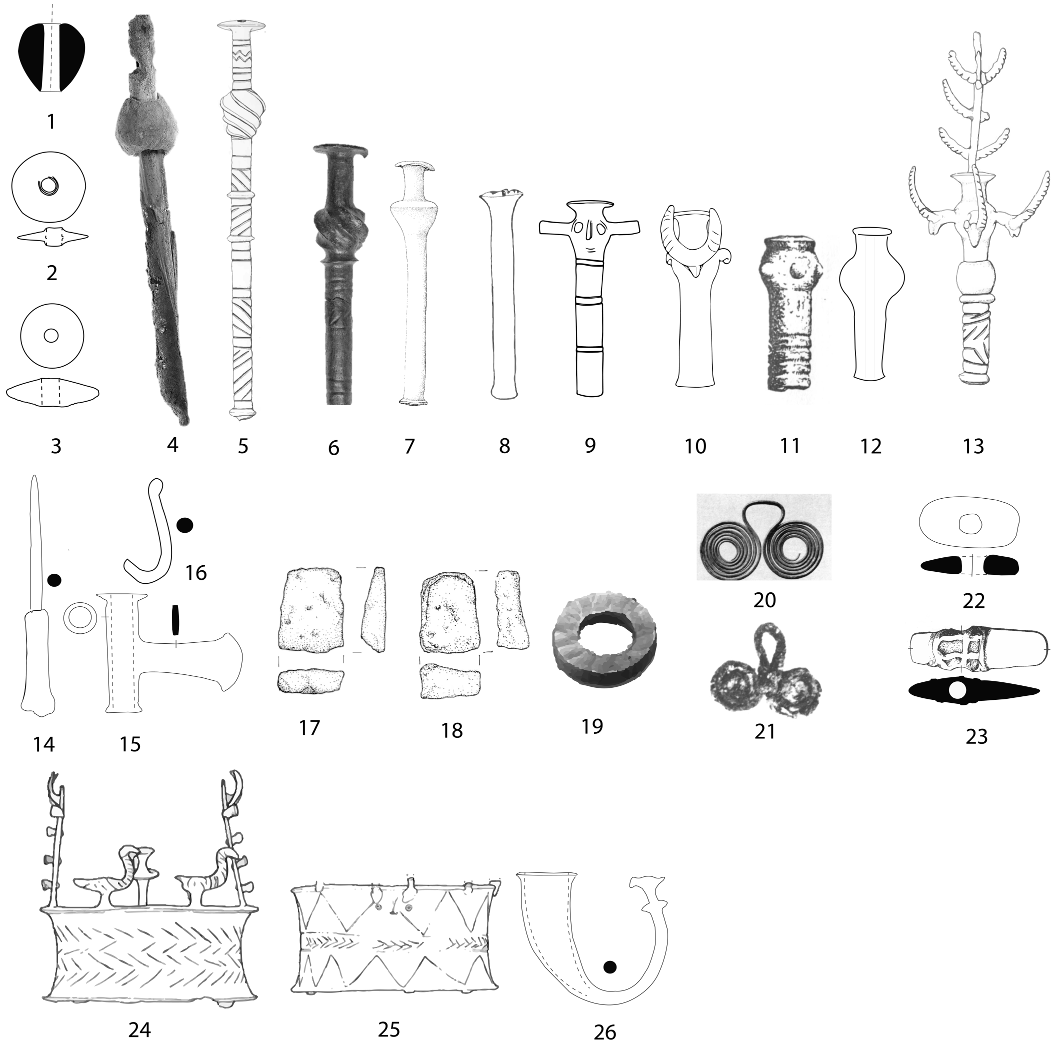
In addition to ore, polymetallic metal containing high levels of arsenic and antimony (and less frequently, nickel and bismuth)[36] was imported from somewhere in Anatolia, the Caucasus, and/or Iran (Shalev and Northover 1993, Shalev 1995, Tadmor et al. 1995, Golden, Levy, and Hauptmann 2001, Golden 2009, Shugar 2000, Shugar 2003, 2018, Key 1980). While it is unknown if finished objects were traded, the development of ingots reflects increased cooperation between communities. At Abu Matar (and potentially at Bir es-Safadi) the presence of a polymetallic ingot-shaped object containing antimony, arsenic, and nickel was excavated, attesting to the import of metal alongside ore (Figure 10:17, Golden 2010, 139-144, fig. 7.21). At Shiqmim, a similar ingot-shaped object made of pure copper was excavated (Figure 10:18, Golden 2001, fig. 9, 2010, 139-

[36] Shalev (1994, 633) reported alloy compositions reflecting up to 22.6% antimony, 8.3% nickel, 8.2% arsenic, which would have resulted in a silvery color and is consistent with an origin in Anatolia or Iran.

144, fig.7.24), leading to the possibility that the local copper was prepared for export. The potential development of standardized units of exchange speaks to the importance of copper for connecting southern Levantine communities to the north by the late fifth millennium.

In addition to the highly organized system of production in the Beersheba, the sudden importance of metal for certain Chalcolithic communities during the late fifth millennium is characterized by the diversity in forms linked to a prestige system of display. Typologically, the variety of objects appear to be connected to the body, as many of them had to be carried. The most frequent form are copper maceheads, which take the shape of both piriform (Figure 10:1) and disc-shaped maceheads (Figure 10:2-3). Scepters were also common among the assemblage and were presumably mounted on a wooden staff to be carried in processions. These designs typically incorporated the macehead and could be cast with minimal decoration (Figure 10:7-8, 12) as well as include more complex patterns that may have been connected to basketry or textile patterns (Figure 10:5-6). Zoomorphic elements appear as important features, as many objects are cast with a range of animal elements, including: horns (Figure 10:10), ibex (Figure 10:13), and birds (Figure 10:24). In addition to maceheads, axes formed another popular object to carry and appear as shaft hole axes (Figure 10:15) as well as axes that clearly mimic hafted stone hammers (Figure 10:22, 23). Copper was also used for tools such as awls (Figure 10:14), fishing hooks (Figure 10:16), and chisels, as well as more ornate objects referred to as crowns (Figure 10:24-25) and tapered designs in the shape of an animal horn (Figure 10: 26).

Figure 10. Chalcolithic metal objects (ca. 4500-3800 BCE). Not to scale. See Table 6 for references. Images adapted by author.

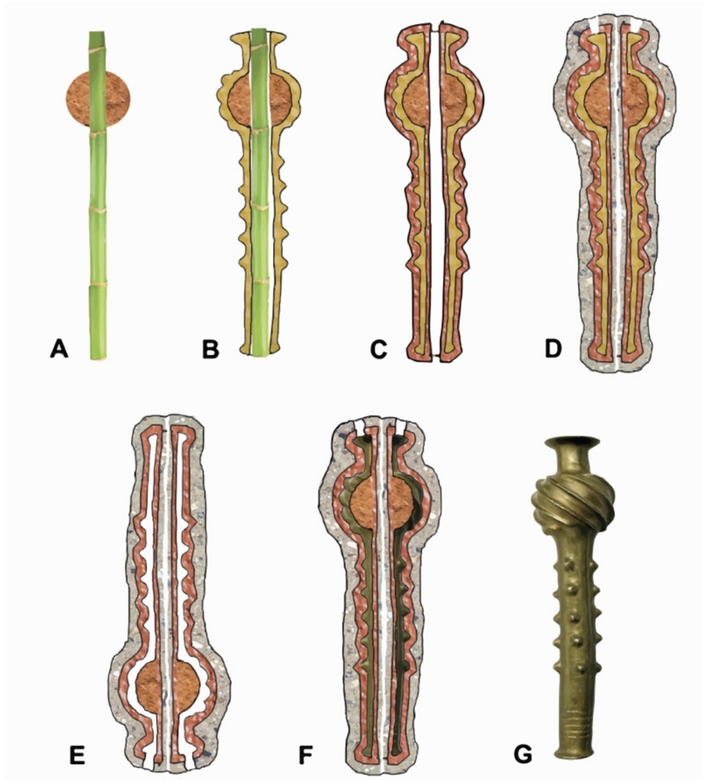


In addition to the variety of forms, diversity is also detected in the production techniques, material, and depositional contexts in which metal objects were found. Late Chalcolithic producers employed both single-sided open molds for casting simple forms such as axes, chisels and awls, as well as the more labor- and material-intensive lost-wax casting process. Los-wax casting is inherently different from casting in open molds as it involves a complex, multi-stage production process that is highly specialized. The steps involved in lost-wax casting are illustrated in Figure 11, and include: A) molding or carving a core out of clay or stone, followed by inserting an organic reed or piece of wood in the event it was to be hafted; B) coating the core in tree resin or beeswax, leaving it to harden, and then carving the desired details into the hardened wax; C) encasing the wax mold in a fine layer of clay to preserve the details; D) packing coarse, dense clay over the core and leaving a hollow channel (sprue) on one side;[37] E) heating the mold over a low temperature allowing the wax to melt out of the sprue, while creating a ceramic mold with a void; F) pouring molten metal from a crucible into the sprue; G) letting the metal cool and breaking the mold to retrieve the piece (Goren 2014, 261-262, fig.1). Once completely cool the piece would have undergone finishing treatments such as buffing out inclusions, repairing breaks, and polishing.

Lost-wax castings are said to be characteristic of the Late Chalcolithic and have been found overwhelmingly in subterranean burial assemblages and habitation areas as foundation deposits, dispersed across the landscape of the southern Levant. These regions include the Negev (Abu Matar, Shiqmim, Bir Safadi, Nevatim, Beth Shemesh), Judean Desert (Nahal Ze`elim, Cave of the Sandal, Qarantal, Lahat Cave, Nahal Mishmar, Ashalim), on the coast plain (Palmahim, Azor, Meser, Shoham) and western foothills of Samaria (Nahal Qanah, Giv`at ha-Oranim), as well as in the Galilee (Peqi`in Cave) (Goren 2008, 374-375, with references; Shugar and Gohm 2011, with references). The appearance of tools and lost-wax castings in the same contexts support their

[37] A sprue is the channel through molten metal is poured during the casting of an object. When the object has cooled, the metal poured into this channel will harden, leaving behind the sprue.

Figure 11. Lost-wax casting schematic (after Goren 2014, fig.1).



identification as part of the same prestige industry (Levy and Shalev 1989, 365). A ceremonial use of the tools is also supported by the fact that they do not replace the local stone tool industry (Rosen 1984). Moreover, they are found incorporated into the design of these elaborate lost-wax casts (Golden 2009, 296, fig. 5, 2014, 572). Both pure and imported metal was employed to make tools and lost-wax castings, reflecting how all metal was viewed as part of one industry.[38] As part of this prestige industry, it is also during this period that the first gold (Gopher and Tsuk 1991), lead

[38] We thus find a copper axe with a high nickel content from Teleilat Ghassul (Golden 2010, 77) as well as tools cast from copper with a high antimony and arsenic content at Peqi`in. From the latter site, a lost-wax-cast scepter was typologically identical to one at Neve Noy and was made from Feinan copper (Segal and Goren Unpublished). Local copper is also known to have been used to cast tools at Bet Shemesh (Ben-Yosef et al. 2016) and Abu Matar (Shugar 2000, 2018), demonstrating that the division between casting techniques did not determine what type of metal was used.

(Yahalom-Mack et al. 2015), and leaded copper (Ben-Yosef et al. 2016) is attested, fitting into a broader pattern of production and alloy exploitation in Eurasia (Yalçin 2017).

When we take a step back and examine the total system of Chalcolithic production from the viewpoint of its technology, we are provided with an image of a highly developed system of production whose producers were experts in their craft and participated in multiple social networks. I have argued that unworked copper-bearing greenstone was imported, expressing continuity with the Neolithic mode of exchange. We must thus ask whether the nature of contact between communities occurred via the long-distance exchange of traded goods by intermediaries, or if contact was mediated by the producers themselves.

We can nuance our understanding of the nature of contact between communities by examining parallels in the assemblage of the Beersheba settlements, which suggest direct participation in northern knowledge networks. Contemporary evidence from pre-Uruk levels at Hacinebi Tepe in the Middle Euphrates provides several lines of evidence that Beersheba smiths participated in the same technological system as communities in southeastern Anatolia. Located 200 km from the nearest mine at Ergani Maden, during the early fourth millennium BCE ore was transported downstream to Hacinebi where it was processed and smelted within the settlement (Özbal, Adriaens, and Earl 1999), providing an analog to the Beersheba system. At Hacinebi, producers employed hemispheric crucibles, pit furnaces, open ceramic molds for casting tools, as well as tuyères (Stein 2001), all with parallels in the Beersheba settlements. Indeed, Pfeiffer (2009, 318) reports 14 crucibles of a different type at Abu Matar, which contained oval sockets in which to insert a stick for handling purposes (Figure 9:6). Typologically, these appear to be a local form of a crucible type found in Iran from a Late Chalcolithic/EB I context at Tepe Ghabristan (Figure

9:8; Amiet 1986). The similarity in production tools appears to reflect a pan-regional system of production whose producers were trained using the same materials.

The procurement strategies at Hacinebi Tepe also suggest communities in this region and Negev participated in the same exchange network, albeit at different production nodes on the landscape. At Hacinebi, a polymetallic sulfide ore was excavated that revealed 43% Pb (Yener 2000, 28, with reference to Özbal 1997), attesting to smelting onsite. When we turn back to the southern Levant, a newly-discovered hoard from Bet Shemesh contained a leaded copper macehead cast with 70 wt% Pb in inclusions, claimed to have been cast locally (Ben-Yosef et al. 2016). Because lead is known to increase the fluidity of the cast, the use of a leaded copper implies the producer of the Bet Shemesh macehead was knowledgeable about the functional properties of casting. Given that the macehead was cast using a highly leaded copper vs. the more widely attested copper-arsenic-antimony alloy, Ben-Yosef et al. (2016) proposed that a disruption to the trade networks farther north from which the arsenic-antimony rich copper was imported led to the search for a suitable substitute to continue the prestige industry. However, it is well known that lost-wax-cast specters and standards were also made using local ores from Feinan and that tools could be cast using complex metals, as both are attested at Peqi`in (Segal and Goren Unpublished). As such, the proposal that leaded copper was the result of local prospecting efforts needs more supporting evidence to be considered convincing.

Rather, lead is known to have been used for lost-wax casting locally during the Late Chalcolithic, suggesting that it too formed part of the broader procurement networks with the north. In the last five years, a pure lead macehead (Figure 10:4) was published from deep within Ashalim

Cave in the Negev (Yahalom-Mack et al. 2015, 1-2).[39] Radiocarbon dates on the staff provide a range from 4300-4000 BCE, consistent with the rest of the burial assemblage (Yahalom-Mack et al. 2015, 2) as well as with the leaded mace from Bet Shemesh (Ben-Yosef et al. 2016) and the Beersheba settlements. Analysis of the object revealed it was produced from smelted lead ore whose isotopic ratios are reported to be broadly consistent with those of the Taurus Mountains as well as similar to fragments of slag and lead ore at Arslantepe, creating a geographic connection with southeastern Anatolia (Yahalom-Mack et al. 2015, 5, 10).

On the possible origin of the lead ores deriving from the Bolkardağ region, Yahalom-Mack et al. (2015, 8, with references) cite evidence of metalworking in the region during the fifth millennium, as well as the presence of lead objects at sites in the Amuq plain during the fourth millennium BCE. When we view all of the evidence in terms of its spatial distribution confined to the south, it suggests communities of individuals who had an intimate knowledge of local geological formations and knowledge of smelting migrated to the region in order to facilitate exchange or exploit local sources. Moreover, Yahalom-Mack et al. (2015) cite Key's (1980) analysis of the Nahal Mishmar hoard, which demonstrated that metallic lead was used to patch some of the casts–a practice well-attested in Anatolia–and that lead was also present in two objects.

[39] Note that the function of this object has been debated. The excavators proposed it was originally used as a macehead repurposed as a spindle whorl (Langgut et al. 2016, Langgut et al. 2017). They cited a series of tamarisk wood sticks interpreted as spindles and distaffs discovered deep within Qina Cave (a contemporary burial site in the Negev) as evidence of textile equipment in burial context (Langgut et al. 2016). This proposal has been rejected by Ben-Yosef et al. (2016, 767), who argue that the connection between lost-wax casting, prestige goods, and cave burials supports the identification of this object as a macehead as no evidence suggests metal was used for spindle whorls. As such, they interpret the Qina staffs as maceheads wherein that metal may have been robbed (Ben-Yosef et al. 2017, 767).

The analysis revealed the lead used could have derived from the parent ore and that it appeared different sources were attested in the hoard (Yahalom-Mack et al. 2015, 10).

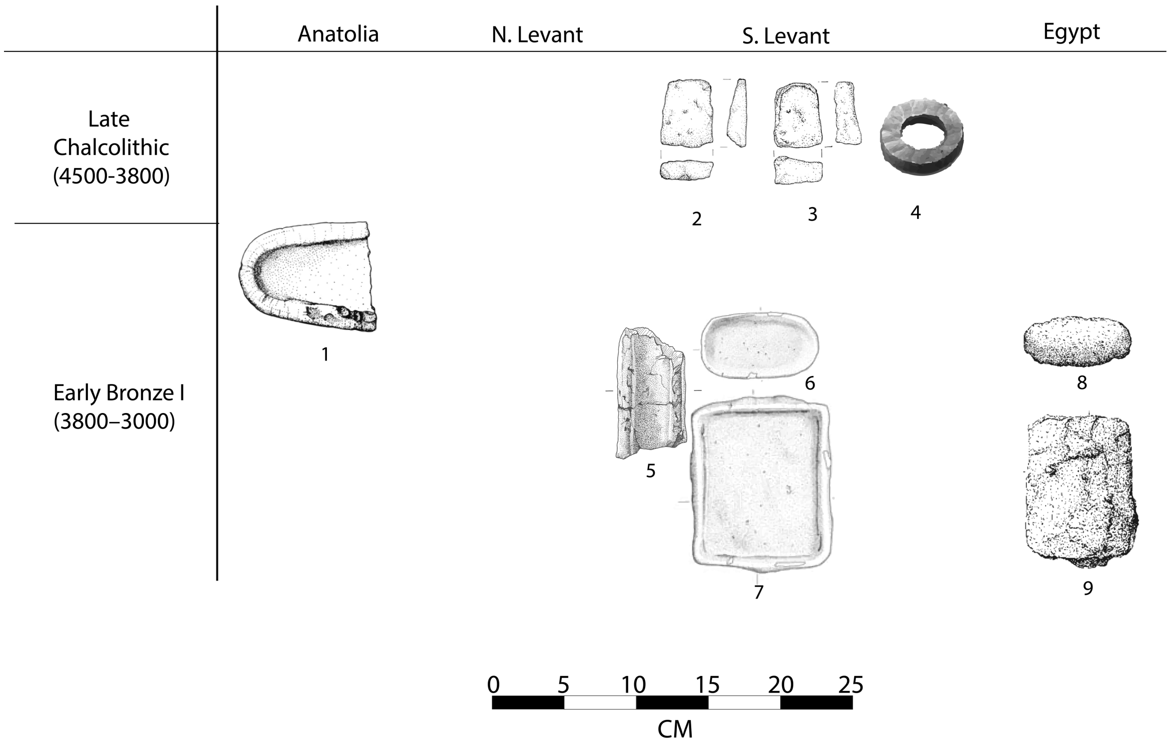
The origin of the copper from the Nahal Mishmar hoard is believed to have derived from southeastern Anatolia, a region in close proximity to the proposed source of lead for the Ashalim Cave macehead, and thus suggests a possible route through which the material was procured. Indeed, Tarsus/Mersin may have formed the port through which Anatolian communities were linked with the broader Eastern Mediterranean world. That the distribution of copper and production refuse in the Late Chalcolithic southern Levant clusters in the Beersheba region and is limited to the southernmost regions—bypassing the northern Levant—seems to suggest contact took place via maritime transport, as suggested by Golden (2014, 562).[40] Given the importance of the Euphrates for connecting Arslantepe to communities farther south, the presence of lead at Hacinebi in relatively contemporary contexts supports that metalworking communities at these sites participated in the same network. While Ben-Yosef et al. (2016, 500) argued that we must refrain from drawing definitive conclusions about the source of the metal given the known galena sources in Mount Hermon have not been mapped for their lead isotopes, we must not ignore these other parallels to the community at Hacinebi, whose total assemblage points to active participation in the same procurement/exchange networks as the Beersheba settlements.

With regard to the mode in which contact took place, Golden (2014, 562) proposed maritime transport as a result of the geographic gap between the Beersheba sites and the earliest

[40] Yahalom-Mack et al. (2015) have suggested that we cannot discount the possibility that the Ashalim Cave macehead was locally produced given objects in the Nahal Mishmar hoard appear to have been cast locally.

copper artifacts in the northern Levant (Hauptmann 2007, 296, citing France-Lanord and de Contenson 1969). When taken together, the production techniques employed in the settlements at Beersheba and Hacinebi reflect an intimate embodied knowledge of the materials that is only learned through sustained engagement within a community of practice. Additional supporting evidence for close contact between producers in geographically distant sites can be found in the presence of polymetallic ores at Hacinebi, suggesting the site may have formed a locus of ingot production for export. Antimony, nickel, and arsenic were found in varying levels in the slag at Hacinebi (Özbal, Adriaens, and Earl 1999, Table 1), suggesting the polymetallic metal imported to the southern Levant formed part of the same procurement network. The possability that metal from Hacinebi was shipped abroad is suggested by the presence of open, rectangular ceramic molds for casting ingots measuring 15 x 5 x 1.5 cm were found (Figure 12:1), estimated to have produced metal weighing 1 kg (Özbal, Adriaens, and Earl 1999, 64). The composition of production refuse when paired with the ingot dimensions cannot help but bring to mind two potential ingots from Abu Matar and Shiqmim, similar in both size and composition (Figure 12:2 and 3). Golden (2010) proposed that the production of such "ingots" may not have been tied to notions of economic exchange values, but rather would have been the product of producers' need to control the amount of metal required for casting certain objects. This proposal is noteworthy as it would suggest that prior to the advent of formal markets, the exchange of standardized weights for metals was centered on the needs of individual producers to exert control over the production process, suggesting that the agents who made up these networks may have been metal producers themselves. Indeed, when we look back to the model for the diffusion of extractive metallurgy, it was based on the idea that the migration of individuals with metal-working knowledge were pre-existing participants in a system of exchange (Roberts, Thornton and Pigott 2009). The importation of both metal and ore from abroad speaks to the continuity of this system and suggests communities stayed in contact, again raising questions about the role of the Beersheba communities in these northern networks.

Figure 12. Ingots and ingot molds from southwestern Asia and Egypt during the fifth through third millennium. Images adapted by author. See Table 7 for references.



Within this potential context of exchange with the north, the funerary assemblage at Nahal Qanah is important as it contains the richest metallurgical assemblage outside of Nahal Mishmar. Like Peqi`in, the cave was first inhabited during the Neolithic. The assemblage comprises several complex castings (scepter, disc macehead, circular crown), unalloyed copper wire, pendants and beads carved from copper ore (reflecting continuity with greenstone production), turquoise, and carnelian, and seven gold rings and one electrum ring (Au with 1.5-35% Ag) (Gopher and Tsuk

1996, Gopher and Tsuk 1991). It has been proposed that the gold and electrum derived from Egypt (Gopher and Tsuk 1996, 217) or Nubia (Rowan and Ilan 2014, 92). However, there is no evidence to suggest communities in the Nile Valley mastered metallurgical practices at this early date (see Chapter 5; Klemm and Klemm 2013). Indeed, the Egyptian origin of these rings was suggested on the basis of the gold reserves in the Eastern Desert and the retrojection of Old Kingdom funerary scenes depicting the weighing of circular gold ingots back more than a millennium–an unsound method to date the origin of such material. This is especially true when we consider that the earliest evidence of gold in burials within Egypt dates to the mid-fourth millennium.[41] Within this context an 18 g lump of metal with a complex composition (76% Cu, 5% Sb, 2% As, 1% Pb) was discovered within the cave, interpreted as a possible casting spill (Shugar 2000, 68). While this lump of metal does not provide evidence of primary production, it sheds light on the social significance of copper production as both finished copper objects and production refuse were viewed as important funerary offerings at Nahal Qanah, perhaps reflecting a connection to the belief system of this community (Golden 2010, 172-173).

The presence of complex castings alongside the possible presence of a Cu-As-Sb casting spill raises the possibility of gold imported from the north. Indeed, Klimscha (2013a, 97) has noted that the gold rings in the Nahal Qanah cave weigh almost 1 kg in sum, similar to those at contemporary late fifth-millennium contexts at Varna in Bulgaria, where an elite burial contained

[41] Klemm and Klemm (2013, 2) suggest placer nuggets were first worked by nomads who may have traded them with the north sometime during the fourth millennium BCE. In addition to picking up nuggets of gold, green stains would have functioned as visual indicators of gold for prospectors, who initially would have been looking for copper during the Predynastic (Klemm and Klemm 2013, 4, citing Tawab et al. 1991).

rich gold and copper objects. Not only does this seemingly provide further evidence to support the proposal that ingots may have been a standard unit of weight for local producers, but it also indicates that the southern Levant was part of a wider phenomenon of metallurgical production that spread via metalworking communities from the north. When the evidence as presented above is taken together, it lends a certain level of support to a northern origin of this practice, reflecting a highly developed system of production—one that appears to have roots that extend much further back in time.

When we combine the evidence for metallurgical production during the Chalcolithic, it appears the system was highly developed by the early fourth millennium. In his analysis of the material at Abu Matar, Golden (2010, 108-149) demonstrated that the distribution of production refuse at the site appears to reflect increasing centralization from the earliest to the last phase. In the earliest phase, production refuse appears diffuse, with ore, furnaces, crucibles and slags attested in approximately 10 different loci representing cottage level production. By the last phase however, production was concentrated to a single courtyard above ground (Locus 244) with a subterranean room (Locus 218) dedicated to crushing and preparing the ore (Golden 2010, 133). The shift from multiple subterranean spaces to one located in a public courtyard may therefore reflect the centralization of the industry by the end of the Chalcolithic as markets with the north were intensifying (Golden 2010, 135-136). While we see increasing centralization, Golden (2010, 167-170) demonstrated that the technology was shared between Beersheba producers, raising questions about the nature of control. We might end this review by asking how this highly organized, increasingly centralized system of production run by individuals with high levels of expertise and long-distance social contacts came to be and why it appeared suddenly in the Beersheba region during the late fifth millennium.

Chalcolithic Immigrants as Vehicles of Transmission?

It is unclear how communities in the Beersheba region procured their knowledge of extractive metallurgy and integrated into northern exchange networks. Given the numerous lines of evidence that the Beersheba communities had been in the landscape since the Late Neolithic, it is thus hard to accept a reconstruction wherein entire communities of potential immigrants migrated to the region with a fully developed system of production. As such, the field has remained in the dark with regard to how local individuals came to display such a high functioning knowledge of extractive metallurgy seemingly out of nowhere, especially in such a ritually charged landscape. Shugar and Gohm (2011, 141-142) have tentatvely placed Peqi`in within the earliest of their arbitrary sub-phases for the Late Chalcolithic as the site dates to ca. 4400 BCE and contained all of material markers later associated with the Beersheba settlements. These included decorated ossuary burials, lost-wax cast maceheads and standards, ivory figurines, and glazed steatite beads (Shalem et al. 2013). While the north appears to provide evidence that the hallmarks of the Beersheba system may pre-date the Beersheba settlements, it is argued that we must look even earlier—to the late sixth/early fifth millennium, when communities from the southern Levant came into contact with metalworking communities from the north. In the discussion that follows it is argued that several lines of evidence support the introduction of extractive metallurgy into the southern Levant during the late sixth to early fifth millennium, demonstrating that the context in which extractive metallurgy was first introduced to local communities should be linked to the same social processes that led to introduction of metallurgical knowledge in the Balkans, Anatolia, and Iran.

Rethinking the Introduction of Extractive Metallurgy

Evidence that the community at Tel Tsaf—where the earliest metal awl was excavated—participated in Syro-Anatolian networks during the late sixth to early fifth millennium is attested by the presence of both obsidian and four Ubaid-style sherds at the site (Garfinkel et al. 2014, 1, Streit 2017). Given my proposal that the pre-existing exchange of copper-bearing greenstone would have resulted in regions becoming known for their local resources (Chapter 3), it is argued to be potentially meaningful that raw chunks of greenstone and (un)finished greenstone beads were also produced in the same area of the site where obsidian and other imports were excavated (Garfinkel et al. 2007, 10). Such material reveals the potential that part of the community at Tel Tsaf was active in the exploitation of the copper minerals at Feinan and/or Timna, as well as active in the exchange networks of Syro-Anatolia. Indeed, the excavators argue that the woman with whom the awl was buried appears to have been connected with a wealthy local family who controlled surplus (Garfinkel et al. 2014, 4-5).

While a few imports at the site do not imply the active participation in northern networks, when we survey evidence from other sites in the southern Levant it becomes more likely that various communities were active participants in different exchange communities. At Hagoshrim in northern Israel, the presence of Halaf-style chlorite vessels, pottery vessels, stamp seals, obsidian, and sling stones attest to long-distance exchange with communities in southeastern Anatolia during the second half of the sixth millennium (Rosenberg, Getzov, and Assaf 2010, 289-

290). From Ein el-Jarba in the Jezreel Valley, a locally-made ceramic hole-mouth jar with a distinct anthropomorphic applique finds parallels in the Balkans, Anatolia and Caucasus, revealing that the producer was aware of these traditions (Streit 2015). Examining the ceramic evidence, Gabrieli (2016) has recently proposed that this period be characterized as one of different "socio-material networks" and communities of practice sharing in different forms of knowledge. It is important to pause here to address the social mechanisms required to facilitate and maintain such long-distance exchange.

While maritime exchange is a real possibility, pastoralists no doubt played a key role in connecting sedentary communities across great distances. Logistically, transhumance requires the seasonal movement of individuals and flocks and tends to take place at variable distances. As more of the landscape adopted agricultural subsistence strategies, differing conceptions of land ownership may have resulted in the need for conflict resolution as mobile groups moved throughout an increasingly sedentary landscape. Patrilocality is known to have formed one such tactic among agricultural communities and may have been employed by these pastoralists, who, as one form of many security strategies, may have married their females into sedentary villages along the route of seasonal migration. Support that such a strategy was employed in Eurasian farming communities during the Neolithic is established by recent studies on the migration of agricultural farmers from southwestern Asia into Europe (Pinhasi, Fort, and Ammerman 2005). In central Europe, strontium analysis on 300 individuals from Neolithic farming communities demonstrated lower geographic variance among males than females, suggesting the region was characterized by a patrilocal kinship system (Bentley et al. 2012). With regard to whether the migration of agricultural communities into the region was sex-based, another study similarly examined the genome-wide ancient genetic data from various Eurasian communities over the span of 10,000 years and concluded that no evidence exists to support a sex-based migration from Anatolia (Goldberg et al. 2017). Rather, the study determined that females from *local hunter gatherer groups* were integrated within farming communities at a higher rate than males from such groups. This pattern was interpreted as reflective of the greater ability by which local hunter-gatherer females would have been able to integrate into settled sites given the issue of land inheritance (Goldberg et al. 2017, 2659). These studies are important for thinking about the mechanisms by which pastoral groups participated in economic cooperation with settled communities across vast landscapes.

While no such studies have been conducted in the southern Levant, we might assume that patrilocality played a similar role in structuring community demographics. When we turn to patrilinear pastoral groups, flocks tend to be inherited and distributed among men (e.g., Lesorogol, Chowa, and Ansong 2013). We can hypothesize that females in pastoral groups—like the local hunter gatherers of Europe—had a better chance of integrating into local sedentary communities than males. As such, patrilocality may have formed a useful political tool for securing safe passage along routes of migration, for fostering exchange relationships with sedentary communities, and for securing a place to rest and stay along the route of seasonal migration. We must thus entertain the idea of women and their role in these early exchange networks, especially as it pertains to security strategy for pastoralists and settled communities alike.

With regard to how communities maintained contact with one another, it is hypothesized that increasingly specialized pastoral groups played a primary role in connecting communities in the southern Levant to the north.[42] Support for this proposal derives from fourteen carved zoomorphic pendants attested at sites spanning the southern Levant into southern Anatolia. While many of the figurines were surface finds and thus lack good context, they are dated to the 6th and 5th millennium on the basis of occupation at the sites in which they were found and parallels to other contextualized zoomorphic figurines (Garfinkel and Streit 2015). Garfinkel and Streit (2015) proposed that these spiral horned animals depict *Capra falconeri* and *Ovis aries orientalis*—the progenitors of the respective domesticated sheep and goat—and connected the significance of the figurines to the rising importance of herding for subsistence economy in pastoral groups. In order to explain the distribution of these figurines, Garfinkel and Streit (2015) raise the possibility that the trade in clay or wood zoomorphic figurines may have prompted local stone imitations.[43] Alternatively, they suggested that these pendants were worn by individuals connected with the obsidian exchange (Carter, Campeau, and Streit 2020, Garfinkel 2011, Gopher, Marder, and Barkai 2011)—the very networks by which extractive metallurgy is assumed to have spread. While pure conjecture, we might nuance the latter proposal by raising the possibility that these were worn by females connected with these exchange routes—a different type of livestock traded along the

[42] This argument was proposed by Anfinset (2010) for interregional interaction between the southern Levant and northeast Africa during the fifth and fourth millennium.

[43] The fact that the stone zoomorphic figurines were made from stones local to their place of origin speaks against the status of the stone figurines themselves as "traded" goods (Garfinkel and Streit 2015).

way. More research is needed but we must begin to think about the role of women in these networks.

When we return to the Tel Tsaf awl, the excavators' interpretation that it belonged to the mortuary assemblage of an important female is argued to be significant. The woman was buried in a silo, connected with a belief system centered on the importance of agriculture as a metaphor for regeneration (Garfinkel 2017). The interment of the first metal object attested begs investigation. Awls can function as tools in multiple industries such as leatherworking, basketry, carving, as well as employed as needles in tattooing practices (Tassie 2003, 96).[44] Given the known antimicrobial properties of copper discussed in Chapter 3, the use of an awl as a tattooing needle would have made practical sense given that the stick-and-poke method breaks the skin. The awl's inclusion specifically with a female raises the question of her role in the community. The assemblage brings to mind the fifth-millennium Nile Valley practice of burying awls with females alongside greenstone pigments to be applied to the body (Anfinset 2010). Indeed, tattooing appears to have been important for marking aspects of identity and is attested on the bodies of men and women in the Nile Valley during the late fifth millennium BCE (Friedman et al. 2018).

Support that tattooing formed an important practice during the sixth and fifth millennium in southwestern Asia is provided by the distribution of figurines from Iran to the Levant—many female—depicting bodies decorated with tattoos and/or body scarring (Joffe, Dessel, and Hallote 2001, 12-13). As in many societies today, tattooing thus appears to have played a role in rites of

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[44] Tassie (2003, 96) proposed that copper awls were used as tattooing needles during the fourth millennium in Predynastic Egypt, although more analysis is needed.

passage and/or functioned as markers of social identity for various groups. When we return to the Tel Tsaf awl, its presence in the burial of an important woman in the community—a group plugged in with the broader exchange networks with the north—is argued to be suggestive of the same processes that led to the introduction of extractive metallurgy in other regions. Its contemporaneity with the earliest extractive metallurgy in the Balkans and Iran thus demonstrates a need to rethink the context and timeline in which extractive metallurgy was introduced into the region.[45]

Mining and Smelting in the Southern Levant

Previous claims that smelting was conducted only in settlements and during the late fifth to early fourth millennium need to be revisited in light of research from both Feinan and Timna. At Feinan, distinct signatures detected in the Feinan Orefield indicate anthropogenic metal pollution was discarded onto the banks of a perennial stream during the Late Neolithic, ca. 7000 cal. BP (Grattan, Gilbertson, and Hunt 2007). This metal pollution consisted of concentrations of copper and lead in ash and charcoal layers identified as the product of heating copper minerals via manmade fires (Grattan et al. 2016, 252). In order to explain such concentrations of copper pollution, the researchers pointed to Neolithic habitation in the Wadi Feinan where lime plaster and greenstone beads were reportedly produced (Najjar et al. 1990). As such, they proposed that the concentrations of copper and lead were the product of dust from bead production making its way into the plaster kilns, potentially causing brightly colored flames to appear. They continued to hypothesize that

[45] Klimscha (2017, 111, n.24) has similarly discussed the need to rethink the timeline of metallurgical development, as well as the need to explore other forms of material culture in the absence of metal to better understand the Late Chalcolithic communities in Beersheba.

the appearance of such flames would have resulted in the desire to experiment with throwing such stones into the fire over time, for "fun, enquiry, ritual and/or spiritual reasons" (Grattan et al. 2016, 255).

The magico-ritual functions of metallurgy in small-scale, pre-industrial societies is well known (Budd and Taylor 1995). Indeed, the prioritization of understanding the technological aspects of smelting at the cost of addressing the sensorial aspects of the production process led M. Radivojevic to experiment with the color of flames when ore is thrown into the fire (Radivojevic and Rehren 2015). Using the same ores from the Balkans as did the early metalsmiths in the region, she demonstrated that the addition of green- and black-colored ores results in a bright green-colored flame—argued to have played a role in the discovery of smelting (Radivojevic and Rehren 2015). For the Feinan evidence, Grattan et al. (2016, 255) claim that it is "rather unlikely and at the moment highly untenable" that crucible smelting—which results in little to no slag—may have contributed to such high yet sporadic concentrations of copper in ash and charcoal, although they acknowledge the possibility. While it is possible that copper minerals from the region were used as pigment in the manufacture of lime plaster beads during the PPNB (Goren, Segal, and Bar Yosef 1993), it is also equally likely that this may have been the result of prospecting efforts with the color of the flame providing an important visual indicator of the ore's utility. Additional evidence from the region suggests smelting may have been a possible explanation.

The Wadi Feinan Landscape project has similarly demonstrated evidence for the anthropogenic heating of copper ore. From a 1.5 ha site in the Wadi Feinan, geochemical analysis of the soil revealed a concentration of copper and lead-rich sediments interpreted as the deliberate heating of metal rich ores onsite (Baker and Mattingly 2008, 103, with reference to Levy et al.

2001, 10). These sediments were accumulated around a stone wall dated to the mid-to-late fifth millennium (ca. 4600–4450 cal. BCE and 4240-3990 cal. BCE) and also included pieces of slag, reportedly indicative of on-site smelting (Baker and Mattingly 2008). When viewed together, this data appears to indicate that smelting not only occurred at the site of the mines in settlements, but also that it may extend back much earlier than previously thought.

South of Feinan, copper ores at Timna were similarly exploited by individuals who possessed metalworking knowledge during the fifth millennium. Rothenberg had originally argued that a natural draft furnace at Site 39b should be dated to the Late Neolithic/fifth millennium (Rothenberg 1999, Rothenberg and Merkel 1995). However, the early dating of the furnace was rejected by several scholars given such a date would render the it more than a millennium earlier than any other known furnace of this type in the region.[46] While such a dating of the actual *furnace* remains doubtful,[47] analysis of the slag from *near* Site 39b's furnace have produced a date supporting on-site smelting during the fifth millennium, ca. 4200 +/- 250 BCE (Ben-Yosef et al. 2008, Table 1). Pit furnaces would have been used during the Chalcolithic and thus the presence

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[46] For a complete discussion on the issues surrounding a Chalcolithic dating of this furnace, see Ben-Yosef et al. (2008, 2875). This debate centers on the dating of a clay-lined pit furnace measuring 30-40 cm in diameter and 40 cm deep that was encased in a stone superstructure approximately 40 cm high surrounded by slag and pieces of crucibles (Ben-Yosef et al. 2008, 2874), citing (Rothenberg 1978). Rothenberg dated the furnace to the Late Neolithic/Chalcolithic on the basis of the ceramic and flint assemblage in the domestic settlement at the base of the hill (Site 39a). He then used the furnace and production assemblage to date a number of sites in the region, many of which have since been re-dated to late periods (e.g., Site F2 is now known to be Late Bronze Age in date (Ben-Yosef, Tauxe, and Levy 2010). Such an early date was met with resistance given the construction of the furnace, which was wind-powered and reflected a much more developed stage of local smelting technology (Avner 2002, Hauptmann 2007, Thornton et al. 2010).

[47] This proposal is on the basis of a radiocarbon date from within the furnace wall, which revealed a date within the eighth century BCE during the Iron Age (Burleigh and Hewson 1979, 349). Ben-Yosef et al. (2008, 2874-2875) detected three separate phases of production according to their analysis of the slag, suggesting the space was reused by different groups over a long period of time.

of slag at Timna Site 39b suggests a secondary mode of production outside of the Beersheba region (Ben-Yosef et al. 2008, 2874-2875). The construction of a sanctuary on the summit of Ras Gebel Khalid near the copper mines (Weisgerber 2006, 5) suggests an early cultic association between mining, hilltops, and copper production, seemingly calling to mind the cultic sites that appear first during the PPNB and continue into the Chalcolithic/EB I. This data reveals the exploitation of the mines at Timna is relatively contemporary with that of Feinan, raising the question of the diversity of procurement strategies during this early period.

The contemporary exploitation of Feinan and Timna is important as each region appears to have been exploited via different techniques, potentially indicating distinct technological horizons. As noted in the previous section, Feinan mines take the shape of adits and scoops carved horizontally into the side of a hill.[48] Conversely, shaft-and-gallery mining is attested at Timna during the Chalcolithic (Shaw and Drenka 2018).[49] In terms of technology, shafts were carved a few meters into the ground and oval rooms carved out of the bedrock (Shaw and Drenka 2018). Such a technique is attested in the Beersheba settlements, where subterranean spaces employed the same production methods used at Timna, where copper (s)melting took place in these underground units (Figure 6:1-2 vs. 3-4). How do we explain the fact that the Beersheba

48 See Hauptmann 2000, 97, 2007, 145-146; Hauptmann and Weisberger 1987, 424; Hauptmann 1989a&b, cited in (Baker and Mattingly 2008, 103)

49 A Chalcolithic date for Mine T at Timna was originally proposed on the basis of a bowl, flint tool, and bi-conical hammer, representing the earliest example of this technique in the region (Rothenberg 1999, 79, Conrad and Rothenberg 1980, Abb. 195–196). Such an early date was challenged by Avner (2002, 141), who suggested Mine T dated to EB I date on the basis of evidence from the surrounding area. However, recent excavation of the mines near Mine T has supported a date in the Chalcolithic (Shaw and Drenka 2018). While the original mine excavated by Rothenberg could not be detected, several Chalcolithic-period mines were excavated, re-carved in the New Kingdom.

settlements employed the same mining technology at Timna but appear to have only exploited the mines at Feinan?

Recent research on the ores at Wadi Amram, approximately 20 km south of Timna, demonstrates the isotopic signature is similar to that from the MBS at Feinan. Moreover, shaft-and-gallery mining is attested during the Chalcolithic/EB I at Amram, creating a connection to the Beersheba subterranean structures. While Ben-Yosef et al. (2008, 2875) proposed that more than one mode of production was present in the region by the Late Chalcolithic,[50] it is possible it was exploited by the same community. More analysis needed, but the possibility is there. Indeed, this distribution pattern raises questions with regard to interaction between local communities, control, and the sources in which ore was exploited. The recent data presented above advocates for a model wherein the introduction of extractive metallurgy may be pushed back to at least the early fifth millennium, closing the gap between the first appearance of the Tel Tsaf awl and the concentration of heated copper ore in the Feinan. Additional support for a migration of metalworking communities into the southern Levant during the late sixth to early fifth millennium may lie in the appearance of the one object so often claimed as reflective of the pre-metallic age: cornets.

Re-casting the Role of Cornets in Early Metalworking Communities

Cornets are argued here to be a key artifact of metallurgical industry that have been hiding production in plain sight. While cornets appear in domestic and subterranean burial assemblages, the high concentration of cornets found in regional mortuary centers at Teleilat Ghassul, Gilat

[50] At Timna Site N3 (Segal et al. 1998) and Site 250b (Rothenberg and Shaw 1990ab) may also date to the Chalcolithic (Ben-Yosef et al. 2008, 2874-2875).

(Commenge 2006, 417), and En Gedi (Ussishkin 1980, 19) has resulted in the widespread acceptance that they were used in ritual. Most recently cornets were connected to ritual praxis specifically involving primary burials (Ilan and Rowan 2015). Their depiction on the back of the well-known ceramic ram figurine from within the sanctuary at Gilat (Figure 18:2) has resulted in a number of interpretations with regard to their function, including: use in milk rituals (Oren and Gilead 1981, 42), as drinking vessels (Kerner 2015, 131), as symbols of male virility tied to fertility rites (Amzallag 2016a), as well as in mortuary ritual connected with primary burials (Ilan and Rowan 2015, 182).

Only in the last decade has their role in connection to metallurgical production been proposed. Namdar et al. (2009) conducted residue analysis on cornets, fenestrated pedestal bowls, and hole mouth jars from six different Chalcolithic contexts at En Gedi, Moringa Cave, Grar, Horvat Qarqar South, and Nahal Qomem. Their results revealed the cornets contained biomarkers consistent with beeswax that had been heated to over 400ºC in the ceramic cornets (Namdar et al. 2009, 632-634). While the authors acknowledged the connection between beeswax and lost-wax casting—proposing such a connection be further investigated—they favored an interpretation wherein these vessels were used as molds to make beeswax candles. Such an interpretation derived from the low heating temperature of beeswax, invoked to explain the lack of soot on the rims (Namdar et al. 2009, 635). Similar interpretations have been made for their use as a torch (Seaton 2008, 43). Amzallag (2016a, 203, n.1) has rightfully questioned these proposals given the association of this form on the back of the ram figurine found alongside the well-known Lady of Gilat figurine, both believed to be used in connection with fertility rites (Figure 18:2-3; Amiran 1989, Joffe, Dessel, and Hallote 2001). He did not address the role of beeswax, however. Indeed, the appearance of cornets during the later phase of the Chalcolithic at Abu Matar and Giv`at ha-Oranim—sites connected with extractive metallurgical production (Shugar 2000, 60)—therefore weakens previous claims that cornets were associated with a non-metalworking cultic system or social practice (e.g., Golden 2010).

When we consider the role of wax in metallurgical production, it is proposed here that cornets were first introduced by metal-working communities in the north during the Late Neolithic. Beeswax derives from the honeybee (*apis merifella*) and is known to have been used by Neolithic agricultural communities as early as the seventh millennium in Anatolia (Roffet-Salque 2015). Roffet-Salque (2015) conducted analysis on over 6400 ceramic vessels across much of Eurasia and northeast Africa in order to test whether a correlation exists between the use of beeswax and the spread of farming communities from Anatolia. In the Levant, 380 ceramic vessels were tested—none of which produced evidence of beeswax (Roffet-Salque 2015, 228). However, this appears to have been a sampling error as cooking pots and globular bowls were predominantly selected for in their analysis. As previously stated, we now know that the cornets from En Gedi contained beeswax (Namdar et al. 2009). Of relevance here is evidence for aged beeswax mixed with animal lipids at Cayönü Tepesi (Roffet-Salque and al. 2015, 228), the site in southeastern Anatolia with the oldest native copper bead is attested (Maddin, Stech, and Muhly 1991, Özdoğan and Özdoğan 1999). The beeswax-animal lipid combination at Cayönü Tepesi establishes a connection between the exploitation of beeswax and early metal-consuming communities. While I am not suggesting lost-wax casting was developed and in use at Cayönü Tepesi, it is suggested that the technique was developed within agricultural metalworking communities who exploited the honeybee for its wax.

Of interest here is that the researchers identified the Balkan Peninsula as the region where early farmers most exploited the honeybee for its wax, with 5.5% of all sherds testing positive for beeswax (Roffet-Salque 2015). This location is significant as it should be recalled that the earliest evidence of smelting is found in this region and dates to the late sixth millennium BCE (Radivojevic and Rehren 2015). Further support for the development of lost-wax casting in the Balkans is confirmed by the well-known elite graves at Varna in the Balkan peninsula, where the earliest lost-wax cast gold objects are attested during the mid-fifth millennium (Leusch et al. 2015). It is thus noteworthy that the Varna material is contemporary with the first appearance of lost-wax cast standards at Peqi`in in the Upper Galilee (Shalem, Gal, and Smithline 2013). Klimscha (2013a, 2018) has discussed the contemporaneity of these developments, arguing they should be viewed as part of the same social processes given the shared symbols of power are attested alongside this new technology (i.e., the macehead and axe). Note that he does not include a discussion on Peqi`in specifically but views the Beersheba settlements as integrated into external networks to the north.

With regard to the significance of beeswax, Martinón-Torres and Uribe-Villegas (2015) have argued for the symbolic role of wax in south American casting, raising questions about the potential cultic association of the bee, wax, and lost-wax casting.[51] While cornets are typically discussed as a cultic hallmark of the Chalcolithic, it becomes significant that these long conical ceramic containers *first* appear in the Late Neolithic levels at Wadi Rabah (level 2) and Ein el-Jarba (Golden 2010, 11 with references)—two sites with evidence of local knowledge of northern ceramic traditions and several new practices pointing to a migration of individuals from the north.

[51] See Chapter 7 for a discussion on the bee as a symbol of power in dynastic Egypt.

Indeed, many elements from the Late Chalcolithic communities can be traced to the Wadi Rabah horizon (Klimscha 2017, 111, n. 24, with reference to Garfinkel 1993). Cornets then continue into the early Chalcolithic at Teleilat Ghassul Phase G where they appear alongside Neolithic ceramic forms (Golden 2010, 74-75, with references) and are used until the site is abandoned ca. 3800 BCE (Bourke et al. 2004). Evidence for a late sixth-millennium migration of agricultural communities out of Anatolia and into the southern Levant is therefore supported by the cornet and what it contained. Specifically, the exploitation of beeswax is connected to migrations out of Anatolia. Beeswax was used within metalworking circles, and is attested locally in the form of cornets, which first appear in contexts contemporary with the Tel Tsaf awl. When we look to the Galilee, further evidence of a migration from Anatolia and/or Iran supports this hypothesis.

When we examine the cave at Peqi`in (Figure 5), the northernmost site containing lost-wax cast copper dated to the mid-to-late fifth millennium (Shalem, Gal, and Smithline 2013), several lines of evidence support a model for the integration of individuals from the more established metalworking regions to the north at some point prior to mid-fifth millennium. Evidence that some of the individuals from Peqi`in may have been immigrants or descendants from immigrants is suggested by recent aDNA analysis of 22 individuals found buried within the cave. The study revealed 27% of the individuals tested trace their ancestry to Anatolia during the Neolithic, 57% were found to be of local Levantine origin during the Neolithic, and 17% find roots in Chalcolithic Iran (Harney et al. 2018). While the results alone do not suggest that the specific individuals tested were themselves immigrants at the time of their burial, the presence of individuals in a burial cave that was clearly reserved for local elites (Shalem, Gal, and Smithline 2013) demonstrates the integration of the previous migrants into local communities, no doubt reproducing with local partners.

Within the cave several characteristics of the assemblage point toward connections both with the Beersheba settlements and other Chalcolithic regions. These parallels include the presence of secondary burials in ossuaries, two copper chisels, two lost-wax cast standards, glazed steatite beads, a carved ivory figurine, and a metal object described as "flower-shaped," providing the northernmost extension of copper in the region (Shugar and Gohm 2011, 135, with reference to Gal et *al*. 1997, 15, 1997, 23). In addition to similarities with the Beersheba communities, elements from all of the Chalcolithic regions are actually attested in the cave, leading to the proposal that the cave reflected a previously unidentified element in Chalcolithic communities (Gal, Shalem, and Smithline 2011). Radiocarbon dates place the earliest use of the cave in the late sixth to early fifth millennium with occupation continuing to the end of the fifth millennium (Shalem et al. 2013, Table 17.4). Analysis of the two lost-wax-cast scepters revealed they were both made of unalloyed copper consistent with ores from the Feinan whereas a chisel appears to have been cast from scrap metal consisting of copper with high amounts of antimony (Segal and Goren unpublished). The use of local Feinan copper at Peqi`in in the earlier phase of the site for both utilitarian and complex castings was considered "anomalous" by Shugar and Gohm (2011, 141). In Anatolia the exploitation of polymetallic ores and the co-smelting of sulfides and carbonates at high temperatures (1100-1200^{o}C) is reported to have occurred ca. 4300-3800 BCE (Yener 2000, 13, 28), contemporary with the Beersheba settlements and Hacinebi evidence, reinforcing the integrated nature of these settlements with metal-working communities in the north.

Evidence that the spread of extractive metallurgy was part of a package of related technologies is supported when we look to the attestation of lost-wax casting and pyro-technology applied to stone. During the fifth millennium, lost-wax casting is attested in regions as far as Bulgaria and Pakistan during the fifth millennium, supporting a connection to the original movements of metalworking communities across Eurasia during the late sixth/early fifth millennium. While the Varna evidence has already been discussed in this chapter, additionally at the site of Mehrgarh in Balchistan in Pakistan is a lost-wax cast copper amulet depicting a six-spoked wheel that was excavated from a fifth-millennium context (Thoury et al. 2016, Mille 2006, Mille, Besenval, and Bourgarit 2004).[52] Noteworthy is that the Mehrgarh amulet is believed to have been cast using a "very pure copper" on the basis of its trace elements (Thoury et al. 2016). The attestation of the lost-wax technique at Varna, Mehrgarh, and Peqi`in in contemporary contexts suggests that this technology was part of the same technological package connected with the initial movement of metal working individuals during the sixth millennium. Such support can be connected to the spread of beeswax in agricultural communities out of Anatolia and the physical manifestation of the cornets in the southern Levant, adding nuance to the aDNA evidence at Peqi`in (Harney et al. 2018).

In addition to such metal-related knowledge, we can also connect new applications of pyro-technology to these communities, reflecting the importance of metal on other industries. Within the complex assemblage at Peqi`in, 190 glazed steatite beads from one of the ossuaries in the cave

[52] The location of this site on a known route where metal was traded with the Indus Valley and on to southern Mesopotamia and into Syria is important when thinking about the social landscapes through which individuals would have passed.

were produced from modeled steatite heated to a temperature exceeding 900°C (Bar-Yosef Mayer et al. 2004). The authors of the study proposed that such knowledge of glazing was part of an "experimental package" connected to metallurgical production and cited contemporary parallels in Egypt as well as Mehrgarh, proposing both as possible sources of this "trade" (Bar-Yosef Mayer et al. 2004, 499-500). As will be discussed in Chapter 5, the Egyptian parallels cited do not actually reflect the same techniques employed in the Peqi`in cave (Horn 2015). As such, the contemporary parallels for this technique at Mehrgarh locates it within the same metal-working communities responsible for the diffusion of extractive metallurgy during the late sixth and early fifth millennium. In their analysis of the genetic makeup of the community at Peqi`in, Harney et al. (2018) argued that such a migration may explain the seemingly new technological package that appears in the Chalcolithic southern Levant (e.g., ossuary burials, metal working, the tournette, churns, painted pottery). However, it should be noted that many of these practices are first attested during the Late Neolithic and appear connected to both the Halaf and Ubaid networks. It is within this context that a recent proposal put forth by Klimscha (2013a) deserves attention.

When we look to the social landscape of western Asia and eastern Europe, it is during the early to mid-fifth millennium that extractive metallurgy appears alongside the advent of new elite identities as part of a wider phenomenon connecting Iran with Europe, laying the foundation of the social networks that would lead to both the so-called Uruk exxchange network (Algaze 1993). The birth of the metals trade during the first half of the fifth millennium led Klimscha (2013a) to propose that the introduction of extractive metallurgy into the southern Levant be viewed as part of this larger phenomenon, a proposal that was made on the basis of the similarity in finished objects—namely maceheads and axes. Emphasizing that participation in such a system requires having the “right” kind of objects for such exchange, he states:

> “It is often the social and not the functional advantage that favors the spread of new technologies and innovations…Consequently, *the analysis of the social embedding of exchange networks* has to be elaborated on to better understand the diffusion of new technologies like copper metallurgy” (Klimscha 2012, 179, emphasis added).

Participation in external exchange networks thus requires a high level of collaboration and social integration between individuals, often resulting in a shared repertoire of symbols to mark participation in the community and typically born out of the very social interactions required to facilitate sustained interaction (Wenger 1998). Within a CoP framework, the centrality of copper tools and maceheads in all of these early assemblages is therefore significant and implies formalized markers of exclusionary group practices in a burgeoning landscape of various communities whose shared endeavor centered on the procurement and production of metal.

Such material similarities link individuals in each community into a larger constellation of practices mediated at both the local and interregional level. Within this context, economic cooperation at the local level is supported by the typological parallels between lost-wax-cast scepter at Peqi`in (Shalem et al. 2013, figure 9.3:6) and Neve Noy in the Beersheba basin (Eldar and Baumgarten 1985, 135). The integration of the Neve Noy community at the interregional level is also supported by the presence of a double spiral made from copper that has parallels from as far away as the contemporary Stollhof hoard in Austria (Figure 10:20 and 21). Additionally, another indicator of northern interaction may be the mention of a horseshoe-shaped installation found in connection with copper awls and sheet among the production refuse (Eldar and

Baumgarten 1985, 138). These installations are typical of Anatolia and later known from the Transcaucasian migration during the EB III (e.g., Ishoev and Greenberg 2019). While an earlier migration of individuals is argued to have been responsible for the introduction of a suite of metal-related knowledge and practices, such similarities during the Late Chalcolithic reflect the maintenance of contact *by producers* with communities in the north. When we consider the aDNA evidence from Peqi`in, one of the ways economic participation between communities may have occurred is through intermarriage between local and non-local individuals. Given that these heating installations tend to be connected with food production (Ishoev and Greenberg 2019), we might suggest patrilocality formed an economic strategy for sustained cooperation.

Let us return to the question: how do we explain the sudden appearance of a highly developed, efficiently organized system of production whose local agents were experts in extractive metallurgy in Beersheba during the late fifth millennium? The simple answer is to situate the Beersheba settlement within a pre-existing system dating back to the late sixth/early fifth millennium. When the evidence for a migration is considered, Golden's (2010, 75) claim that copper was first introduced at a time when cornets were disappearing needs to be revisited. We now know copper first appears in the region at Tel Tsaf (Garfinkel et al. 2014), around the same time as the introduction of these enigmatic cult vessels at Wadi Rabah (level 2), Ein el-Jarba (Golden 2010, 74-75), and the evidence of extractive metallurgy in Iran, Anatolia and the Balkans. At Feinan, metallurgical pollution created by repeated human application of pyro-technology to copper ores is attested in the lithofacies as early as 7000 cal. BP (Grattan et al. 2007, 2016). Moreover, the earliest lost-wax castings also appear in the north in a cave at Peqi`in alongside secondary burials in ossuaries and other characteristics that would become hallmarks of

Chalcolithic society (Gal, Shalem, and Smithline 2011). By the time of the Beersheba settlements, these once-foreign individuals would have become highly integrated into the social landscape of the southern Levant, leading to the continuity so often invoked with the Late Neolithic—but also maintained direct and indirect contact with communities in the north, reflecting high levels of mobility. It is also possible that the continued intermarrying between communities continued uninterrupted as a strategy. As such, the Late Chalcolithic should be viewed as a period of increasing social complexity tied to the rise of community cult, which formed a local node in a wider interconnected system with the north dating back to at least the PPNB. We may thus interpret the Beersheba production system as the intensification of a pre-existing system of production, perhaps part of the increasing centralization of control over the industry *by* producers.[53] In order to nuance our understanding of the intensification of metallurgical production, we must seek to contextualize it against the sociocultural backdrop of the Late Chalcolithic. Let us turn to examine the nature of economic cooperation between communities and the processes of ritualization that accommodated such changes.

Mortuary Shrines, Metalworking Ritualists and the Intensification of Economic Cooperation

The intensification of metallurgical production raises questions with regard to its role in the rise of social complexity and rank during the Late Chalcolithic. The proposed intensification that we

[53] The intensification of copper mining during the later phase of the Chalcolithic and into the Early Bronze Age is attested by the exploitation of roughly 100 mines in the region of Wadi al Abiad, Wadi Ratiye and Qalb Ratiye in the Feinan mining district (Weisgerber 2006, 5). It is from these mines that three different types of ore were collected and brought back to settlements in the Nahal Beersheba (Shugar 2018), reflecting experimentation with different sources of ore ranging in both copper content and composition, which is what would be expected within the context of an increased scale of production.

see in the Beersheba region took place at a time when Late Chalcolithic communities were experiencing great change, characterized by a population increase, intensified agricultural production, and changing demographics that appear to correlate with the appearance of new cultic motifs, new mortuary practices connected with formalized extramural cemeteries and secondary burial, the rise of public sanctuaries, and a new, homologous system of belief shared across regionally-distinct assemblages (Shalem 2017). The result was a shift from domestic to community cult and the rise of central mortuary shrines and cemeteries. In what follows, I will argue that these changes should be viewed as the ritualizing of behavior tied to the intensified production of copper that resulted in the entire process of production coming to form a life-cycle metaphor. I also argue that the emergence of community-sanctioned ritualists formed the managerial leaders of this system as well as the shrines at Gilat, Teleilat Ghassul, and En Gedi.

Late Chalcolithic Social Complexity

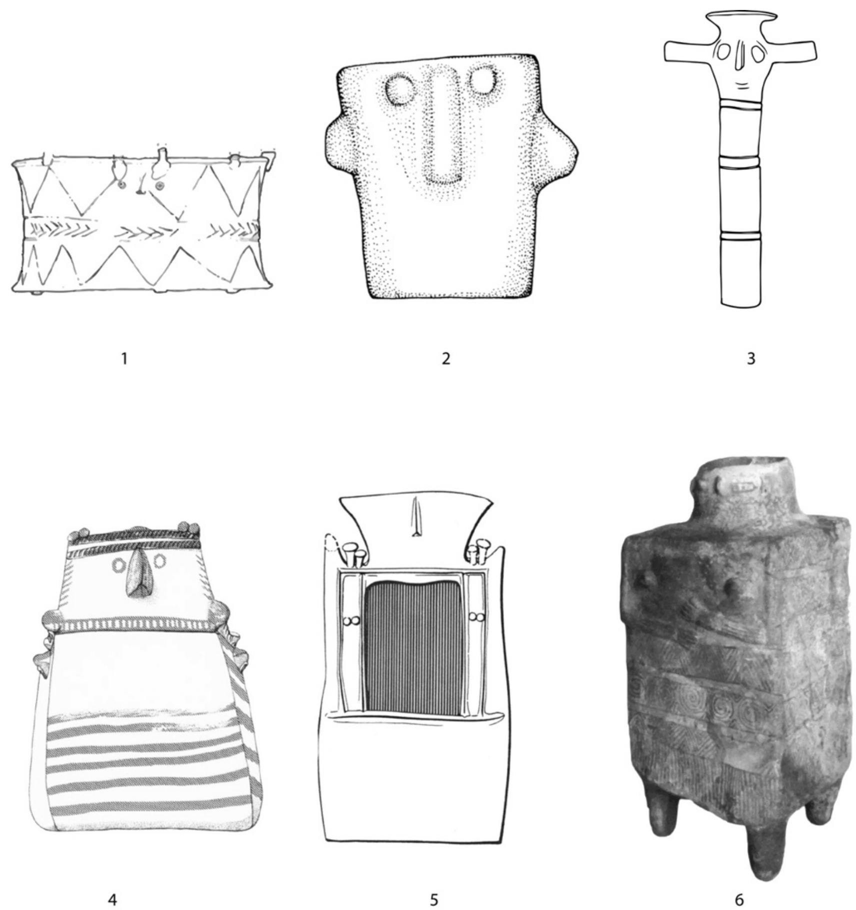
In order to try to explain this correlation between new forms of social complexity and the system of metal production in the Beersheba region, Levy (1986, 1995) characterized the lower Jordan Valley and northern Negev settlements as a chiefdom-level society made up of both an agropastoral and specialized transhumant population. This model of complexity was constructed on the basis of developments previously unattested during the Late Neolithic, specifically: a two-tier settlement hierarchy, specialized pastoralism, craft specialization (e.g., ceramic, flint, stone, ivory and metal), formal cemeteries, central farming sites, and the rise of the cultic sanctuaries, which he interpreted as temples, reflecting ranking between individuals and/or groups (Levy 1986). According to this proposal, the population influx characteristic of the Chalcolithic resulted in new social pressures that led to resource scarcity and tensions over grazing and farming rights. In turn, a sense of territoriality crystallized, as did the need for conflict resolution, leading Levy to interpret the high quantity of maceheads and subterranean structures in the Beersheba drainage as reflective of different defense strategies (Levy 1986, 1995, 240). Accordingly, such tensions led to the rise of an elite group that oversaw land rights and the prevention of overgrazing as a form of risk management through the institutionalization of the temple and priests who served as the head in society (Levy 1986, 83, 87, 1995, 238-241). Levy (1995, 239-241) therefore asserts that in the Beersheba region, a small group of elites controlled the metallurgical industry to produce objects of ritual prestige, which were then exchanged with individuals within the community to create a sense of gift debt, institutionalizing social difference and inequality. This model was accepted by Golden (2010, 186-190), who sought to further nuance the potential rise of a Beersheba chiefdom through the lens of control over grazing rights, born out of pastoral origins of these communities.

Several scholars have rejected the chiefdom model given the low levels of social differentiation outside of the Beersheba region (Gilead 1988, 2011; Bourke 2001; Joffe 2003, 46) as well as the resource *abundance* of the period, negating claims of risk management (Rowan and Ilan 2007, 249). Within this context, Rowan and Ilan (2007) favor a model for power wherein community ceremonies performed by ritual specialists may formed a locus of power. In order to mitigate risk, Joffe (2003, 56) argued that corporate groups pooled resources across (vs. within) sites to invest in mortuary rites of passage. Little evidence suggests belief in the afterlife, as no provisions are to be found in most Chalcolithic graves (Joffe 2003, 48). As such, Joffe (2003, 50) proposed that the burial site was not a place for competitive display given "the simplicity and sparseness" of most funerary assembles, which he interpreted as reflective of an unwillingness to remove wealth from circulation.

Within the model proposed by Rowan and Ilan (2007), the funerary grounds *could* form a locus of power. Pushing back against Earle (1997, 154), who claimed the transitory nature of public ceremonies was not a resilient enough locus to institutionalize power given their fleeting nature, Rowan and Ilan (2007, 249-250) argue that when capital investment is *combined with ritual* it actually can prove to be a legitimate path toward power differentiation. Given the always prevalent nature of death, the funerary landscape was thus transformed into a politically charged space, resulting in the construction of regional cult sanctuaries potentially as mortuary shrines and in turn allowing for the crystallization and reification of individuals in charge of these spaces (Rowan and Ilan 2007, 249-250; Rowan and Golden 2009, 61-62, see references throughout; Ilan and Rowan 2015). Evidence in support of this model is found in the burial record, when we see an investment in the development of formalized extramural cemeteries (Shalem 2017), possibly reflecting new territorial identities. The diversity in burial practices is attested in the continued placement of infant jar burials below domestic floor spaces, pit burials of adults, grave circles, cist tombs, tumuli and potentially dolmens, subterranean burial in natural and artificial caves, and charnel houses (Joffe 2003, 48).

Despite the regionality expressed in burial practices, however, the ideological belief system appears quite homogenous throughout the southern Levant. Ilan and Rowan (2012, 89) have classified the spiritual life of the Chalcolithic as "a life-cycle religion with extensive, almost ever present, ritual reference to death and the regeneration of life." Support for a unifying belief system is reflected in the development of a shared cultic iconography penetrating community boundaries, manifest in the large eyes and noses that appear on ivory figurines, basalt cult stands, and various copper objects (Figure 13; Rowan 2014, 234). Such a shared cultic iconography implies high levels of integration between communities around ritualized practices—perhaps through participation in public ceremonial rites.

Figure 13. Shared cultic iconography as expressed in prominent nose and eyes motif. Nos. 1-5 from southern Levant, no. 6 from Toptepe. See Table 8 for references. Images 1-5 adapted by author.



Secondary Burial, Community Cohesion, and Changing Beliefs

To explain these changes in belief and mortuary practice, Shalem (2017, 161) linked them to increasing social complexity combined with a new peak in the dependence on materials as a result of cooperation between communities and the regionalized economic intensification of production. Drawing on the work of Alexander (2006, 32), who argues that "a society with increasing complexity of social performances must engage in a project of re-fusion," Shalem (2017, 162) proposed that such efforts manifested in the shift to secondary burial in extramural cemeteries. The population increase felt throughout the southern Levant during the mid-to-late fifth millennium resulted in a new need to reify community identity and cohesion, resulting in new forms of social complexity. As a seasonal event, secondary burial served to strengthen ties between communities and their ancestors. Within this framework, she discusses how liminal phases allow elites to consolidate their power (Shalem 2017). Such events create community cohesion and allow for social memory of dependents and ancestor alike to foster an in-group identity. Citing the work of Keswani's (2004,11) study on secondary burial on Cyprus, Shalem (2017, 162) discusses how secondary burial rites result in "overall increases in the level of mortuary investment and consumption." Drawing on Drabsch's (2015) conclusions about ritual at Teleilat Ghassul, Shalem (2017, 162) characterized Late Chalcolithic rituals as more "complex, formalized, ranked, and powerful."

Despite the variety in mortuary practices, that individuals appear united in their belief system is supported by the shared cultic iconography that appears on these ossuaries and in other domestic assemblages across the southern Levant. This shared cult practices attests to cooperation among households in daily practice (e.g., Lovell 2010). These ceramic receptacles were often decorated with colored pigments, took a variety of forms including architectural, anthropomorphic, and zoomorphic shapes (Golden 2010, 196; Shalem, Gal, and Smithline 2013). The nature of their shapes, however, remains debated, with some scholars proposing the ossuaries reflected grain silos, animal pens, and temple architecture (see Ilan and Rowan 2019, 253-255, with references). Indeed, ossuaries begin to have many zoomorphic features, connected with new cosmological beliefs. In addition to zoomorphic motifs, many of the vessels appear connected to women and fertility. Shalem (2017, 163) proposed that the appearance of the same motifs on ossuaries as on domestic material is reflective of a strategy that bonded secondary burial to everyday life. The motifs that appeared on ossuaries can be traced back in their various forms to the Neolithic as part of a pan-regional landscape of cultic symbols across Western Asia (Shalem 2015, 221-224; 2017). However, these motifs appear from the Galilee to the Negev, across mediums and regionalized traditions of craft specialization in both burial and domestic contexts, reflecting changes in belief that were shared across the region despite different forms of burial (Shalem 2017, 150). Drawing on Durkheim, Shalem (2017, 163) discusses how people will only shift their burial practices and use new symbols if their cosmological beliefs similarly alter. The implication is that the widespread adoption of a cultic vocabulary of symbols was the product of a conscious choice made by communities. Like many scholars, she connected the belief to agriculture and fertility based on some of the icons on the ossuaries, arguing for a link to regeneration.

While the general belief is that secondary ossuary burials were connected to regeneration, Ilan and Rowan (2019, 255-264) have made a compelling case that these ossuaries may reflect a unique belief system tied to Chalcolithic cult: reincarnation of the individual within *this* life.

Building from the universal connection between clay and creation, Ilan and Rowan (2019, 264) proposed that the materiality of these ossuaries represented the corporeal aspects of the soon-to-be incarnate.[54] What was depicted on the outside served as a physical manifestation of what was on the inside. They argue this replaced the Neolithic "ancestor" statues formed from plaster, the actual skull of the deceased, and branches.[55] Of relevance here is their proposal that the zoomorphic elements incorporated into the design of many ossuaries might reflect the belief that individuals could be reborn with zoomorphic qualities (Ilan and Rowan 2019, 262), which is an ideology that we only see attested in later Nile Valley beliefs about the status of the king.

Support for such a claim is found in various spheres of ritual praxis, which reflect this interplay between anthropoids and zoomorphic creatures. One of the most popular motifs to appear during the Late Chalcolithic is the human-bird motif, which comprised two eyes and a prominent nose stylistically similar to that of a raptor (Figure 13). We might connect this motif to the newfound importance of secondary burials, which require the excarnation of the body and thus the birds of prey may have played an important role in the process of funerary regeneration (Fox 1995, 221). Evidence of this ideology is attested at Teleilat Ghassul, where a funerary fresco depicts ritualists who wore wear masks, brightly colored robes, and what appear to be horns (Drasch and Bourke 2014, fig. 5). Cameron (1981, 13) proposed that the masks were meant to invoke vultures

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[54] The red painted lines on the Gilat Lady and Ram with Cornets figurines from Gilat have been similarly interpreted as represented channels of blood by Amzallag (2016, 193-196).

[55] Ilan and Rowan (2019) cite Amiran (1962), who was the first to argue that such a rebirth ideology may extend back into the Neolithic, wherein ancestor statues appear to reflect a broader creation mythos. Importantly, we can connect the regenerative properties of copper-bearing greenstones with such status at Ain Ghazal and Jericho, establishing a connection between regeneration and the exploitation of the stone during the PPNB.

and the horns may have been vulture features, creating a symbolic connection between the ritual practitioners *as* birds of prey, playing a critical role in facilitating mortuary rites of passage (cited in Fox 1995, 221).[56] Additional evidence of human-animal interaction is seemingly attested at Gilat, where the well-known Lady of Gilat and Ram with Cornets on its back are often interpreted within the context of fertility rites, establishing a sexual union between female and ram.

By drawing on the literature linking secondary burial rites to systems of power legitimized by ancestral authority, Shalem (2017, 163) proposed that the abrupt changes that took place during the Late Chalcolithic were directed by the "leading authorities." She cites a similar interpretation made by Seaton (2008) regarding the rise of the cult center at Teleilat Ghassul, who argued that it was an installation initiated by ritual specialists (cited in Shalem 2017, 163). As will be argued below, these ritualists were metalsmiths and these shifts in belief occur at a time of intensified metallurgical production and economic cooperation between communities in the southern Levant, Nile Valley, and Anatolia. That death came to play a new role in life is suggested by the investment of both labor and capital into the construction of central places to carry out funerary rites of passage, raising the question: what role did mortuary centers play in the shift from domestic to community

[56] The cognitive associations between clay, regeneration, and embodiment of zoomorphic elements draw direct connection to elite communities in the Nile Valley. Such an ideology places emphasis on animism and totems in later elite religious ideology, wherein the king was reborn into the this life as Horus, bird of prey. It is argued that the Late Chalcolithic system of belief surrounding metallurgical production played a key role in shaping Nile Valley elite identities later connected with the state. The rise of this identity was thus the product of economic cooperation with metalworking communities in the southern Levant. See discussion in Chapter 5.

cult?[57] And even more specifically, what role did metal play in the rise of these public mortuary sanctuaries?

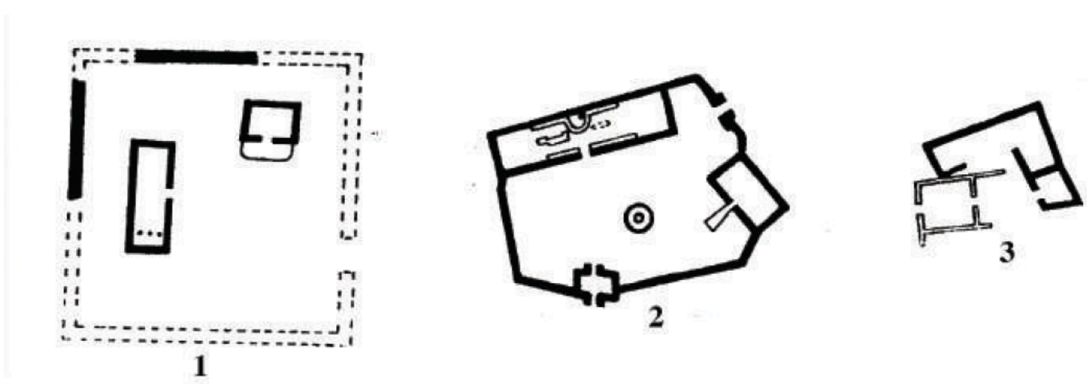
Mortuary Shrines and the Emergence of Rank

Control over mortuary ritual and other public rites of passage is attested by the appearance of public cult buildings at Teleilat Ghassul (Seaton 2008), En Gedi (Ussishkin 1971, 1980), and Gilat (Alon and Levy 1989, Levy 2006). It is believed that these buildings functioned as important central places for certain communities, staffed by ritual specialists in charge of performing various ceremonies including funerary rites of passage (e.g., Levy 2006; Rowan and Ilan 2007; Gošić 2016). Notably, such formal structures are not reflective of communities north of the lower Jordan Valley, suggesting the landscape may have played a greater role in institutionalizing social difference in the south—the region economically connected with mining and metallurgical production. The cult centers of the Chalcolithic share a number of architectural and spatial characteristics with one another, suggesting cooperation and collaboration between sites and the establishment of community. Indeed, Lovell (2010, 109-110) investigated the domestic assemblages from Grar, Abu Matar, and Teleilat Ghassul and demonstrated that they are similar, attesting to shared behaviors at the micro-level. Such exchange at the household level can thus connected to the construct of communities of cultic practice, explaining the shared iconography manifest in the human-bird/prominent nose and eyes motif.

[57] It is argued as significant that this system of belief disappears with the abandonment of the Chalcolithic settlements. As will be discussed in Chapter 5, this system of belief appears to continue in the Nile Valley.

Avner (2018) has identified several features characteristic of the earliest cult centers during the Chalcolithic and traces them back to a longer desert tradition (Figure 14), suggesting high levels of integration between desert populations and the settled, metalworking centers of the Chalcolithic—many features which carried through to the Early Bronze Age I at Megiddo (Kempinski 1972, Ussishkin 2015). These similarities raise the question of what role pastoralists and copper production played in the rise of these centers and the economic cooperation among communities that took place around the rites of passage connected with life, death, and the reification of the community. While we typically associate institutionalized "religion" with sedentary lifestyles, Avner made a convincing case that the desert population reflected a codified belief system as early as the PPNB (Avner 2018, 48-51), raising questions about the influence of this group—who was likely connected with greenstone production—on the more sedentary populations, either through processes of sedentarization, collaboration, or integration. Considering the similarities in these structures—each with two broadroom shrines and enclosures, and cornets—we must explore the potential role of metal in ritual rites of passage.

Figure 14. Late Chalcolithic central places/community cult centers in the southern Levant. 1: Teleilat Ghassul, 2: En Gedi, 3: Gilat (after Avner 2018, fig. 29, altered).



The importance of metallurgical production at Teleilat Ghassul is suggested by several lines of evidence, attesting to the importance of metal for daily community ritual. First, certain groups within the community clearly participated in the metals trade as suggested by the attestation of the earliest copper tools found in domestic contexts at the site. Most of these were cast from pure copper, however, one of the copper axes was made from imported metal with a high nickel content—pointing to contacts with the north (Golden 2010, 77). Second, the presence of a 10-gram lump of melted copper residue has been interpreted as the residue of melting down imported copper tools (Golden 2010, 77-78). While not evidence of smelting, members of the community were clearly aware that metal could be melted and recast into different forms. Third, the presence of cornets should now be understood as the continuation of ritual praxis connected with metal working from the early fifth millennium at Wadi Rabah and Ein el-Jarba. At Teleilat Ghassul, cornets appeared throughout the site's occupation (Golden 2010, 75 with reference to Lovell 2001), forming an important component of ritualized behavior at the site. Given the contents of the cornets at En Gedi, these forms may have been connected to the use of beeswax potentially for lost-wax casting (Namdar et al. 2009). The importance of beeswax would have played an important economic role, although it is unclear if communities were raising bees or pursued them for their wax in the wild.

Additional evidence that the site may have engaged in lost-wax casting is supported by Goren's (2008) analysis of the casting shells from some of the lost-wax-cast scepters, standards and maceheads. Petrographic analyses revealed that the stone and clay used for the modeling of the cores and production of the casting shells was procured in the Wadi Arabah (Shalev et al. 1992) and the Moza formation in the Judean Desert (Goren 2008, 379). The procurement of raw material from regions at such a distance from the Beersheba sites either implies producers understood the best material for the specific technique, or that the collection point indicates the place where casting was conducted (Goren 2008, 379). An important point regarding the casting shells analyzed is that the materials used in the technique were highly standardized, leading Goren (2014, 263) to conclude that production was centralized in one location vs. the product of itinerant smiths moved around the landscape (e.g., Gates 1992). He thus identified the most likely place where casting took place as the region of the Dead Sea and Lower Jordan Valley, identifying Teleilat Ghassul as the most likely place for collection but nevertheless invoking the lack of metallurgical refuse as evidence that the region could not support such a place for material collection. As such, he favored the region of En Gedi, not far from where the Nahal Mishmar hoard was deposited (Goren 2008, 391-392).

Of relevance here is that Ilan and Rowan (2015, 177) have connected cornets with primary burials—which are found at Gilat, and in some of the subterranean structures in the Beersheba region, and Teleilat Ghassul. It is significant that cult centers arose in two of three of these places, with metal production attested at the third. When we look at the similarities in their mortuary structures, we should recall that Avner (2018) has argued that these can be tied to a shared system of belief whose origins resided in the desert. What about En Gedi, where over 1600 cornet fragment were excavated from the courtyard with beeswax? Given the lack of burials around En Gedi, Ilan and Rowan (2015) have recently made a convincing argument that the Judean Desert formed a funerary necropolis on the west bank of the Dead Sea comprised of primary burials in caves, replete with mortuary shrine at En Gedi (Ussishkin 1971, 1980). Ilan and Rowan (2015, 184) draw attention to the fact that spatial arrangement of a mortuary shrine and necropolis on the west bank of a body of water is parallel to the later Egyptian practice of burying the dead in the land of the setting sun and raises the question to what extent each community influenced the other.[58] Significantly, they note that Teleilat Ghassul—as the type-site for the Chalcolithic—is located on the *east* side of the Dead Sea (Ilan and Rowan 2015, 184), perhaps hinting at the possibility that the communities in the southern Levant may have laid the foundation of this funerary practice in Egypt. It should be recalled that Teleilat Ghassul appears to carry on characteristics first attested at Wadi Rabah, when metalworking communities appear to have integrated in small numbers into the region and may thus form a locus wherein knowledge was passed on intergenerationally. We can therefore connect cornets to primary burial practices and the rise of mortuary cult centers in regions south of the Jordan Valley, where metalworking and pastoralism came to form a major part of the regional economy.

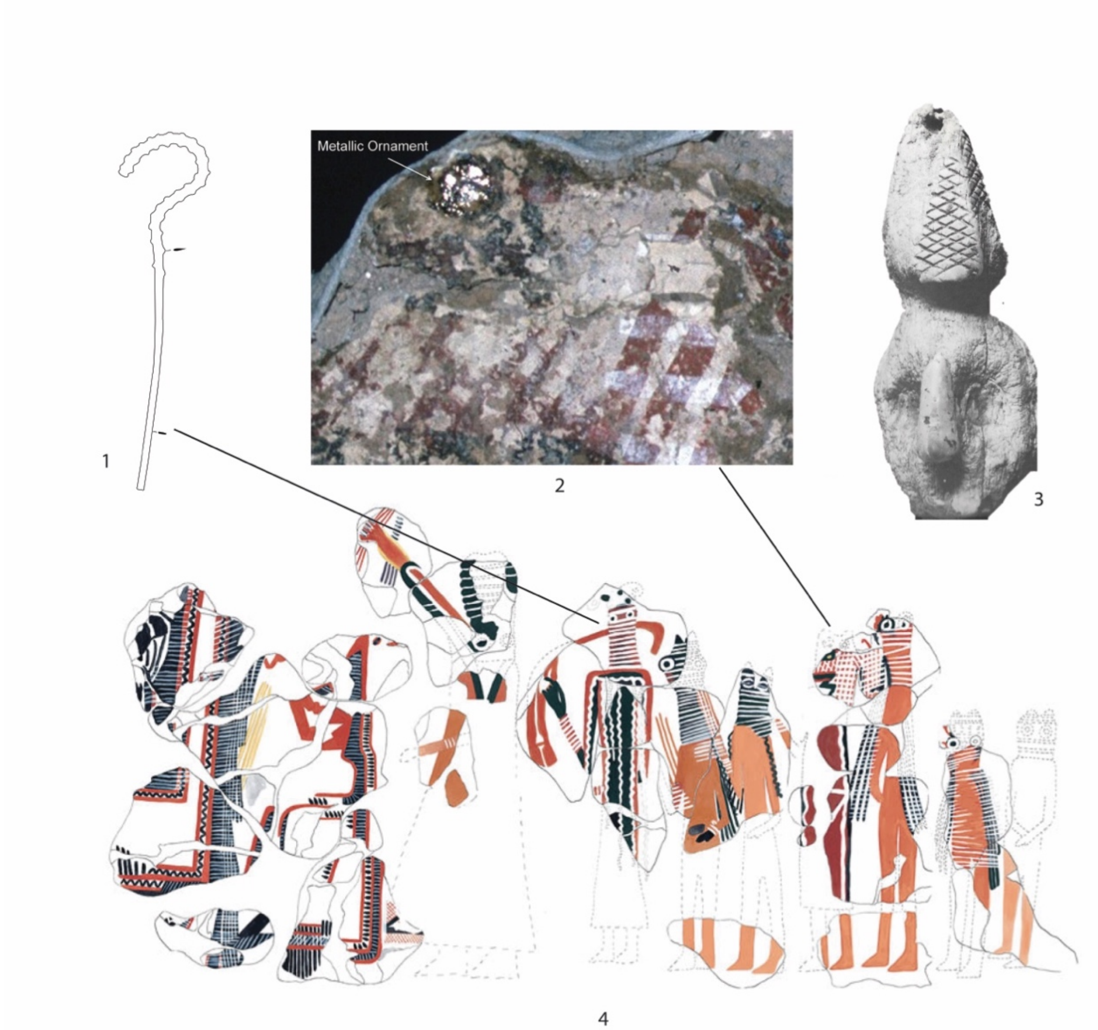
As individuals who were seen to control the natural elements, ritual specialists thus came to form the locus of power in communities centered on the continuous rebirth of the individual. The funerary ground thus transformed into a landscape of display and community-sanctioned rank. What role did metalsmiths play? Drawing on ethnographic and epigraphic evidence, Gošić and Gilead (2015b) have argued that metalsmiths would have served a shaman-like role in communities. They reconstructed the ritual and social aspects of the Chalcolithic era through engagement with ethnographic data across Bronze Age communities in southwest Asia and the

[58] This proposal raises several important issues with regard to the nature of contact between Nile Valley communities and the metalworking communities in the southern Levant during the Chalcolithic—a topic discussed at length in Chapter 5.

eastern Mediterranean, which resulted in a reconstruction wherein metalsmiths were most likely men, ritual specialists, and may have performed cultic duties outside of production (Gošić and Gilead 2015b). However, they assume cornets were not connected with metal production and thus did not connect specialist to institutionalized sanctuaries.

The importance of metal becomes clear when we consider its role in the costumery of the ritual specialists in the plaster fresco at Teleilat Ghassul. The fresco is believed to be the earliest narrative depiction in the region and is interpreted as depicting a funerary procession (Drabsch and Bourke 2014). Given that cult operated at the domestic level prior and after the construction of the sanctuary in Area E (Seaton 2008, Lovell 2010), the fresco may have been produced by figures similar to the specialists depicted in the scene (Drabsch and Bourke 2014, 1096). Within the space, the plaster walls were ritually painted over multiple times (Drabsch 2015, 174-175), emphasizing the importance of funerary cult within the home. Evidence that ritualists were set apart in rank is suggested by the producers of the Teleilat Ghassul funerary procession employing scale with colorfully dressed, masked individuals depicted at a larger scale than their nude counter parts, indicating their importance within the narrative (Figure 14:4). The similarity between the crook held by one of the larger scale figures (Figure 15:4) and the lost-wax-cast shepherd's crook from the Nahal Mishmar hoard (Figure 15:1) suggests the potential that the staff in the fresco was made of metal, but this cannot be confirmed. A more tangible line of evidence that metal played a role in the costumery of ritualists at the site is supported by the insertion of a piece of metal—either copper or gold—into the top of a crosshatched mask or headdress (Figure 15:2). Drabsch and Bourke (2014, 1092) interpreted the (now lost) piece of metal as potentially symbolic of an eye, however this is not convincing given that no other eyes contain a piece of metal inserted into the

Figure 15. Similarities between display objects at Teleilat Ghassul funerary fresco, Nahal Mishmar hoard and Beersheba settlements. 1: Crook from Nahal Mishmar (line drawing by author); 2) metal ornament inserted into cross-hatched woven mask or headdress from Teleilat Ghassul (Drabsch and Bourke 2014, figs. 5 and 10; 3) Ivory head from Bir es-Safadi, with basket-woven headdress or crown (Perrot 1979, pl. 53); 4) Funerary fresco at Teleilat Ghassul (Drabsch and Bourke 2014, fig. 10).



plaster. Rather, I propose it would have been inserted into a headdress, reflecting the importance of metal in some sort of ritual regalia worn during funerary processions. Drabsch and Bourke (2014, 1091) describe the crosshatching as indicative of some sort of "woven, basket-like construction." A possible parallel to such a crosshatched headdress is depicted on an ivory figurine from Bir es-

Safadi, suggesting shared symbols of costumery set these individuals apart in ceremonial performances (Figure 15:3). Similarly, the headdress has a hole, perhaps for a metal insert (but this is pure speculation). What we can conclude is that it appears metal played a role in these central places for community ritual, which begs the question of where the Nahal Mishmar hoard fits in to this narrative.

Nahal Mishmar Hoard and the Role of Metal in Mortuary Shrine

Within the context of the ritualized funerary economy, the Nahal Mishmar hoard has played a central role in understanding Chalcolithic metallurgy (Figure 16). The hoard was found in a cave in the Judean Desert—close to the sanctuary at En Gedi shrine—and is comprised of over 400 lost-wax-cast copper objects. These ranged in form and included: 240 plain rounded maceheads, 18 decorated maceheads, 16 carinated maceheads, 4 cylindrical maceheads, 87 maces, 11 scepters/standards, 10 cylindrical objects referred to as "crowns,"[59] 8 containers, 3 shaft axes, 1 hammer. In addition to these complex castings, 11 axes and 4 adzes were cast in open molds. Several nonmetal objects were also discovered in the hoard, which included 6 hippopotamus sickles with drill holes, 1 elephant ivory tube, 6 rounded hematite maceheads, and 1 rounded limestone macehead (Sebbane 2014, Table 1). Both the metal and production techniques employed to cast the tools and ceremonial objects in the hoard find parallels in the Beersheba settlements, where local and imported polymetallic metal was used to cast objects in open molds and using the lost-wax technique (Shalev and Northover 1993, Tadmor et al. 1995). This evidence has been used

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[59] Bar-Adon (1980) acknowledged that they were not used as such.

to argue for a casting location of the hoard in the Beersheba settlements (Moorey 1988, 186, Gošić and Gilead 2015b, 26), support for which is suggested by the furnace remains at Abu Matar, which demonstrated co-smelting of arsenic-rich metal with local Feinan ores (Shugar 2000, 2018) as well as polymetallic ingots from Bir es-Safadi and Abu Matar (Golden 2010, fig. 7.21), providing a geographic link between arsenic-antimony-nickel metal and the Nahal Mishmar hoard. It should be noted, however, that an arsenic-rich casting spill was also recovered from the burial assemblage in the Nahal Qanah cave, raising the possibility that the act of casting or at least recycling was connected with funerary rites of passage (Golden 1998, 86, 2010, 56).

Figure 16. Nahal Mishmar hoard (Ilan and Rowan 2015, fig. 4).

With regard to understanding the context of the hoard's deposition, various proposals have been put forward. These previous proposals identify the hoard as: a cultic hoard from the nearby En Gedi temple hidden in a time of crisis (Ussishkin 1971, 1980, 2014, Goren 2008); a merchants hoard (Tadmor 1989); the product of itinerant metalsmiths selling to Egyptian elites (Gates 1992); the ritual disposal of cultic objects (Garfinkel 1994); the cache from a temple or sanctuary hidden during duress (Moorey 1988, Ilan and Rowan 2015); burial offerings (Ilan 1994, cited in, Golden 2010, 90, Ilan and Rowan 2012, 93-93, 102-105); pilgrimage offerings connected to the En Gedi shrine (Arav 2014, 30), and most recently as a form of proto-writing meant to encode the secret knowledge of metallurgical production (Amzallag 2018). While these previous interpretations have sought to credit one community as responsible for the hoard's production, a recent proposal has raised the possibility that it was produced by multiple communities over a long period of time.

The high quantity of maceheads in the hoard was argued by Sebbane (2017) to reflect the type of ritual caching we would expect to find in a Bronze Age temple deposit of the third millennium in both southwest Asia and Egypt. He cited the particularly apt parallel of the "Main Deposit" from Hierakonpolis, where material spanned from the Predynastic through the Old Kingdom (ca. 3300-2200 BCE). Indeed, lead is known to have been used to repair several objects in the hoard, suggesting they were in circulation long before their final deposition (e.g., Amiran 1985, 10, Tadmor et al. 1995, 127, Sebbane 2017, 452). Sebbane's proposal adds nuance to Moorey's (1988) argument that the hoard belonged to a temple or sanctuary or sorts. Within the context of a temple hoard, we must ask what role metal played in the rise of the mortuary shrines during the Late Chalcolithic.

A connection between the hoard and the mortuary shrines is supported when we examine the various proposals for dating the hoard's deposition. The original radiocarbon dates on the mat used to wrap the hoard turned up several dates in the mid fourth millennium (Bar-Adon 1980, Weinstein 1984), which would have placed the hoard's deposition at the end of the Chalcolithic. This was seemingly confirmed by analysis of one of the wooden hafts of a scepter, which was also dated to the mid-fourth millennium (Bar-Adon 1980). However, new radiocarbon dates were run on the mat in 1999, producing a date in the last quarter of the fifth millennium (Aardsma 2001). While it was suggested that the mat was an heirloom and thus older than the deposition of the hoard (Aardsma 2001), most scholars now accept the date of the hoard's deposition between 4300-4000 BCE (Gilead and Gošić 2014, Klimscha 2017, Sebbane 2017, Amzallag 2018). Such a date would render the hoard contemporary with the Beersheba settlements and the mortuary shrines at En Gedi, Gilat and Teleilet Ghassul.

Recently the stratigraphy of the cave in which the hoard was deposited has added another level of nuance to the debate. The cave contains three layers of occupation: the earliest layer dates to the Chalcolithic (Layer III), a middle layer is currently identified as Indeterminate (Layer II), and the latest occupational phase is dated to the Bar Kokhba revolt (Layer I). The cave within which the hoard was buried contained five primary burials wrapped in linen shrouds, representing the rare instance when primary burial occurred in caves (Rowan and Ilan 2014, 102)[60] and also connecting primary burials, lost-wax casting and cornets. The wrapping of the bodies in linen or reed mats is attested in the Nile Valley during the contemporary Badarian and Predynastic (Chapter 5) but relatively unknown in the southern Levant. Nearby, two other caves contained similar inhumations resulting in 21 individuals interred between the three caves, revealing the importance of this space for burial rites (Bar-Adon 1980, 198). The possibility that the hoard's placement in

[60] Other notable Chalcolithic primary burials in the Judean Desert include Horbat Govit and Cave of the Warrior (Ilan and Rowan 2015).

the cave may have been a separate activity removed from the burial depositions has long been recognized (Tadmor 1989, 249, Bar-Adon 1980, Goren 2008).

Ilan and Rowan (2015, 177) argued that the hoard was placed in the cave precisely *because* the community responsible for its deposition was aware the cave was used for burials.[61] Who would have been in such possession of such a cache of objects and known where burials were located? The most probable response is someone in charge of overseeing funerary processions of primary burials—at Gilat, Teleilat Ghassul, or En Gedi. Given the rise of mortuary shrines, previous proposals that metalsmiths served as ritual practitioners within the community appear supported. We must therefore question why so many of the motifs on the Nahal Mishmar hoard find direct parallels in the ossuary burial throughout the region (Shalem 2015). What was the connection between metal working and this new system of belief adopted across the southern Levant? Given the intensified production of copper during the mid-to-late fifth millennium, we might ask how the process of production fit in with the unique belief system of the Late Chalcolithic—and what role metal working ritualists played in its widespread adoption.

Forging a Life-Cycle Metaphor: The Materiality of Metallurgical Production

It should be recalled that new techniques, practices, and innovations will only take hold in society *when there is alignment and coordination between actors and ideologies in the social, economic, legal, scientific, and political context* (Pfaffenberger 1992, 498, emphasis added). In small-scale

[61] Note that such a late dating for the burials in Cave 1 must be rejected, as Gilead and Gosic (2014, 232) dismissed one line of evidence on the basis of potential contamination by Roman period occupation, and then explored the possibility of no contamination on the mat because it fits their argument. Indeed, the various dates on the mat below, where it is discussed that certain reeds spanned the fifth through the fourth millennium

societies, magic and taboo play a key role in coordinating economic production, structuring labor, and ritualizing behavior (Pfaffenberger 1992, 501, Stanish 2017). It is therefore critical that technological systems of production be situated within their wider social contexts and the nature of economic cooperation between communities be properly understood. In the previous section I discussed the research around how the mid-fifth millennium population boom resulted in social pressures that led to novel communal coping mechanisms. These new ways of dealing resulted in the rise of formalized extramural cemeteries, secondary burial in ossuaries, and the rise of public mortuary sanctuaries. These changes were also accompanied by a fundamental shift in mortuary belief across various communities that appears connected to the interchangeability of individual and animal. This newfound shift in belief and burial practices coincide with the rise of public sanctuaries that appear to play a prime role in organizing public ceremonies and overseeing funerary rites of passage at Teleilat Ghassul, Gilat and En Gedi, all of which contained cornets and can be connected with primary burials. These places were staffed by ritualists who appear to have directed these widescale shifts in burial practice and thus were presumably connected with these changes in belief. When we consider this all correlates with the intensification of a reginal system of copper production south of the Lower Jordan valley, we must ask what role copper played in these economic and ideological transformations?

In complex stateless societies, managerial leaders are sanctioned by the community as a result of the ways in which they use magic and taboo to legitimize certain economic structures and actions (Stanish 2017). I have nuanced previous claims that metal producers were shamans by connecting their place within the community to the institutionalization of ritual practice in the public shrines, where cornets abound and metal may have played a role in presentations of self to community. Cooperation between communities at the household level led to the construction of a shared cultic iconography that included the human/bird motif. This particular motif appears linked with community ritualists who performed communal rites of passage and are argued to have worked metal. The shared aspects of these mortuary centers appear to have arisen from a desert cult dating back to the PPNB, when the exploitation of the copper minerals first began, potentially locating these communities within the earlier system of greenstone—and later copper—production. The presence of the Beersheba culture attested as far north as Peqi`in may thus point to the importance of this region for copper production networks with the north.[62] Given the unique role of metal in its local context, we must ask what role copper played within regional rites of passage and whether can we align this shift in increased production with the changes that took place in the Chalcolithic system of belief.

Persuading local communities who are necessary for the intensification and maintenance of economic cooperation with northern communities through the use of magic and taboo is hypothesized to account for the shifts in systems of belief that we see transpire across the landscape. Such a shift explains the development of a shared iconography, wherein the human-bird/prominent-nose motif plays an important role. As argued below, the ritualization surrounding new burial practices led to the connection between copper and life cycle metaphor necessary for the perpetuation of the community. Such a connection was made possible via the pre-existing

[62] Hauptman (et al. 2011) have pointed out that the distribution of copper with nickel can be plotted in settlements connecting southeastern Anatolia to the southern Levant through the Jordan Valley, into the eastern Delta and south into the Nile Valley, attesting to the importance of this overland network for the metals exchange. The placement of Peqi`in may thus be connected to a community in the north in connection with this network.

associations to greenstone as the stone of healing, which would morph into greenstone as the stone of physical and metaphorical transformation. These cognitive shifts in worldview are argued to have allowed for the transformation of the southern Levant into a regional system of copper production.

This investigation must begin with a review of the previous research by Milena Gošič and Isaac Gilead, who have argued for a need to explore the ritual processes surrounding metallurgical production during the Chalcolithic. Drawing on ethnographic research on the symbolism and social beliefs surrounding preindustrial metal working communities, they discussed the various ways ritual and community symbolism structure production in pre-industrial metalworking communities (Gošić and Gilead 2015b). Such symbolism can include processes of genderization, sexualization, and transformation, wherein these concepts can be applied to both producers, objects, and materials (Gošić and Gilead 2015b, 33, 36-37 with references). One way such a symbolism might manifest is through the production process as a metaphor for birth, shrouded in fertility allegory. For example, in many pre-industrial communities the furnace tends to be connected with the female womb, while tuyères—inserted into the furnace—can serve as a symbol of male virility, transforming the smelting process into a represented act of sexual union, resulting in the charge giving birth to the metal (Eliade [1962] 1978).

While Gošić and Gilead (2015b) have convincingly argued that similar processes would have surrounded local production processes for copper, they have not detailed the ways in which the materiality of production would have been understood. Rather, their investigation into the ritualization surrounding Chalcolithic production is centered on explaining production as the result of its *initial* introduction during the mid-fifth millennium—assuming the Beersheba settlements represent the first phase of introduction. Indeed, they maintain that it is still unknown whether such knowledge was an independent discovery or imported from elsewhere given a lack of parallels from where lost-wax casting could have potentially arrived (Gošić and Gilead 2015a, 169). While recognizing the importance of copper for community identity, they view the Beersheba settlement as the *only* community that produced metal during the Late Chalcolithic, subscribing to the belief that cornets were not part of metalworking communities (Gošić and Gilead 2015a, 169). When it comes to the Nahal Mishmar hoard, they argued that the presence of ceramics and the latest radiocarbon dates on the mat ca. 4300-4000 BCE reflects the community responsible for—and time of—its deposition, ascribing this to the Beersheba communities as the responsible party (Gilead and Gošić 2014, 233). Given their belief that cornets reflect a pre-metallic phase of production, the high frequency of these vessels at En Gedi is invoked as evidence against the site's connection to the hoard (Gilead and Gošić 2014, 234-235).

They discuss how the introduction of new technologies is often accompanied by intensive ritualization (Gošić and Gilead 2015b, 36) and propose that the production of metal skeuomorphs was a form of sympathetic magic—a power strategy employed by producers meant to express the dominance of metal over all other material forms (Gošić and Gilead 2015a, 169). Such skeuomorphs include the casting of everyday objects like baskets, tools, and plants into copper. According to this view, *all* stages in the system of metallurgical production were ritualized (Gošić and Gilead 2015a, 169-170, 2015b, 26-27). As such, they argue metalsmiths would have served as ritualists of sorts within the community, as the entire production process would have been enshrouded in pomp and ceremony. Although their argument about the social role of metalsmiths is apt, we recall that Sebbane (2017) criticized this proposal on the basis that it did not factor into account the economic importance of metal during this period.

I argue that we can add nuance to our knowledge of the social significance of metallurgical production by situating it within the broader argument presented in this chapter. By building from the previous arguments about the rise of mortuary shrines/public sanctuaries, I have connected producers to these public central places and argue that the shift from domestic to community practice around the burial would have been opportunities for metalsmiths-ritualists to display not only metal objects in processional ceremonies, but likely their knowledge of production, establishing and institutionalizing rank that was sanctioned by the community. The correlation between intensified metallurgical production, the rise of mortuary centers, secondary burial rites in extramural cemeteries, and a new belief system centered on the reincarnation of the individual into *this* life is argued to be tied to the ritualization process surrounding the economic intensification and cooperation among groups around the economy of death. It was not the introduction of metal to the region that led to this new form of ritualized mortuary behavior; *it was the need to integrate metal into the wider region to intensify production and thus economic cooperation with the northern communities*.

Given the economic importance of metal in linking the region to communities in the north, I hypothesize that widescale shifts in the belief system can be associated with new understandings of the social role of metal in society. When we return to the ritualization processes connected with the casting of metal skeuomorphs, I therefore reject that such processes were the product of the *introduction* of this technology in favor of a model where the economic intensification of production required that communities buying into the technological system. I propose that not only did the skeuomorphs assert the dominance of metal over other material industries, but they also served to transform the producer into the *chief* ritualist of society. It is argued that copper allowed for the forging of a life-cycle metaphor, and through its materiality, a shift in the belief system occurred wherein one could be recycled so-to-speak, into this life and in a new form. In order to support this claim, let us examine how the materiality of the production process may have been understood as a metaphor for the reincarnation of the individual.

Mining the Stone of Transformation

While greenstone was first exploited during the Late Natufian, the widespread exploitation of copper minerals during the PPNB suggests that the communities discovered the pharmacological properties of certain greenstones. The longevity of groups exploiting this region would have surely resulted in new notions of territoriality as the mining landscape became imbued with significance. Over time, individuals who possessed the ability to locate such stone no doubt began to take note of the flora, which tends to grow in the region where copper minerals are located. Given the introduction of extractive metallurgy into the southern Levant, the stone of healing morphed into the stone of transformation as certain regions in the mining zone became associated with places to procure this material subsequently leading to changes in the symbolic attachment to the landscape. Given the mines formed the locus in which the stone of transformation and regeneration was found, we must consider such subterranean spaces as having chthonic associations, as spaces connected to liminal stages of being. When we examine the physicality of mining, such associations may explain why caves morphed into ritual spaces wherein secondary burials were placed (Rowan and Ilan 2104).

The first step in the production chain would have involved the mining for greenstone—a community act wherein children were no doubt present as part of the processes necessary for the intergenerational continuity of practice. Mining involves physically penetrating into the earth; transgressing into liminal spaces associated with both life (regeneration) and death (transformation). The role of children in these early mining communities would have played a functional role in the carving of small ventilation tunnels, as well as indoctrinating these individuals into the system of production as a part of the intergenerational continuity of practice. This connection between mining and the regeneration of the individual would have rendered chthonic associations to the spaces where greenstone was procured during the late fifth and early fourth millennium. These spaces were dark, cold and crammed: at Feinan, adits and scoops were carved into the sides of hills up to 10 m; at Timna the mineralizations were such that miners carved down a few meters to extract the ore into the body of the earth where galleries were exploited in the dark. This stage in the production chain would have no doubt included rites of passage, as individuals emerged from these liminal spaces. Outside of the mines, the more sensorial aspects of production may have included throwing ore into an open flame and looking for a certain color to see whether the acts were productive—physical indicators of the copper content. No doubt these acts served to solidify community cohesion—the stories told of the landscape, the intergenerational continuity of practice, the songs that would have accompanied smelting and the sense of identity tied to place. The process no doubt transformed miners into figures who transgressed boundaries—spaces of the living and spaces of the dead.

Such a connection between mining, metallurgical production, and mortuary rites of passage appear to date back to the Late Neolithic, when subterranean spaces took on new ritual significance for burial (Rowan and Ilan 2014). It is argued to be significant that for many communities the formalization of extramural burial during the Late Chalcolithic—that is, a place for public ceremony *en masse*—occurred in and around caves (e.g., Peqi`in, Nahal Qanah). The use of these specific caves by many communities speaks to the role of ritual in connecting individuals and fostering a shared group identity. In the northern Negev, the similarity between the subterranean structures and the technology employed in the mines at Timna suggests mining played a significant role in the ritualized economy of these sites. This would have no doubt included expeditions to the Wadi Arabah and potentially Sinai, serving to foster social cohesion and ingroup identity centered around the procurement and subsequent smelting of greenstone. The location of production refuse in subterranean chambers in the Beersheba at places of the living like Abu Matar and Shiqmim—as well as places of the dead such as Nahal Qanah—thus appear to emphasize the chthonic aspects of metallurgical production. The subterranean associations with mining may have represented the space wherein individuals went to be reborn—the same locale where greenstone as the stone of transformation and regeneration was procured. Mining is therefore argued to have formed an important first step in the symbolism of reincarnation and provide a connection to these new burial practices of certain communities across the southern Levant.

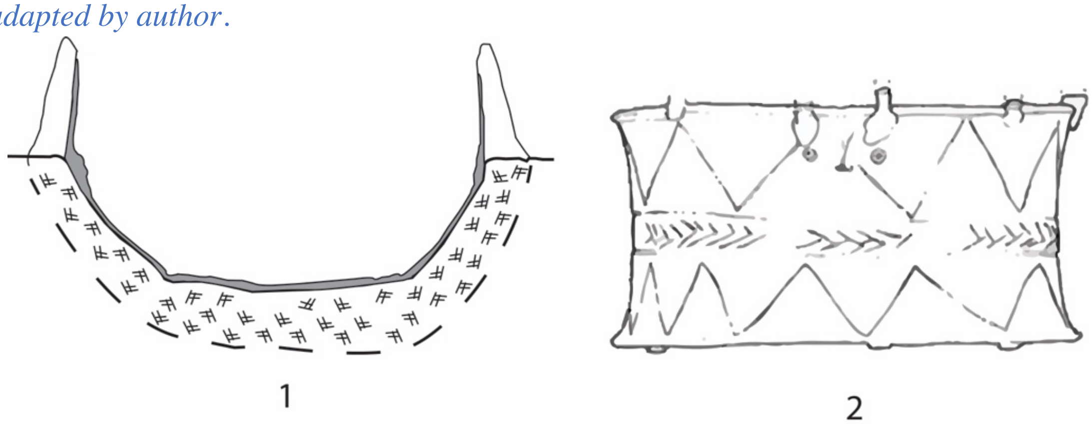
Parturition: Smelting, Slag and the Birth of Copper

While mining would have played a role in creating a connection with rebirth and subterranean spaces, the materiality of Chalcolithic smelting techniques is argued to have been connected with parturition. Based on the analysis of production refuse from the Beersheba settlements, crucible smelting resulted in low redox conditions resulting in a highly viscous slag that led to the production of metal prills within the slag (Shugar 2000). The act of smelting would have thus required grinding down the stone of regeneration, placing it into ceramic crucibles, filling it with charcoal and exerting heat from above through forced induction either through blowpipes or tuyères. The end product would have been the conversion of the greenstone into a highly viscous slag within which bright, shiny copper prills would have been trapped. Such a process therefore may have been likened to parturition, the physical act of crushing the slag viewed as the symbolic birth of the copper prills from the stone of transformation.

The connection between regeneration and metallurgy is strengthened when we look to enigmatic copper "crowns" in the Nahal Mishmar hoard. Various scholars have sought to interpret these objects. As such, Bar-Adon (1980, 133) viewed them as models of temples, a hypothesis supported by Mesopotamian temple architectural parallels dated to the third millennium (Beck 1989, 44). Conversely, Amiran (1985) proposed that they formed composite pieces that were assembled to form drum-like altar stands, a hypothesis that is corroborated on the basis of projectiles on certain crowns. Moorey (1988, 179) viewed these crowns as potentially reflective of burial places to excarnate the body. Ziffer (2007) identified certain features as a palace facade, with the horns representing divinity. The similarities between doorways on a few of the crowns and Chalcolithic ossuaries led Gilead and Gošić (2014, 235) to propose a connection with the afterlife. Shalem (2015, 229-230) has argued that their round structures are significant, interpreting their form as representative of silos given that they are the only architectural structures that were round during this period. Noting the similarity in shape between the stool upon which the Lady of Gilat sits and the copper crowns, Ilan and Rowan (2015, 177) recently interpreted them as birthing stools. This suggestion was based on the earlier proposal by Alon and Levy (1989, 193), who proposed that the object upon which the Lady of Gilat figurine sits should be identified as a birthing stool.

While these previous proposals help to begin thinking about the function and symbolism of these crowns, within the hypothesis put forth in this study about copper serving as a life-cycle metaphor, the most recent and most convincing proposal adopted here is that these crowns were meant to be symbolic of metallurgical pit furnaces from the Beersheba Valley settlements (Amzallag 2018, 66-67). These crowns are very similar to the furnace collars attested in the Late Chalcolithic at Abu Matar (Figure17:1). The appearance of the prominent-nose motif on one crown

Figure 17. Parallel between 1) Abu Matar furnace with ceramic collar (Golden 2010, fig. 21.2) and 2) copper crow with prominent-nose motif, Nahal Mishmar hoard (Moorey 1988, fig.3B). Images adapted by author.



in particular (Figure 17:2; Bar-Adon 1980, no.9) was interpreted by Amzallag (2018, 68-69) as reflective of the breath of life motif—blowing into the furnace through blowpipes or potentially the use of tuyeres. This interpretation fits well within the life-cycle metaphor proposed for copper and raises questions about whether the one who was in charge of smelting would have been set apart by the community.

Given that producers are argued to be the chief ritualists of mortuary shrines, we must question how their role was viewed within the process and community. The act of working the blow pipes—literally breathing life into the furnace—likely rendered them as figures of authority, reinforcing their role as the overseers of rites of passage. Such a claim is reinforced when we look to the Teleilat Ghassul frescoes, wherein ritual servitors wear zoomorphic masks potentially made to resemble that of a vulture (Cameron 1981)—birds of prey, assisting in the regeneration of the individual. Indeed, funerary performance would have played an important role in solidifying community cohesion. At Abu Matar, we may seek to view the shift from smelting subterranean spaces diffused across the site—similar to domestic cult—to the transition in the last phase of the site to above ground in a single courtyard (Golden 2010). While only certain members of the community may have participated in smelting, casting and/or forging pieces to shape, it would have been on view for the entire community who may have participated by sorting ore, crushing slag or collecting fuel. Given the ethnographic evidence, smelting was likely accompanied by dance, song, storytelling and perhaps even sacrifice—celebrations required for the birth of new life. If such an identification is accepted, as it is here, then the furnace would come to fit within previous interpretations of life and death reflected in the iconography of the hoard (Ilan and Rowan 2012, 97-98)—as well as connected to a birthing stool —symbolic of the regenerative receptacle of the individual.

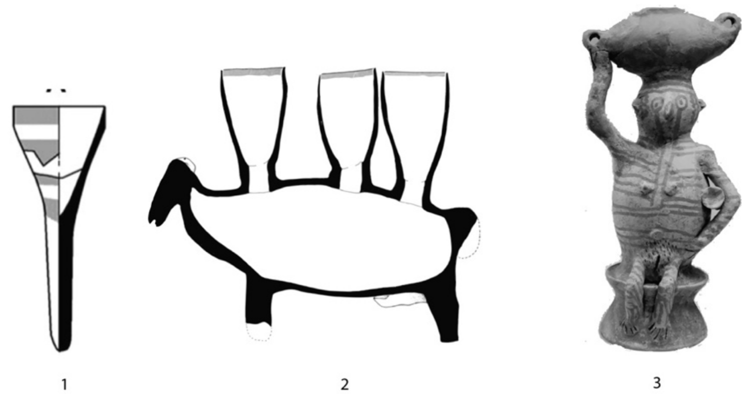
Molding the Individual: Clay, Casting and the Sexual Act of Creation

Once the copper was removed from its ore body the next step would have required casting. During the Late Chalcolithic, the intensification of production metallurgical production was accompanied by the profusion of lost-wax-cast objects of display. The motifs incorporated into these copper standards and scepters are the same incorporated throughout the cultic iconography of the southern Levant (Shalem 2015). As the container that held the beeswax (Goren 2008), the cornet would have become an integral display piece for the molding of the form to cast and may explain why they are decorated. We must thus question the material symbolism of this process—especially the wax—which was molded by the producer to manufacture a copper form that could take any shape.

The technique involved molding a core out of wax, encasing it in clay, placing the mold into a fire to melt out the wax through an open channel left in the mold, and pouring in the molten metal (Figure 11). Once cooled the clay shell was broken off and a unique metal object was revealed—the nature of the technology was such that no two were ever alike. When we consider the materiality of the lost-wax casting process, it is hypothesized that the act of casting represented sexual union: the beeswax is hypothesized to have been symbolic of semen and connected to male virility as the central process of creation, reinforcing man—and not woman—as the progenitor of all life. The casting shell may have thus been likened to a womb. The significance of the wax becomes more apparent when we consider the role of cornets in their ritual contexts. It should be recalled that cornets are found overwhelmingly in public shrines at Teleilat Ghassul, En Gedi, and of interest here, Gilat.

In order to understand the symbolic role of beeswax, it is argued that we must contextualize the cornets in relation to other objects that depict them in ceremonial rites. As such, one figurine from Gilat—a pilgrimage site that drew groups from as far as the Nile Valley (Levy 2006)—plays a role in understanding the symbolism of beeswax. A number of cornets (Figure 18:1) were found in the sanctuary at Gilat alongside the most iconic Chalcolithic figurines—the so-called Lady of Gilat and a Ram with Cornets on its Back (Figure 18:2 and 3). The Lady of Gilat depicts a female sitting on a cylindrical object holding a churn over her head (Figure 18.3). She is decorated with red bands all over her body, variously interpreted as tattoos (Alon 1976) or as body paint (Fox 1995). While some scholars identify her as goddess (Amiran 1989, 53-54; Fox 1995), others argue she represents a human female (Joffe, Dessel, and Hallote 2001). Several scholars believe she is depicted in a state of parturition, with the cylindrical object on which she sits interpreted as a birthing stool (proposed here to also be a furnace collar), connecting her presence with rites of passage in the sanctuary (Alon and Levy 1989, 193; Ilan and Rowan 2015). Indeed, the sexual connection between these two figures is suggested by the presence of the ram figurine with cornets on its back, painted with red bands in a like manner with its spine emphasized by triangles (Figure 18.2). The ram is depicted with a large phallus, emphasizing its status as a symbol male virility given its important role in the perpetuation of the flock. The appearance of these two cultic vessels alongside cornets (Figure 18:1) creates a context for understanding the role of the cornets in connection with the figurines.

Figure 18. 1: Cornet (Namdar et al. 2009, fig. 1:A); 2) Ram with Cornets on its Back figurine, Gilat (Amzallag 2016a, fig. 7); 3) Lady of Gilat figurine, Gilat (Amzallag 2016a, fig. 2). Images adapted by author.



Amzallag (2016a, 187) has recently challenged claims that the woman is depicted in a state of parturition, arguing her small breasts, rotund belly, and enlarged genitalia suggest a state of post-copulation. The identification of the Ram and Lady of Gilat as a pair of deities was similarly rebuked by Amzallag (2016a, 201-202), who argues that iconography does not seem to support this interpretation—a claim argued earlier by Joffe, Dessel, and Hallote (2001), who saw her bodily decoration as reflective of her human—vs. divine—status. We must then question the non-divine status of the female in a state of post-copulation or birth (or both) alongside a ram as a sign of male virility, in a sanctuary connected with rites of passage and a community that mined greenstone.[63]

Reinterpreting the Lady of Gilat as a fertile young woman rather than a pregnant woman in parturition,[64] Amzallag (2016a, 187-188) proposed that the presence of the ram and a young

[63] Analysis of ore from Gilat has demonstrated the presence of copper silicates from the DLS unit at Feinan (Golden 2010, 75-76, Table 5.2), suggesting individuals from these communities were active in the mining landscape or were in connection with those who mined.

[64] This is on the basis of the lack of swollen belly, alluding to childbirth, paired with small breasts as a signal of puberty, and the churn as a symbol of the womb (Amzallag 2016a, 187-188).

female figure were connected with reproductive rituals enacted in the shrine.[65] While the ram has served as a symbol of male virility since the Neolithic, the proposal that a female anthropoid could mate with a zoomorphic male suggests a cognitive interplay between individuals possessing zoomorphic features—neither were divine, both were symbolic of humanity in its different forms. This interpretation lends further support to the proposal by Ilan and Rowan (2019) that Chalcolithic ideology may have been centered on reincarnation of the individual, which could have occurred with varying degrees of zoomorphic features.

The connection between the ram, sexual reproduction, and cornets deserves attention. The Ram with Cornets figurine has been interpreted as a beast of burden transporting liquids. Such an interpretation derived from previous beliefs that the cornets were used for milk ritual (Epstein 1985). Other zoomorphic figurines similarly depict donkeys with packs on their backs, seemingly providing a parallel to the Ram with Cornets. However, Amzallag (2016a) cogently points out the ram was not used as such during this period in the southern Levant; indeed, the small size of cornets renders them unsuitable for liquids, let alone in transport. Observing that the distribution of animal bones at Gilat suggests numerous female sheep made it to maturity, he argued that this would signify a few rams were selected for breeding leading to the association of male virility with horns (Amzallag 2016a). Archaeologically, horns have been found at major cultic centers alongside cornets (e.g., En Gedi, Ussishkin 1980) and appear to have been cast in metal as attested in the Nahal Mishmar hoard (Figure 10:26). Within the context of ceremonies, it should be recalled that

[65] He notes that a zoomorphic figurine at Teleilat Ghassual was also found with an anthropomorphic figurine, potentially providing a parallel to Gilat. Noteworthy is that both sites are known for their significant number of cornets.

the ritual practitioners shown on the Teleilat Ghassul fresco may be depicted wearing horns (Figure 15:4, center; Drabsch and Bourke 2014, fig. 5).

Drawing on later Egyptian epigraphic evidence, Amzallag (2016a, 196) argues for an association between semen as a life-giving substance and the cornets as containers connected to the ram's spine—where it may have been believed this life force derived. According to Egyptian belief, semen originates in the spine and as such the ram-god Khnum is said to have made himself as the god of creation (Amzallag 2016a, 196-197, with references). Indeed, such a connection is seemingly supported when we consider that the ankh sign—as a sign of life—may have been symbolic of a ram's coccyx (Amzallag 2016a, 196-197, n.5). It is thus noteworthy that the etymology for Khnum (*ḫnmw*) can be traced to its *Semitic* root for "ram" (von Pilgrim 2013), which raises the possibility of linguistic transfer through cooperation between communities.[66] This interpretation is relevant for understanding the potential associations of beeswax, allowing us to situate the materiality of the lost-wax casting process within the realm of sexual union.[67]

The physical act of lost-wax casting first involves carving an object into shape from beeswax. If beeswax was symbolic of semen, this stage in the process may have been interpreted as the male metalsmith as chief ritualist in charge of creation. Once the wax core was molded to

[66] As argued in Chapter 5, such overlap in creation narrative with the metalworking communities in the Besor and Nahal Beersheba was seemingly born out of the product of community participation of an elite group transgressing culture-historical boundaries by site type, extending into the Nile Valley.

[67] I will argue later in this study that the bee in the Egyptian titulary *nsw.t bjtj* is connected with the Egyptian king's role as chief ritualist. Specifically, I propose that the significance of the symbol dates back to the fifth millennium in the southern Levant, when ritual practitioners were in charge of metal production and lost w ax casting played an important role in fostering a landscape of display. As such, the cooption of the bee in the Egyptian titulary is argued to be connected to claims over industry during the Naqada III. See chapters 7 and 8.

form, it was carefully encased in several layers of well-prepared clay, forming a symbolic womb encasing the wax core. After the mold was heated in a fire, the sprue left in the symbolic womb would have allowed the wax (read: semen) to run out upon melting, coming to symbolize a sexual orifice. The addition of the copper into the mold would have completed creation, allowing the metal object to now form in the clay womb. Once cooled, the object was broken from its mold and revealed to the community. Whereas Gošić (2015) argued that the skeuomorphism reflected in the casts was reflected over claims of metals dominance over other industries, when viewed within the context of a life cycle metaphor such claims would have position the smith as chief craftsman and ritualist and asserted the dominance of the industry in life for death.

Reincarnation: Recycling and Recasting the Body

The last major step in the life cycle of copper is its reincarnation. The materiality of recycling metal is such that it can live on in perpetuity. Metal can be cast into one form, melted down and recast into a new shape repeatedly. The ability to melt down pre-existing metal forms and recast them into new shapes is argued to be linked to the shift in the unique belief in reincarnation—the product of intensified economic cooperation among communities dealing with new social pressures as a result of population increase. When we consider the public ceremony of interring the dead *en masse*, this would have marked the stage of reincarnation—the symbolic rebirth of the individual in the subterranean setting creating a link with the mines. The inclusion of a casting spill in the assemblage Nahal Qanah cave—the largest metallurgical collection outside of the Nahal Mishmar hoard—may provide a tangible connection between the recycling of copper and the symbolic reincarnation of the individual in the community. In his analysis of the casting spill, Golden (2010, 172-173) drew on smelting rituals in Finnish burials to suggest that the inclusion of such refuse could reflect the liberation of the soul from its body as a symbolic parallel to the emancipation of the metal from its host rock, suggesting this individual exerted control over production in life and thus was exercising control over production in death. While this is an apt interpretation regarding the power of producers in connection with funerary rites of passage, we might seek to ground the performative acts of casting in funerary ceremony.

We should recall the importance of performance in fostering community cohesion, collective identity, and social memory in the funerary landscape. The nature of formalized extramural burials was such that communities would have made annual, if not seasonal, pilgrimages to the place to bury the recently deceased within the community. When viewed within its mortuary context, the inclusion of a casting spill may have been the production of casting within the funerary landscape, establishing a connection with birth, fecundity, and procreation. Indeed, such a process is attested in Early Dynastic contexts in Egypt, wherein metallurgical production took place next to king Khasakhemy's funerary shrine (Golden 2002). When we connect this to smelting and casting in subterranean structures throughout the Beersheba region, we reinforce the link between chthonic aspects of metallurgical production and the reincarnation of the object as individual in subterranean places. When we place the intensification of metallurgical production against the backdrop of institutionalized power networks centered around the economy of death, the shaman-smith may have therefore come to perform the role of creator, dominating nature by casting life.

Discussion

New techniques, practices, and innovations will only take hold in society *when there is alignment and coordination between actors and ideologies in the social, economic, legal, scientific, and political context* (Pfaffenberger 1992, 498, emphasis added). The introduction of extractive metallurgy into the southern Levant must therefore be understood as the result of social processes dating back to the Late Natufian, wherein newly sedentary communities faced increasing social pressures to ensure the perpetuation of the community. Evidence from the last decade has allowed us to nuance the introduction of extractive metallurgy to the southern Levant by looking outside the traditional lines of evidence. It now appears that the same social processes that linked communities in the PPNB, also led to the spread of metallurgical production in the southern Levant. Locally, this would have resulted in modifications to the greenstone industry by changing the stone of regeneration to the stone of transformation. The social significance of greenstone was tied to it antimicrobial properties, creating associations to it as the stone of regeneration . By the early fifth millennium, metalworking communities from the north appear to have thus integrated into local communities, bringing new agricultural practices and technical knowledge, including the exploitation of the bee for its wax (and potentially honey), extractive metallurgy, lost-wax casting, and the glazing of stone. Here greenstone became the stone of transformation.

During the late fifth millennium, the rise of the Beersheba settlements was linked to the economic intensification of copper production in connection with communities finding new ways to cope with social pressures linked to population increase. The resource abundance of the period thus transformed the funerary landscape into a politically charged space, wherein the pooling of resources was the direct result of a ritual economy centered on the rebirth of the individual.

Managerial leaders who possessed such knowledge may have drawn on the magic of copper production mixed with new taboos about who was allowed to participate in certain aspects of production. Smelting rituals near the mines or in settlements may thus have functioned both in a practical and ideological way, allowing certain individuals to demonstrate their knowledge of and dominance over the landscape, transforming greenstone into copper prills born from the stone of physical and metaphoric transformation. In funerary contexts, lost-wax casting may have been a symbolic act of procreation, connected with rites of passage for the deceased.

It is important to note that this chapter has focused predominantly on the evolution of economic cooperation between communities in the southern Levant and the north into Anatolia. The purpose was to lay the foundation of the system and explore the ideological significance of the economic system. One of the key pieces missing is the cooperation between Nile Valley corporate groups in the region. Indeed, as will be argued in the next chapter, many of the proposed associations with the materiality of production are reflected in later dynastic-era beliefs, rendering the Late Chalcolithic as an important period that contributed to the later Egyptian worldview. As such, we must return to explore a possible answer to the provocative question posed by Ilan and Rowan (2015, 184): did one culture—that is, Egypt and the southern Levant—inform the other? As will be argued in Chapter 5, the answer is an emphatic yes. Such connections must be sought not through the lens of "culture contact" but rather in the practices, identities, and beliefs borne out of increased economic participation of Nile Valley pastoralists in the ritual mode of copper production in the southern Levant.

Chapter 5. Joint Mining Expeditions and the Metallurgical Origins of an Elite Egyptian Identity (ca. 4500–3800 BCE)

"…outside influences had a long term, and by no means simple, part to play in the internal transformation of Egyptian society that cannot be accurately characterized by a piecemeal approach (e.g., invoking periodic migrations or phases of contact). In order to understand such long-term processes, it is necessary to treat the notion of 'Egypt' as a historical construct, rather than a timeless reality, and to venture far beyond the modern and ancient borders of that country. It is also necessary to adopt a flexible approach to the question of how social boundaries are constituted and maintained over time and space, taking into account the contingencies of historical development and interaction."
(Wengrow 2006, 16)

In order to understand the role of metal in the construct of both power and identity in the early Egyptian state, it is argued that we must look to the economic cooperation that took place between communities in the Nile Valley and the southern Levant during the fifth millennium. Previous studies on interregional interaction tend to approach the presence of foreign material through the monolithic label of *trade,* homogenizing the complex interactions that took place between individuals on the ground (e.g., Harrison 1993, 89; Anfinset 2010, Braun 2011, 105-108). Such approaches are argued to have hindered how we understand the ways in which certain corporate identities were constructed in the Nile Valley—that is, through the role of mobility and participation in the system of copper production in the southern Levant.

Drawing on Wengrow's (2003, 2006) model of the *primary pastoral community* as well as a communities of practices approach, this chapter takes a closer look at the nature of contact between communities in the Nile Valley and southern Levant through the lens of ritualized practices and economic cooperation during the fifth and early fourth millennium. Certain transhumant corporate groups from the Nile Valley may have collaborated with—and been highly integrated into—the metalworking communities in the southern Levant. Such economic cooperation between groups correlates with an increase in the mining of greenstone for copper production and several changes in mortuary practice in the Nile Valley, reflecting the creation of a unique communal identity borne out of this participation abroad. In the Nile Valley, these changes include the first appearance of copper, the sudden importance of greenstone for application to the body in mortuary assemblages, various cultic motifs paralleled in the southern Levant, the rise of specialized production systems with ties to the Beersheba settlements, as well as material practices that suggest transfers of pyro technological knowledge occurred between groups—argued to be reflective of Nile Valley groups' newfound knowledge of extractive metallurgy. Given that systems of technological production are part of *social* systems, I argue that the situated learning that took place by Nile Valley groups who temporarily (or permanently?) migrated to the southern Levant for participation in this system, resulted in fundamental transformations in elite display, ritual praxis, and belief systems surrounding the regeneration of the individual. This intensive collaboration between Nile Valley pastoral groups and metal working communities in the southern Levant led to new cognitive conceptions of place and forged a unique communal identity born out of a ritualized economy centered on the transformation of greenstone into copper.

Overview of the Badarian and the Newfound Role of Greenstone

To set the context for these exchanges, let us begin with a brief overview of the mid fifth to early fourth millennium in the Nile Valley. The Badarian period is attested only from a handful of cemeteries at Badari (Brunton 1927, Brunton and Caton-Thompson 1928), Mahgar Dendera (Hendrickx, Midant-Reynes, and Van Neer 2001), Elkab (Maczyńska 2014), Qau (Brunton 1927), Hammamiya, Mostagedda and Matmar (Hendrickx and Vermeersch 2000, 37). Burial grounds typically comprised of 50-300 pit graves—the product of small social groups utilizing different nodes on the landscape and reflective of a diverse subsistence economy (Wengrow 2006, 50-51). Such levels of mobility are complemented by the rich and varied mortuary assemblages of the period, which attest to a range of materials and objects centered on the adornment of the body (Wengrow 2003, 2006). It is therefore within Badarian assemblages that we find: expertly carved objects of personal display, including turquoise, steatite, copper, carnelian and lapis beads, as well as pierced shell from the Red Sea; ivory combs and spoons depicting zoomorphic figures (Figure 20:3, 21:2); carved slate palettes often found with grinding pebbles in association with malachite or ochre (Figures 20:1); as well as amulets of worked bone and teeth—the majority of which Wengrow (2006, 27) points out are objects that can be collected from surveying the wadis of the deserts east and west of the Nile. Badarian assemblages are also characterized by decorated caliciform beakers, pit burials containing mats onto which the body was placed, thin-walled, hand-made pottery with a red slip and black top, and bifacial tools (Hendrickx and Vermeersch 2000, 37). Evidence for social differentiation is attested in these cemeteries by the uneven distribution of such portable objects (Anderson 1992). According to the primary pastoral framework, Nile Valley groups placed emphasis on the body as the medium through which power was displayed—tied directly to showcasing knowledge of and participation in various networks abroad (Wengrow 2003, 2006, 31).

During the mid-to-late fifth millennium that we see a new belief system emerge in the Nile Valley, wherein greenstone comes to play a central role in mortuary rites of passage—contemporary with the intensification of copper production in the southern Levant. Prior to this period, the manipulation of green-colored stone was restricted to carved amazonite beads and pendants in burial assemblages of the sixth millennium, reflective of a larger interregional trade connecting the southern Levant with incipient social complexity reaching down to the Sudanese coast and Ethiopia (Zerboni et al. 2018). However, during the fifth millennium, chunks of unworked malachite, glazed steatite beads, and ground greenstone pigments began to appear alongside rectangular slate palettes accompanied by grinding stones in the Nile Valley (Brunton and Caton-Thompson 1928, pl. XXI:9; Stevenson 2009a, b). Although other pigments are found in funerary contexts stretching down to Sudan (e.g., red and yellow ochre, galena, and malachite), Wengrow (2006, 51) argued that malachite was the preferred pigment of choice for application to the body in the Nile Valley given its prevalence in Badarian and Naqada tomb assemblages.[68]

It is also during this time that copper makes its first appearance in Badarian assemblages.[69] Copper beads first appear on a *very* limited scale in select funerary assemblages spanning the length of the Nile Valley (Wengrow 2006, 27, n.17 with references), reinforcing that corporate groups fostered socioeconomic relations with one another around the exchange of prestige portable

[68] Red and yellow ochre also appear in the Nile Valley but on a more restricted scale. Galena is likewise attested in one case at Mostagedda whereas red and yellow ochre were more popular in the south near Khartoum (Wengrow 2006, 51).

[69] The earliest evidence of a smelting furnace in a settlement context is reported at Elephantine in a Naqada IID-III context (Kaiser et al. 1997). Within a mining settlement, the first furnaces appear in the Eastern Desert by Dynasty 1 at Wadi Dara (Castel et al. 1992). Knowledge of extractive metallurgy is seemingly attested by evidence of smelting in the southern Sinai at a number of sites with a known Egyptian presence during Dynasty 1 the Delta. A copper prill and possible socketed crucible have been reported from settlement contexts at Tell el-Farkha during the Naqada IIC-III, interpreted as evidence of secondary production at the site (Czarnowicz 2012, 341, Table 1:6, fig. 4:8-9). Moreover, evidence for metallurgical may extend back into the Naqada I at Maadi, wherein lumps of ore, ingots, and metal objects appear to have derived from the southern Levant (Rizkana and Seeher 1989, 15-18) and Sinai (Abdel-Motelib et al. 2012).

objects.[70] At Badari, ring and barrel-shaped copper beads were reported in Tomb 3730 alongside lapis and carnelian beads (Brunton and Caton-Thompson 1928, 51, 56), signifying the possibility of procurement from regions to the north. Another copper bead was also reported from the tomb of an infant (Tomb 5413), formed by twisting a thin metal “ribbon” into a spiral (Brunton and Caton-Thompson 1928, 12, Tomb 5413, pl. L, 86W3). From Matmar, copper cylinders (beads?) were found alongside carnelian beads in Tomb 2507 (Brunton 1948, 10, pl. lxx). Another four copper beads were found in Tomb 2840 at Mostagedda, one manufactured using the same technique as the copper bead from Tomb 5413 at Badari suggesting procurement from the same network, whereas the other three were reportedly formed by hammering a cast, square-sectioned blank around a circular core (Brunton 1937, 29, 51-53, pls. XXII:38, XXXIX: 79W3-9). In addition to the beads, a three-inch pointed copper object in the shape of a pin was found at Badari in tomb 5112, interpreted by the excavators as a borer for bead manufacture (Brunton and Caton-Thompson 1928, 7, 27, 33, 41, pl. 26:5112).

With regard to where the copper originated and who was in charge of its manufacture, the lack of Badarian material in the Nile Delta has resulted in claims that these groups would have traversed the Eastern Desert to Sinai, where copper sources are known (Hendrickx and Vermeersch 2000, 40; Baumgartel 1960; Anfinset 2010, 64-65). While it was originally thought the copper beads and awls were made from hammered native copper from the Eastern Desert (e.g., Baumgartel 1960), such claims are unsupported by the nature of the evidence (Ogden 2000, 151).

[70] While the attestation of copper is geographically widespread, it must be emphasized that the nature of local consumption was extremely restricted, revealing its procurement was difficult for a majority of groups in the Nile Valley.

It is therefore likely that early copper objects in the Nile Valley were made from smelted copper by a community who possessed metal-related knowledge. Braun (2011, 107, with references) has proposed that the appearance of copper in these assemblages is believed to have been mined from Feinan, smelted in the Beersheba settlements, and *traded* west to communities in the Nile Valley, explaining its appearance in Badarian tombs of Upper Egypt. Such a proposal raises the question about the nature of contact between these communities and the ways in which such cooperation may have led to shifts in the local significance of greenstone.

Horn (2014) has explained the significance of greenstone in Badarian mortuary assemblages as reflective of a newfound association connecting greenstone with a regenerative ideology centered on the rebirth of the individual. Drawing on dynastic-period epigraphic evidence, he discussed how the context in which we find green pigments during the fifth and fourth millennium provide a likely context for the origin of the later symbolism and significance that greenstone had for the Egyptian state. More specifically, Horn (2014, 58-59, with references) discussed the following associations of greenstone with the regeneration of the individual: 1) the numerous attestations of greenstone in the Pyramid texts, which are believed to have originally been oral spells tied to the rebirth of the king whose origins may date back to the Early Dynastic;[71] 2) the continued use of greenstone pigment for bodily adornment throughout dynastic Egypt; 3) the color green likened to that of vegetation in texts, a possible reflection of the early importance

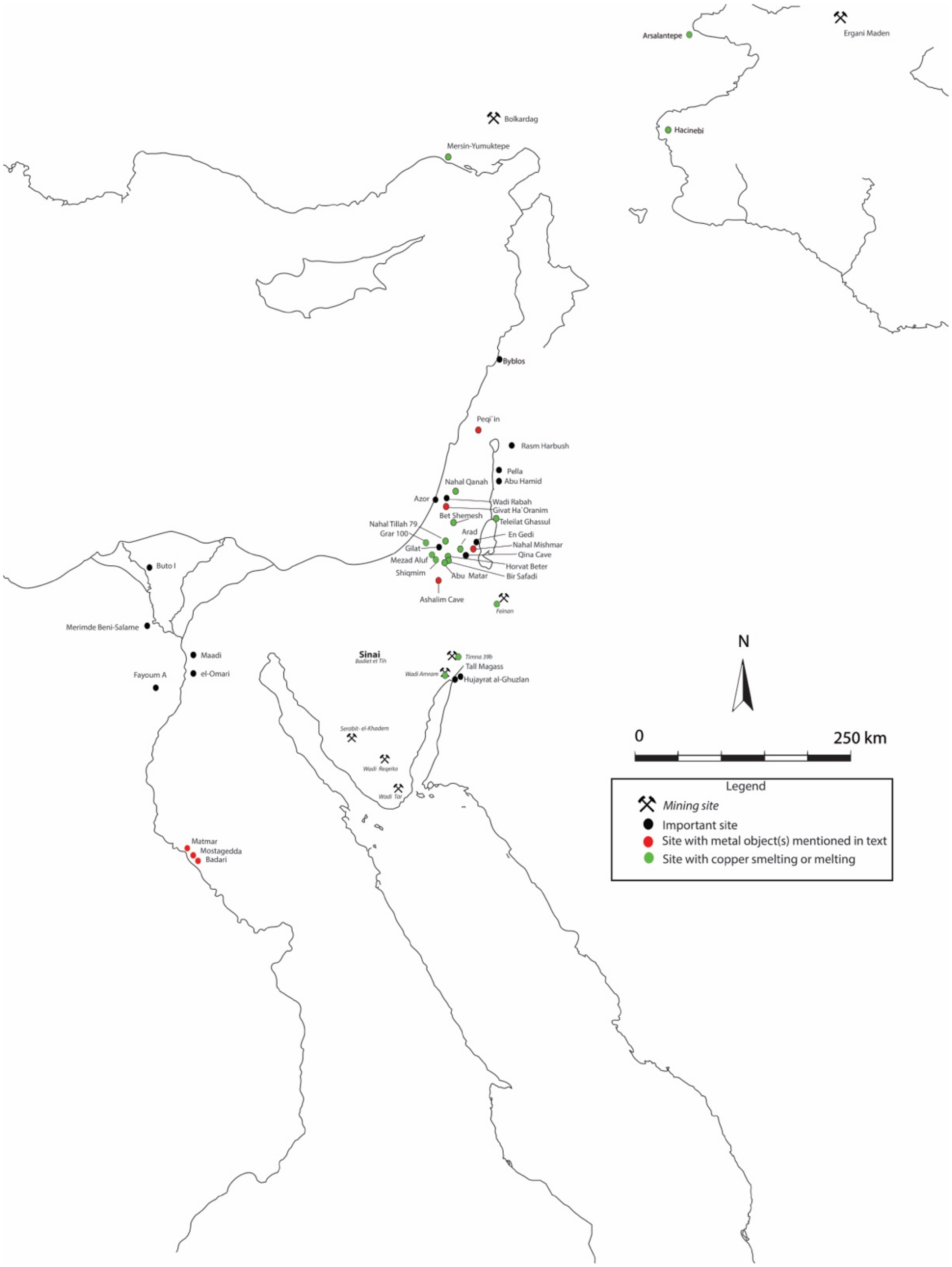
[71] Note I argue in chapters 6 and 7 that specific oral spells from these texts appear to reflect back on fourth millennium cooperation between Nile Valley elites later connected with the Egyptian state and metalworking communities in the Levant. For a summary of the dating debate for the Pyramid Texts, see Steiner (2011, 1-3 with references).

of plant cultivation; 4) the use of greenstone in the restoration of Horus' eye (lit. *wḏt*, green), attesting to its regenerative properties; 5) the use of greenstone in medical prescriptions; and 6) Spell 125 of the Book of the Dead, which requires the application of greenstone to the eye to reunite successfully with Osiris in the afterlife. While drawing on epigraphic evidence demonstrates the central importance of greenstone for the Egyptian state, it does little to help us understand *why specifically* it was during the fifth millennium that this ideology emerged, resulting in a fundamental shift in mortuary and labor practices. I argue we can provide nuance to this picture by examining the shifts in economic cooperation with communities in southern Levant, where copper production intensified alongside a new ideology centered on the reincarnation of the individual. Before exploring the nature of contact with the southern Levant, let us briefly review in more depth the contexts of greenstone within Badarian assemblages and the various uses of this stone in connection with the first appearance of copper.

Rethinking the Social Context of Greenstone in Badarian Mortuary Assemblages

The social significance of greenstone in southwest Asia was *originally* connected to communities adopting more sedentary practices beginning in the Late Neolithic (Bar-Yosef Mayer and Porat 2008, 8549). However, in the Nile Valley agricultural-based sedentism was not adopted until after

Figure 19. Badarian and Late Chalcolithic system of copper production.



the Naqada I ca. 3800/3700 BCE (Dee et al. 2013) and thus greenstone came to have its own local significance connected with the body and mortuary rites of passage at time when mining for greenstone in the southern Levant increased alongside the intensified need for copper in ritual display.[72] When we compare the contexts and uses of greenstone in the Nile Valley vs. southern Levant, however, there is a stark contrast that can only be explained by the social contexts in which the stone came to have its local significance in the fifth millennium. In the southern Levant, copper minerals had played an integral role as the stone of healing and regeneration since the PPNB; by the fifth millennium it retained those associations but also came to be viewed as the stone of transformation given its connection to copper metallurgy. As such, during the fifth millennium copper appears to have played a major role in display purposes connected with ceremonial rites of passage for various communities in the southern Levant, as well as provided a life-cycle metaphor for the belief system centered on reincarnation—all of these associations argued to be tied to economic intensification of production.

When we turn to the contexts of greenstone in Nile Valley burial assemblages, it appears communities recognized the stone as both one of healing and transformation, however they lacked the sociotechnical system locally to have copper play such a significant role in a relatively mobile community. Rather, the portability of the stone was more economically sensible to these early communities. Groups thus interred the deceased with chunks or pieces of raw, unworked malachite alongside stone palettes, grindstones, and sometimes copper awls—a practice that is not attested

[72] On the evidence for a lack of sedentarization of Nile Valley groups prior to the Naqada, see Wengrow 2003, 2006, 41-62, and Wengrow et al. 2014. On the late adoption of agriculture by Nile Valley groups, see the recent radiocarbon dates by Dee et a. (2013) as well as their discussion on the implications of their results.

in the southern Levant (Anfinset 2010, 114). That greenstone appears to have taken on its own significance in the Nile Valley is further supported by its lack of significance for the sedentary communities in the Nile Delta prior to Maadi (Chapter 6). Its application as a colored pigment to decorate the eyes and bodies of later Predynastic statues (Ayrton and Loat 1911, 12-13, pl. XV, n.1, Craig Patch 2012, 122, 127-128, cat. nos. 102, 106) has resulted in the general claim that it was used for "cosmetic" purposes (i.e., application to the body).[73] Such application, however, should be viewed in connection with the importance of the antimicrobial properties of malachite and chrysocolla as two copper minerals in Nile Valley burial assemblages. Support that greenstone was associated with healing is reflected in the placement of pieces of raw malachite as well as malachite pigments on the bodies of the deceased in areas that appear to have been diseased or damaged, leading several scholars to argue it held an apotropaic function connected to warding off disease and/or harm (Horn 2014, 59, with references). Its placements in these contexts reflects a similar connection to greenstone as the stone of healing, reflecting knowledge of its antimicrobial properties. Greenstone pigments also begin to appear in in leather bags placed near—or worn on—the body, often accompanied by expertly carved ivory spoons with zoomorphic figures for mixing the pigments, as well as bone needles used for application to the body. Within the primary pastoral framework, the importance of decorating the body with portable objects played a central role in

[73] The use of this term is problematic as it masks the ideological significance of greenstone pigments, rendering ordinary the application (either permanently or temporarily) of such ritually charged material to the body. The term thus dilutes the signification inherent in both the act of application as part of a ritualized system by tacitly drawing mundane associations to the material. The use of the word "cosmetic" hinders our understanding of the connection between the ideological significance of greenstone in connection to the introduction of extractive metallurgy in the Nile Valley.

the power strategies of these communities. Greenstone thus came to be the stone not only of regeneration but also *portability and transformation*—it could be displayed on the body, used to heal, and facilitate the transformation of the individual into the next stage after death.

Considering its importance in healing, transformation, and display, we might question the connection between greenstone, copper, and tattooing the body—the ultimate portable object of display, identity and power. Evidence that tattooing was practiced during the Badarian is supported by a figurine of a woman with an incised chevron pattern on her back from in a tomb at Badari (Brunton and Caton-Thompson 1928, pl. XXIV:3, Friedman 2017, 10, fig. 1.4). Further support for tattooing as a practice is attested during the Naqada I (ca. 3600 BCE), when a woman between the age of 40 to 50 from Hierakonpolis HK43 in Burial 333 was found with a toolkit for medicinal and tattooing purposes. The toolkit included plants, fruit, incense, and unguents, round stones and a bird-shaped greywacke palette to grind the pigment, a leather bag of resin, and, among other things, five polished bone awls made from the metacarpals of both sheep and pig,[74] attesting to the female tomb owner's status as a "magico-medicinal practitioner" in the community (Friedman 2017, 22 with reference to Friedman 2003)[75] and connecting her to communities where sheep and pig were raised. Friedman (2017, 21-22) reports the woman's grave was the richest outside of the elite cemetery, suggesting she held a place of distinction in the community. Such a toolkit provides

[74] Recent experiments by Deter-Wolf and Peres (2013) demonstrate polished bone is the most ideal tool for tattooing.

[75] In Chapter 7, I argue that the Egyptian king will co-opt these early symbols of healing as the master ritualist in chief. As such, it is important to recognize the ritual landscape in which they first appear.

a parallel context with the 40-year-old from Tel Tsaf, buried with an ostrich eggshell necklace at her waist and the earliest metal object in the Levant (Garfinkel et al. 2014).

Tattooing is also physically attested as a practice during the Naqada II-III at Gebelein, as the mummified bodies of both a man and a woman speak to the decoration of the body with greenstone pigment as a ritualized act connected with certain corporate group practices (Friedman et al. 2018). Tassie (2003, 97-99) proposed that five copper awls from Grave 1027 dated to the Naqada III at Kfar Hasan Dawood in the eastern Delta may have been used as tattooing needles given the context of the assemblage —which belonged to two females aged 25 to 35. In light of the above evidence, we might reinterpret the copper "borer" at Badari in tomb 5112 in connection with tattooing. The a thick, three-inch pointed copper object in the shape of a pin was found alongside ivory pins, a bone awl and needle, a basket containing malachite, a fishtail knife,[76] an ivory bangle, a slate palette with "a round lump of green malachite paste and green paste in (a) little ivory vase" (Brunton and Caton-Thompson 1928, 7, 27, 33, 41, pl. 26:5112). Such use would create a connection between copper as a ritually-charged tool to adorn the body with the very pigment from which it was made. Given its antimicrobial properties, copper implements would have also served a functional purpose as tattooing needles given the poke and stick method would have broken the skin literally inking the stone of healing into the body. Such a combination may have worked to prevent infection while simultaneously showcasing participation in a specific community connected with the manipulation of greenstone.

[76] These flint knives were produced by one group in the Nile Valley and appear to have been used in rebirth rituals that later transformed into the opening of the mouth ceremony (Hikade 2003).

With regard to identity, tattooed individuals appear linked to a specific group that comprised of dancers and musicians who participated in ritual hunting and various ceremonies related to life and death (Friedman 2017, 22, with reference to Hendrickx et al. 2008, 212-219). While the significance of tattooing remains debated, we cannot dismiss it as a practice connected with early metalworking circles, especially when we consider that ceremonies of life and death tend to play a major role in both mining and smelting rituals (Herbert 1993, 68-69). Indeed, the practice of storing malachite, ochre and galena in leather pouches—which are often found in Badarian and predynastic tomb assemblages—is a dynastic characteristic of desert prospectors known as *sementiu,* whose title was classified with a man holding a leather pouch to store that ore (A33).[77] The possibility of tattooing in metalworking communities gains nuance when we consider the earliest metal object is a copper awl in the southern Levant that was found with an older woman of status, that the awl finds parallel with those from the Ubaid, and that it is during the Ubaid that tattooing appears frequently on female figurines tied to fertility (Joffe, Dessel, and Hallote 2001, 12). In the Nile Valley, the correlation between females, awls, grinding stones, malachite pigments and ivory spoons seems to point to their role as ritualists in their respective communities. Is it possible that women were used as tools to facilitate economic cooperation between communities in the Nile Valley and southern Levant, fostering ties through kinship? Moreover, is it possible they played a role in the transfer of knowledge at the local level? When we consider that greenstone appears in funerary assemblages at the same time that we see the

[77] The connection between prospectors and leather pouches filled with greenstone is attested in the burial of a man dated to Dynasty 6 at Ayn Soukhna, the port in the Gulf of Suez, whence the Egyptian state launched expeditions to collect copper from Sinai (Abd el-Raziq et al. 2011, 2017, Tallet 2016–2017).

intensification of metallurgical production in the southern Levant—argued to be connected to new forms of ritualization around community cemeteries—we must re-evaluate the nature of contact between communities.

Crafting Constellations of Ritual Praxis and Community Identity

As Anfinset (2010) has demonstrated, increased interaction between communities in the Nile Valley and southern Levant correlates with the rise of specialized pastoralism, resulting in wider-reaching interregional exchange networks mediated through transhumant groups. In the southern Levant, however, the presence of Nile Valley groups is largely understood as the product of trade, typically through the presence of imported objects from the Nile Valley. Such imported "Egyptian" objects include: maceheads from the Nile Valley (Czarnowicz 2014a); shells from the Red Sea and Nile (Bar-Yosef Mayer 2002); flint tools, hippopotamus and elephant ivory, as well as ivory statuettes carved in a similar style Braun (2011, 107). In the Nile Valley, evidence of foreign interaction includes Red Sea shells (Hendrickx and Vermeersch 2000, 40) and a tabular scraper at Badari (Braun 2011, 107). Evidence for an interregional exchanges connecting the Western Desert with Sinai is hinted at via the preliminary identification of malachite and turquoise at Nabta Playa (Kobusiewicz et al. 2004, 570).[78] While it is acknowledged that such interaction between Nile Valley groups and southern Levantine communities would have resulted in multidirectional

[78] More analysis is needed on objects identified as turquoise, as preliminary research conducted on beads previously identified as turquoise reveals they are of glazed steatite (Horn 2015). Evidence that Sinai was mined by the sixth millennium is supported by an unpublished date from a turquoise mine reported at Jebel `Adeideh, approximately 9 km south of the major copper mining district of Bir Nasb (Avner 2002, 44, n.18). Beit-Arieh (1980) also reported a Chalcolithic site near Serabit el-Khadem, whose material culture resembled that of the Beersheba-Ghassulian communities in the southern Levant, perhaps reflecting the different groups who utilized the landscape or collaborated to mine the material.

influence, Braun (2011, 107) has stated that we know very little of whether—and the extent to which—Nile Valley groups adopted or adapted elements from their southern Levantine neighbors. In what follows, I will demonstrate that there was a great deal of southern Levantine influence on Nile Valley practices, providing a context in which the significance of greenstone was learned via intensified economic cooperation in the system of copper production.

Nile Valley Cooperation in the Southern Levant

The spatial distribution of Nile Valley material in the southern Levant reflects participation in local communities and their ritualized behaviors. Evidence that the same cultic objects were used by groups in the Nile Valley as in the southern Levant is supported by the presence of perforated ivory rods believed to have been used in a ritual attested at Nahal Qanah, Teleilat Ghassul,[79] and in a tomb at Mostagedda in the Nile Valley (Klimscha 2013b, 93, with reference to Scham and Garfinkel 2000), creating connections between metalworking communities in the southern Levant and the same ritualized use of ivory in the Nile Valley. Indeed, the presence of Egyptian maceheads in the Negev (Czarnowicz 2014a) and in northern Jordan at el Khawarij (Lovell et al. 2006) suggests the same symbols of power were now being manufactured in the Nile Valley and regions farther south, reflecting the integration of these communities into an expanding regional system.[80] When we look closer at certain sites, the nature of interaction becomes clear.

[79] It should be recalled that both Nahal Qanah and Teleilat Ghassul reflect spaces of significance for skilled individuals who possessed metallurgical knowledge (Chapter 4).

[80] Evidence that this system may have extended down into Sudan is suggested by the presence of Cialowicz's Type 2 macehead in Fayoum A and Sudan (Cialowicz 1989, 261).

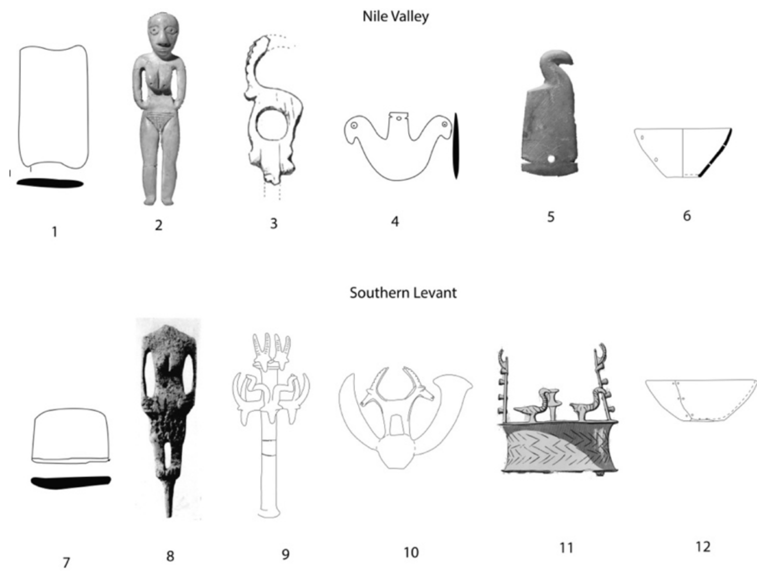
Beersheba region

During the Late Chalcolithic, certain communities in Beersheba region were economically specializing not only in copper production, but also ivory carving. The similarities between Nile Valley ivory carvers and those in the Beersheba region have long been noted, but the nature of influence has been little explored (Perrot 1955c, 185-188, 1959). When we look to the iconography employed on Nile Valley palettes, decorated ivory spoons, combs, and pins, many find parallels in the ritualized imagery connected with metalworking communities in the Chalcolithic southern Levant. Similarities in ivory carving style are most notable in two female figurines—one in the Nile Valley and the other at Bir es-Safadi in the Beersheba region. The first was excavated from the fill above Tomb 5107 at Badari and depicts a woman with folded arms, large almond eyes and a pubic triangle, carved from hippopotamus ivory (Figure 20:2; Brunton and Caton-Thompson 1928, 28-29, pl. XXIV:2, XXV:3-4). In form, she bears a striking resemblance to the carved ivory figurine at Bir es-Safadi, found in a silo dated to the last phase the site's occupation (Figure 20:8). Noteworthy is that the Bir es-Safadi figurine appears to be carved onto a sprue,[81] hinting at the potential influence that lost-wax-cast figurines may have had on the ivory figurine's design and thus exposure of the ivory carver to the lost-wax casting production process. Indeed, it was at Bir es-Safadi that an ivory workshop was attested in a subterranean space where awls and elephant ivory were located (Perrot 1959). Such subterranean spaces were also used for metalworking,

[81] While it is typically sawed off as part of the finishing process, lost-wax cast figurines from the northern Levant retain the sprue as a functional component to aid in their vertical installation. It should be noted that the earliest known lost-wax cast figurines are found at Tell Judaidah in the Hatay province of southeastern Anatolia, date to Phase G in the Amuq chronology (i.e. EB I-II). While the drawings included in the original publication the figurines did not depict them with sprues (Braidwood, Braidwood, and Haines 1960, 300-306), the metalworker(s) who cast these figurines did indeed design them to retain their sprue as attested in a photograph of the figurines (Perrot 1979, pls. 108-109).

reflecting the importance of ivory carving for metalworking communities and the potential ritual importance of production in underground spaces similar to the mines in the Wadi Arabah.

Figure 20. Similarities between Badarian and Predynastic (nos. 1-5) and Late Chalcolithic material from the southern Levant (nos. 7-12). See Table 12 for references. Images adapted by author.



While the Badari figurine has thicker legs, a more robust face, and is notably not on a sprue, her bodily composition reflects the same carving tradition attested to during the Late Chalcolithic in the Beersheba region, suggesting a shared tradition of production.[82] Given the presence of Nile Valley groups in the region, it is possible that the similarities in motifs were the product of

[82] The Beersheba ivories should be contextualized against a broader stylistic trend dating back to the Ubaid "lizard figurines" of the sixth millennium found at Ur, which depict females with accentuated pubic triangles and folded arms. While the heads of these figurines have been interpreted as various zoomorphic creatures including birds and lizards, it is proposed here they relate to the cult of a serpent mother goddess tied to metallurgical production and ritual (Chapter 7). While the serpent mother goddess has been widely discussed in the literature, only recently was the connection between serpent cult and metallurgy discussed by Amzallag (2016b), who points out that it is only during the Chalcolithic when serpents become a feature of local assemblages in the southern Levant.

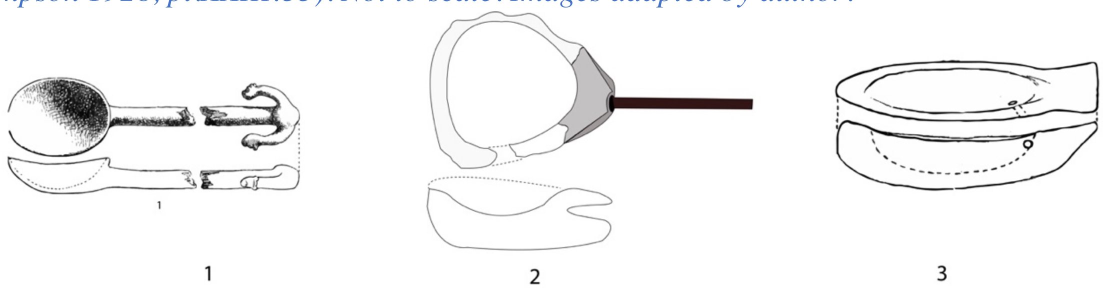
participation in public ceremonies and rites of passage wherein these standards would have been on display.

Full participation in these metal working networks is likely given the nature of stylistic motifs that appear on Nile Valley ivories and lost-wax-cast display pieces from the Nahal Mishmar hoard. These parallels include the ibex head with accentuated horns (Figure 20:3), recalling the imagery employed on the ibex and ram scepter from the Judean Desert (Figure 20:9). The sinuous bird motif is also shared between communities, appearing in the form of a double bird on the handle of an ivory spoon from Tomb 5457 at Badari (Figure 21:1) as well as a greywacke palette carved in the shape of a bird to grind pigment from Tomb 185 at Mesaid dated to the Naqada II (Figure 20:4). Indeed, the double bird recalls the double ibex standard from the Nahal Mishmar hoard (Figure 20: 10), emphasizing the shared practices between Nile Valley ivory carvers and metalsmiths in the southern Levant. Stylistically, the way in which these birds are carved find parallel in the southern Levant during the Late Chalcolithic and EB I as supported by the application of modeled birds on the rim of a lost-wax cast copper "crown"[83] from the Nahal Mishmar hoard (Figure 20:11), as well as the birds placed on the rim of a transitional Chalcolithic-

[83] In Chapter 4, I proposed that these crowns should be interpreted as furnace collars on the basis of their form, which was similarly proposed by Amzallag (2018, 66-67). This proposal finds support as the collars find parallels to the furnaces of the Late Chalcolithic Beersheba settlements (Golden 2010, fig. 21.2). Noteworthy is that the Naqada III/Dynasty 0 furnace at Elephantine is described in a similar way to these early installations (Pfeiffer 2009, 324-325). While this may seem like a long chronological gap–from 4000 to 3300 BCE–the recent publications from Ashkelon-Afridar Site E reveal that these furnaces with collars continue throughout the EB IA at the site (Golani 2014, 124). Within this context, Moorey (1988, 179) reported that a terracotta model from Hu was stylistically similar to one of the "crowns" with appliques from the Nahal Mishmar hoard, but described it as a city wall. When viewed together it is possible that later Nile Valley groups were aware of the furnace construction, which was no doubt visible if smelting was performed in public community spaces as at Abu Matar in the last phase of its occupation.

EB I basket-handle vessel with cultic associations (Amiran 1986, 86).[84] Indeed, even some ivory spoons resemble—if somewhat superficially—the socketed crucibles from various sites in the southern Levant (Figure 21:1 vs.2). When we consider copper ore had to be ground down into small chunks or powder and then placed into the bowl of a socketed crucible, it is possible that such a resemblance is more than superficial, as the ivory spoons were used to scoop greenstone—filled with ground ore just like a crucible but for application to the body. Indirect evidence that certain groups were aware of socketed crucibles is hinted at by a "mud" object (bead or model?) from a tomb at Badari argued here to resemble one of the socketed crucibles in the southern Levant (Figure 21:3). At Abu Matar it should be recalled that smelting and casting took place in an above ground courtyard in the last phase of the site, providing a context in which communities would have witnessed the act of production/creation.

Figure 21. Similarities between Badarian ivory spoon, Tomb 5457 from Badari (Brunton and Caton-Thompson 1928, pl. XXII:7), southern Levantine socketed crucible from Meser, EB I (Pfeiffer 2009, fig.13), and a ceramic "bead," Tomb 5452 from Badari (Brunton and Caton-Thompson 1928, pl.XXIII:33). Not to scale. Images adapted by author.



Participation in an economic system requires that exchanges be made and as such we must question how certain Nile Valley groups were permitted to participate. While it is unclear whether

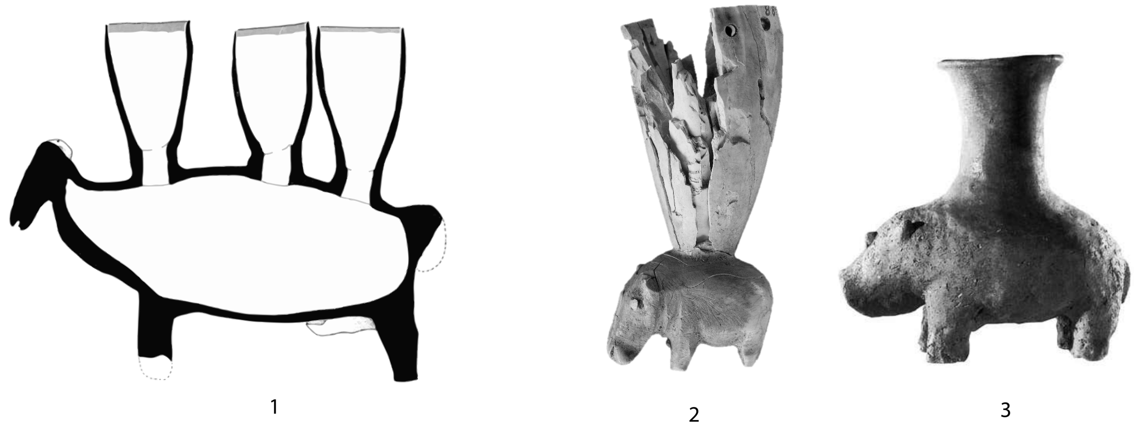
[84] This cultic vessel is also held by the sandal bearer on the Naqada IIIB Narmer palette (Amiran 1986), attesting to its longevity in certain elite circles.

the ivory from the southern Levant came from Syria or Egypt, bringing ivory from the Nile Valley may explain the presence of unworked elephant tusk from the subterranean ivory workshop at Bir Safadi (Perrot 1959, 16), as well as in the Nahal Mishmar hoard (Bar-Adon 1980). The elephant's importance for Nile Valley elites is reflected by its appearance as a common motif carved and painted onto ceramic vessels, depicted in rock art, etched into slate palettes, carved into ivory knives, and interred alongside human burials at Hierakonpolis by the Naqada II (Friedman 2004). In addition to elephants, hippos were known to have played a significant role in Predynastic elite culture. During the early fourth millennium, they begin to appear on the rim of certain vessels in a similar manner as that of the bird applique on the Nahal Mishmar crown, as well as depicted painted on vessels where they are alone or being hunted (Czarnowicz 2018), reflecting their economic importance for elites. A connection between hippopotami and greenstone is suggested by the appearance on hippopotamus figurines of open channels on their backs, potentially to hold greenstone pigments (Horn 2014, 58). The similarities between these figurines and the ram with cornets on its back from Gilat are striking (Figure 22: 1-3) and propose that a cognitive association existed between the cornets, beeswax and these Nile Valley figurines and greenstone.

Gilat

In addition to the Beersheba settlements, Nile Valley groups also appear to have been active at the pilgrimage center of Gilat, providing another context for exposure to—and possible participation in—local rituals and systems of belief. Archaeologically, objects from the Nile Valley attested at

Figure 22. Similarities between cultic vessels in southern Levant and Nile Valley1: Ceramic painted figurine with cornets on its back, from Room A at Gilat (Amzallag 2018, fig. 7). 2: Ivory hippo with cornet(?) on its back from Nile Valley, predynastic; 3: Ceramic hippo figure with vessel/channel on its back, from Nile Valley, Naqada I-II (Droux 2011, fig.1). Not to scale.



Gilat include: maceheads parallel to those in the Nile Valley (Rowan et al. 2006, 591, 596), stone palettes (Rowan et al. 2006), pressure-flaked blades, fan scrapers, shell from the Nile (Bar-Yosef Mayer 2006), and vessels made *from* Nile clay (Gilead and Goren 1989, 7). Rowan et al. (2006, 581, 596) have discussed the similarity between the stone palettes from Gilat (Figure 20: 7) to Nile Valley assemblages (Figure 20: 1), noting that Gilat appears to have the highest quantity of these palettes in the southern Levant, which would naturally be the product of intensified interactions between communities. While Gilat does have evidence of unworked greenstone on site, one of the differences between the slate palettes at Gilat and in the Nile Valley is the absence of grinding pebbles at Gilat (Rowan et al. 2006, 581). The presence may attest to a connection between these communities that resulted in the exchange not only of these objects but also the subsequent system of beliefs regarding their use. What those systems of belief involved, however, have remained unexplored, calling for the need to critically investigate the potential contexts in which these exchanges took place.

When we return to the similarities between the Ram with Cornets and the hippopotami with greenstone, we are provided with yet another line of evidence proposing these Nile Valley groups were highly integrated into a shared ritual landscape by virtue of their cooperation with one another, constructing a community whose practices—while geographically apart—were the product of participation in the same crafting tradition (=community). It is important to recognize that these similarities are not superficial—rather, they should be understood as the product of the cooperation between communities and the construction of a shared repertoire of symbols to mediate cooperation. That means that during the rise of cult centers in the southern Levant alongside a new system of belief—potentially linked to reincarnation—Nile Valley corporate groups were part of this process. Such an explanation provides nuance as to why these stylistic parallels are reminiscent of the shared cultic iconography so characteristic of the different regional schools of production in the Chalcolithic southern Levant, suggesting participation in a broader cultic landscape that involved the sharing of knowledge. Such participation no doubt led to transformations in worldview.

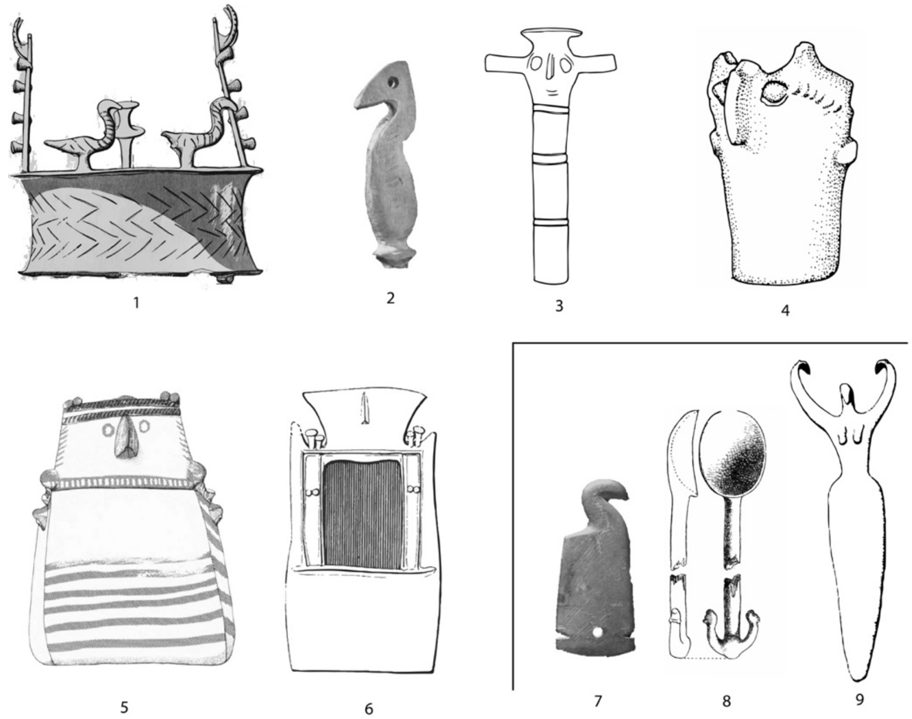
Horus in the southern Levant?

It should be recalled that one of the characteristics of a community of practice is the diversity among its members. As such, what constitutes the group's shared repertoire is both cohesive and coherent yet constantly in flux: newcomers will not only come to embody the shared repertoire of symbols and practices that mark membership through legitimate peripheral participation, transforming their identities as they move toward becoming full members, but they also bring with them their own identities, practices and complex worldviews that can lead to transformations in the community's shared practices and thus identity. When placed within the context of stateless complex societies, it is through ritualization that non-related groups will cooperate with one another and through population influxes that complexity is intensified, and behaviors transformed. The intensification of copper production during the Late Chalcolithic is argued to be connected to the known new community pressures brought on by population increase and demographic shift (Chapter 4). I argued that these changes in the belief system were the result of managerial leaders using new forms of taboo about the afterlife to legitimize the intensification of production—copper was now necessary and came to form a life-cycle metaphor, allowing the region to intensify economic cooperation abroad. The system of production surely would have required more labor and resources, deepening tis between communities. Individuals now displayed both anthropomorphic and zoomorphic features and secondary burial was key. Here we must ask whether such influence may have also resulted in the Nile Valley construct of a shared world view with their eastern neighbors—one that would last throughout dynastic Egypt.

Within this context of economic participation through a highly ritualized landscape, one symbol that becomes critical to the construct of a later Egyptian state identity is the human-bird motif, which is argued to potentially originate to the southern Levant. During the Late Chalcolithic, birds of prey became important symbols given their role in excarnation of the body for secondary burial—a key stage in preparing the body for transformation. Secondary burial was a practice that belonged to a new, homogenous system of belief across certain communities in the southern

Levant that was borne out of responses to population increases. The formalization of extramural cemeteries was a way to establish a central place around which the community could

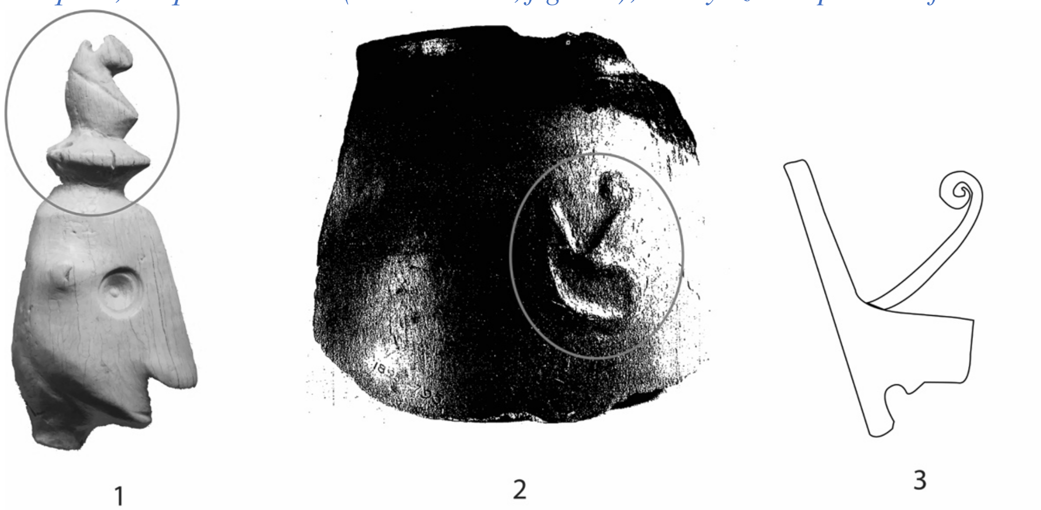
Figure 23. Similarities in prominent-nose/human-bird and bird motifs between Southern Levant (1-6) and Nile Valley (7-9) during late fifth and early fourth millennium. Table 10 for references. Images adapted by author.



reify bonds. As such, the centrality of the human-bird/prominent-nose motif appears across the southern Levant, transgressing regionally distinct assemblages in both domestic and funerary contexts. This shared motif is thus connected with its importance in daily life (Shalem 2017). The interplay between human and bird seemingly supports a recent proposal that this new belief system centered on the reincarnation of the individual in this life, who could be recast with varying degrees of zoomorphic features (Ilan and Rowan 2019). The motif might have played a role in the costumery of the ritualists in the Teleilat Ghassul frescoes, wherein vulture masks and possible feathers or horns were worn in funerary procession, emphasizing the central and symbolic role of the ritualists role in facilitating the transformation of the individual. Assuming a certain degree of functionalism, I argued that the shift to this specific worldview was the product of the intensification of copper production via mortuary shrines which functioned as organizing economic activities. Given the materiality of production process, the creation of copper as a life-cycle metaphor for local communities was an easy transition given the long-standing association of greenstone with healing. The performative aspects of smelting may have been perceived as magical—transforming the stone of regeneration into the stone of transformation.

The appearance of a bird motif occurs relatively contemporaneously in the Nile Valley during the fifth millennium. Whereas the human-bird/prominent-nose motif was connected to excarnation and the ritual specialists in the southern Levant, in the Nile Valley secondary burial was not practiced until the Naqada II, implying that the significance of the motif derived from another context. As discussed above, during the fifth to early fourth millennium birds appear on ivory spoons used to scoop greenstone out of bags and presumably zoomorphic ivory figurines, some of which draw direct parallel to the ram with cornets on its back at Gilat. The importance of this bird-motif in connection to regeneration and greenstone is supported by the Naqada I-II stone carvers, who begin to quarry greywacke from the Wadi Hammamat—where copper and gold will later be mined—specifically to carve stone palettes in the shape of birds for grinding greenstone. Indeed, the same interplay between human and bird is best attested by a Naqada II female figurine in the shape of a bird with her arms raised in a dancing gesture (Figure 23.8), reflecting a similar arthro- and zoomorphic interplay individuals could embody. Perhaps the best know attestation of this convergence of mortuary belief is the later Egyptian king as Horus perpetually in a state of reincarnation. Given the importance of this period in establishing the economic foundations of cooperation and ideology, it is possible that certain Nile Valley communities—who would later become the ancestors of dynastic kings—were shaped in part by participation in this economic system of exchange with the Chalcolithic communities in the southern Levant.

Figure 24. Parallel depictions of cultic headdress: 1) Cultic headdress on ivory man with prominent-nose motif, Abu Matar, Late Chalcolithic (Levy 2014, 41); 2) Red Crown on ceramic sherd from Naqada, Naqada I/EB IA (Baines 1995, fig. 3.1); 3: Stylized depiction of Red Crown.



Support that the system of ritualized behavior within the system of copper production may have formed a context in which certain symbols were first coopted by Nile Valley corporate groups, later becoming connected to Nile Valley elites. In addition to the Teleilat Ghassul ritual servitors as potential human-vulture performers, of interest here is the head of an ivory figurine from Bir es-Safadi, carved in the human-bird style with prominent nose. Of specific interest is the cultic headdress that sits upon his head, which bears striking resemblance to the later attested Red Crown worn by the Egyptian king (Figure 24:1 vs. 3). The earliest known depiction of the Red Crown appears from Tomb 1610 at Naqada in the Nile Valley, in Naqada I/early fourth millennium contexts (Figure 24:2). The appearance of this symbol in the Beersheba region therefore adds another level of support for the influence and exchange that occurred between communities in the Nile Valley and southern Levant. I am not claiming that the Egyptian state arose in the southern Levant. Rather, what I wish to draw attention to is the way in which such intense economic cooperation between communities transformed local identities, power dynamics and belief systems. Here we must ask whether the close interactions so clearly indicated by the archaeological record was the context in which Nile Valley corporate groups learned their knowledge of extractive metallurgy and mining.

Greenstone Glazed Steatite Beads and Landscapes of Knowledge Transfer

Considering the shared set of cultic practices surrounding funerary rites of passage, we must ask whether transfers of metallurgical knowledge *actually* occurred between communities and if so, how would these have contributed to the mortuary significance of greenstone. How can we answer this question in the absence of metallurgical refuse? A cross-craft approach will allow us to explore proxy data that may reflect knowledge of and a connection between greenstone and pyro-technology. The close contact between ivory and metal production was suggested by the context of the workshop in a subterranean space at Bir es-Safadi, the regionalization of ivory production in the Beersheba Valley, the shared motifs between ivory and metal in the Nahal Mishmar hoard, as well as the extractive carving techniques wherein carving wax and ivory are essentially the same in terms of extraction of material to a desired form. While this is not enough to suggest knowledge of metal was procured by these groups, we might gain further insight when we look to the appearance of glazed steatite beads, which also appear around the same time as greenstone and copper in Badarian assemblages.[85]

Glazed steatite beads first appear in Nile Valley funerary assemblages during the second half of the fifth millennium, in contexts contemporary with both metal production in the Beersheba region and the appearance of glazed steatite beads from Peqi`in Cave (Bar-Yosef Mayer et al. 2004). In a recent preliminary investigation into the techniques employed in the production of Badarian beads, Horn (2015, 114) discussed the different manufacturing techniques employed to produce the beads at Peqi`in vs. those in Badarian assemblages. At Peqi`in, the beads were made by: 1) molding a ground steatite paste combined with an alkali flux and copper powder for glazing; 2) molding the paste around an organic core; 3) cutting the beads to shape; and 4) firing the beads using the efflorescence method[86] (Bar-Yosef Mayer and Porat 2009, 118). This method was also attested at Mehrgarh and connected to a metalworking package tied to small-scale migrations into the southern Levant from the north (Bar-Yosef Mayer and Porat 2009, 118). Conversely, Badarian beads appear to have been drilled from a solid steatite stone cylinder and thus glazed using the cementation process (Horn 2015, 115).[87] Tite and Bimson (1989, 88-89, 93-94) confirmed that the

[85]See previous studies by (Vandiver 1983, Tite and Bimson 1989, Nicholson and Peltenberg 2000, Tite and Shortland 2008, Horn 2015).

[86] Efflorescence is a glazing technique that essentially involves mixing the glazing agent with a crushed paste containing an alkali flux. The flux then initiates a process wherein soluble salts rise to the surface of the shaped object during the drying process, creating what has been referred to as a "scum." When the paste is heated, the salts melt and the object self-glazes (Nicholson and Peltenberg 2000, 189). This method is important for recognizing that the producer has an embodied knowledge of the properties of the materials and heating mechanism.

[87] Cementation involves encasing the object in the glazing power and heating it in a vessel, resulting in the fusion of the glazing material to the object and a hard crust that is then broken off (Nicholson and Peltenberg 2000, 190). The manufacturing techniques regarding the shaping of the stone are currently being investigated by Horn.

colorant used for Badarian-Predynastic faience and steatite beads was copper powder. The importance of glazing steatite with malachite for the manufacture of beads was recently illustrated by Horn (2015, 111), whose preliminary results on the production techniques employed in Badarian bead manufacture suggest many beads previously identified as turquoise may actually be glazed steatite beads.[88]

On the surface this seemingly supports a previous argument made by Hendrickx and Bavay (2002, 60) that glazing steatite was independently invented in both Egypt and the Near East.[89] However, the sudden appearance of steatite beads—whether as a molded paste or drilled stone—colored using a *copper powder* reflects novel uses of greenstone in conjunction with pyro-technology in a region that has no evidence of plaster production (and thus pyro-technology) prior to the mid-fourth millennium. At Peqi`in, Bar Yosef et al. (2004) observed that the glazed steatite beads reflect the first time such pyro-technology was applied to material outside of ceramics and plaster, positing it formed part of an "experimental package associated with the emergence of metal production." It is thus significant that locally-produced glazed steatite beads begin to appear in

[88] Note that Horn (2015, 111) also acknowledged the possibility that glazed steatite beads could have mimicked more precious turquoise beads, leaving open the possibility that turquoise beads were actually in circulation. Hendrickx and Bavay (2002, 60-61) maintain that turquoise was not in circulation until the late Naqada II and contest Beit-Areih's (1980) claim that the site discovered in Sinai near Serabit el-Khadem can be exclusively dated to the Chalcolithic. Their claim is on the basis of the fragmentary nature of the ceramics used to date the site, the presence of a Canaanean blade typical of the EB I, and Egyptian marl ceramic sherds representative of the Naqada IIIA2, contemporary with the EB IB. However, sites in Sinai are known to reflect multiple short-term habitation episodes, providing an explanation for the presence of Naqada III sherds. Indeed, Klimscha (2009, 384) reported a calibrated radiocarbon date from the wood at the site surveyed by Beit-Arieh, which provided a date consistent with the Chalcolithic (ca. 4240-3960 BCE). Evidence pre-dating occupation at the site is potentially supported by activity in a turquoise mine at Jebel `Adeideh located 9 km south of Bir Nasb where A. Goren is reported by Avner (2002, 44, n.18) to have excavated material that provided a radiocarbon date in the sixth millennium BCE. Indeed, turquoise is attested from the Late Natufian alongside malachite (Bar-Yosef Mayer and Porat 2008, Table 1).

[89] Horn (2015, 104) accepts this proposal.

Badarian assemblages at the same time as imported copper and lapis beads from outside the region copper, *as well as chunks of malachite, greenstone pigment, and carved stone palettes* of a type similar to those as the cult center of Gilat in the southern Levant. The economic cooperation between these groups must have resulted in transfers of knowledge given the effects that the ritual landscape had on local Nile Valley groups.

Further support for this hypothesis is seen in the origins of faience technology, which is generally assumed to have been invented by communities in the Nile Valley. This assumption is reflected in the presence of glazed and faience beads reported from Teleilat Ghassul, where it is assumed their origin was from the Nile Valley (Bourke 2002, 156). However, while the Badarian beads were drilled and glazed using the cementation process, the manufacture of faience beads shares technological similarity to the production of the Peqi`in beads, providing a connection between greenstone (glaze), pyro-technology, and metalworking communities north of the Nile Valley. In terms of their production, faience beads consisted of modeling a silica-alkali-lime paste to form, dipping the object in a soda-lime-silicate glaze and then baking it at a high temperature (Nicholson and Peltenburg 2000, Nicholson 2009). Predynastic faience beads thus were formed on an organic axis (such as wood or thread), cut, and then fired, leaving a negative space in the center of the beads or pendants (Lucas and Harris 1962, 44-45), reflecting the same technique described for the beads at Peqi`in (Bar-Yosef Mayer and Porat 2009).

With regard to the connection between glazing stone and copper production, Moorey (1994, 168) discussed the uncertainty of the relationship. From Chalcolithic Abu Matar, Perrot (1955b, 79-80) described the inside of the furnace walls as glazed[90] whereas Lucas and Harris (1962, 45) proposed that glazing took place in a pan or at the bottom of the oven. The connection between (s)melting furnaces and glazing as a technology is important as it implies individuals who knew how to glaze beads may have observed the smelting process or been involved. This technological connection between glazing and metallurgical production was raised by Hauptmann et al. (2000) when examining the smelting furnaces at Ras en Naqb in the Feinan, where blue, green and dull red glazes cover numerous furnace fragments. While both glazing and smelting share a "quartz-rich matrix and its chemical reaction with copper and alkali-salts at high temperature," Hauptmann et al. (2000, 113) assert that the differences include high concentrations of potassium in the furnace samples vs. sodium as the major element in Egyptian glazes,[91] implying that the Feinan furnaces during the EB were not the origin of faience glazing. The glazing of vitreous materials so characteristic of various Egyptian industries, such as steatite, faience, and later Egyptian blue, may therefore find their origins in the situated learning that took place during periods of temporary migration to the southern Levant to participation in economic exchanges with metalworking communities in the southern Levant. When we consider that Nile Valley pastoralists were present in the landscape, that they learned how to glaze but within their own stone carving tradition, we provide a tentative context for technological exchanges that took place between individuals and flourished in their own unique local settings. As such, the presence of greenstone in Badarian

[90] Moorey (1994, 168) has pointed out that Perrot's description of the glaze in the furnaces as the product of "the combination of metal, silica, and bases" is not a solid analog for soda-lime-silicates found in faience glazing.

[91] This analysis was conducted on EB III-IV furnaces from Feinan and as such the chronological gap between the earliest glazed beads—attested during the Badarian—and these samples needs to be considered.

funerary assemblages alongside the first attestation of glazed steatite beads strengthens the hypothesis that collaboration between communities may have resulted in similar ideological associations with regard to the perception of greenstone as well as familiarity with copper production.

Discussion

The Badarian and early Predynastic are often acknowledged as the periods in which core symbols of the Egyptian state and belief system began to crystalize. While we do not have Nile Valley texts attesting to the reception of the early economic or ideological importance of mining and metallurgical production, epigraphic evidence spanning the course of the dynastic Egypt and into Ptolemaic times connects metallurgical production with birth and the gods (Aufrère 1991). It is argued to be significant that the social importance of greenstone within a funerary setting during the Badarian period coincides with the emergence of a specialized carving industry that shares motifs with those found in the Nahal Mishmar hoard. As such, I proposed that certain Nile Valley corporate groups engaged in intense economic cooperation with metalworking communities in the southern Levant at a time when the local system of copper production was undergoing intensification and ritualization, becoming embedded within the larger local landscape. The nature of this interaction was such that we can detect exchanges of knowledge around cult as well as technological practice. Although we currently lack the data to unequivocally prove whether certain Badarian groups possessed the knowledge of extractive metallurgy, the Nile Valley practice of glazing steatite beads suggests that technological knowledge *was* shared between communities. Given that technological systems are fundamentally *social* systems, the economic cooperation between groups would have required a shared set of practices to mediate contact, sustain engagement, and foster a sense of community.

Wengrow (2003, 2006) argued quite convincingly that the power of the early Egyptian state must not be sought in the sedentary communities with which we so often associate the origins of state power, but rather from the pastoral communities who co-opted the body politic through funerary display, showcasing their restricted knowledge of and participation in external communities abroad. When we explore the nature of interregional cooperation within the context of this framework, we begin to nuance previous assumption that communities in Egypt procured their knowledge of extractive metallurgy from the Levant (Chapter 1). Anfinset (2010) highlighted the importance of specialized pastoralism in connecting communities, he assumed that the market in the Nile Valley was sedentary, rendering pastoralists as middlemen between burgeoning sedentary elites. However, when we explore the data through the *primary pastoral community* within a community of practice framework, we are provided with a novel way to analyze certain patterning in Badarian burial practices through the lens of anthropological game theory. Pastoral groups from the Nile Valley were not living on the fringes of southern Levantine communities, but rather highly integrated into the fabric of daily life, perhaps during certain parts of the year. One way that complex stateless societies cooperate is through exogamy; the potential importance of women in greenstone ritual needs to be acknowledged and thus studied further in the future.

It should be recalled that participation in a community of practice results in the construction of a shared group identity around a joint endeavor—that endeavor is argued here to be the mining and transformation of greenstone into copper. The ideological connections between greenstone, copper ore, and the regeneration of the individual expressed in Badarian funerary assemblages thus appear similar to the relationship expressed between greenstone, copper, and regeneration found in metalworking circles of the southern Levant. As such, this chapter has explicitly sought to demonstrate that the contact between certain Nile Valley pastoralists and the metalworking communities in the southern Levant provided a likely context for the transfer of knowledge related to extractive metallurgy and thus an explanation for the new mortuary practices—and belief system—tied to greenstone in the Nile Valley. In turn, such cooperation laid the ideological foundation of a belief system that would carry throughout dynastic Egypt—tied to the economic importance of mining and metallurgy.

Chapter 6. Connecting Chalcolithic Continuity in the Nile Valley: The EB IA and Naqada I-IIB (3800-3450 BCE)

The transition to the EB IA between 3800 and 3600 in the southern Levant is often depicted as a clean break from the Chalcolithic, resulting in transformations to the social significance of copper. This interpretation was constructed on the basis of abandonment of the Beersheba-Ghassulian settlements, the cessation of lost-wax casting and imported metal from the north, and a new division of labor connected with increasing demand for local copper sources abroad (e.g., Ilan and Sebbane 1989; Shalev 1994). These shifts in copper production correlate with changing demographics, a new settlement pattern, an influx of small, unwalled villages throughout the landscape, the appearance of apsidal architecture, increased interregional contact via maritime and overland trade, and rising regional industries (Greenberg 2019, 26-43). The increased reliance among communities was tied to the development of new economies of scale, resulting in the transformation of power dynamics as coalition-building became an integral component of maintaining the regional system of copper production in the absence of the mortuary centers to coordinate activity—tied to increased consumption in the Nile Valley, Delta, and regions to the north.

Table 3. Chronology of southern Levant, Upper Egypt, and Lower Egypt. Adapted after Maczyńska (2013, table 5). All absolute dates BCE, from Table 1.

Southern Levant	Lower Egypt	Upper Egypt
Late Chalcolithic 4500-3900/3800-3600	**Maadi Buto I**	**Badarian 4500-3800**
EB IA1 3800-3600 ——— **EB IA2 3600-3400**	**Maadi Buto I-IIb Tel el-Farkha 1** ——— **Buto IIb Tel el-Farkha 1-2**	**Naqada I-IIB 3800-3450** ——— **Naqada IIC-D 3450-3325**

EB IB1-Erani C 3450-3200 _________ EB IB2 3200-3000	**Buto IIIa Tel el-Farkha 3-4 _________ Buto IIIb-IV Tel el-Farkha 4-5**	**Naqada IIIA-B 3325-3050 _________ Naqada IIIA-C1 3325-3050**

The chronological syncretism between the southern Levant, Delta and Nile Valley correlates with the intensification of economic cooperation among communities around copper production (Table 2). Evidence for a possible movement of individuals from the southern Levant to the Delta is supported by a century-long overlap between the foundations of Maadi and Buto (Hartung 2013, 2014)—wherein various practices and technologies from the southern Levant are attested locally around the time in which the Beersheba-Ghassul system was abandoned.[92] Indeed, recent aDNA analysis on the genetic makeup of the southern Levantine population during the Chalcolithic vs. Early Bronze Age demonstrated genetic discontinuity, leading researchers to

[92] Klimscha (2009) argues that the end of the Chalcolithic in the southern Levant should be dated to 4000 BCE, an arbitrary date when we consider many of the radiocarbon dates from certain sites date to 3800/3700 BCE. Moreover, he did not incorporate the radiocarbon dates from Teleilat Ghassul, which place the abandonment of the site at ca. 3800 BCE (Bourke et al. 2004), contemporary with the abandonment of some sites in the Beersheba. It is unclear if the radiocarbon dates for the transition to the EB I at Pella were available (Bourke et al. 2009) as they were not included in his discussion. While recognizing that the material from Maadi and Buto resembles that from the Beersheba-Ghassul settlements, Klimscha has dismissed a potential connection and settlement overlap on the basis of his dating the end of the Late Chalcolithic sites to 4000 BCE. As such, he has created a gap of 100 years between the Late Chalcolithic abandonment ca. 4000 and the occupation of Maadi and Buto ca. 3900/3800 BCE (Klimscha 2009, 393). However, when we consider that Maadi and Buto were occupied ca. 3900/3800 BCE and that the Late Chalcolithic sites were abandoned ca. 3800 BCE, we actually generate a 100 year *overlap* between settlements, allowing for social ties to be generated in order to explain the immigration that is witnessed at both settlements. Indeed, what is most likely is a gradual shift from 3800 to 3600 BCE, wherein certain sites like Givat Ha-Oranim and Shiqmim were abandoned slowly as a result of multiple factors (Backham 2002 contra Gilead 1993, 2011). Moreover, at the time he published the article the dates from Shiqmim were not yet published (Burton and Levy 2011), which resulted in his estimation that the abandonment of the site also ended around 4000 BCE (Klimscha 2009, 390). We now know that the site was settled until at least 3600 BCE (Burton and Levy 2011). When we consider the transition to the EB IA at Pella in the northern Jordan Valley (Bourke et al. 2009), the picture is one of a higher level of integration between certain sites than previously detected. The social mechanisms that resulted in the end of the Late Chalcolithic thus appears to have affected communities, with some sites abandoned by 3800 BCE and others not until the mid-fourth millennium.

conclude population movement (Harney et al. 2018, 8).[93] Against this backdrop of an increased scale of production and the possibility of a small-scale migration, in the Nile Valley pastoral groups began adopting a more permanent modes of habitation (Dee et al. 2013)—a transformation that correlates with the first attestation of symbols later associated with Egyptian kingship.

This chapter argues that the Chalcolithic system of copper production and its ideological system of legitimation continued both in communities in the southern Levant, Delta *and Nile Valley*. The continuation of practices associated with this system of production at central places in the Nile Valley should be connected with a burgeoning funerary economy, settlement patterns, and increased economic cooperation with communities in the region of the Red Sea and potentially farther abroad. These shared practices reflect the maintenance of contact with Syro-Anatolian communities and the intensification of cooperation with groups in the Nile Valley and the southern Levant. New burial practices in the Nile Valley that appear in connection with the rise of mortuary cult centers on the west bank of the Nile not only reflect many similarities with the system of Chalcolithic belief, but also they suggest the rise of managerial leaders connected with the mortuary cult, copper production, and participation in external exchange networks. I propose that the appearance of symbols later connected with kingship—the macehead and the Red Crown—be

[93] Additional support in favor of a population movement out of the southern Levant during the fourth millennium may be attested as far as Crete, wherein the transition from the Final Neolithic to the Early Minoan I is marked by the presence of various newly-attested practices in the Mesara Valley that have been attributed to immigration to the island from the Chalcolithic southern Levant (Koehl 2013, 245). The material support for such a migration includes: "secondary burials in tholos tombs, clay ossuaries, red-on-cream linear-decorated pottery, ceramic 'churns,' pithoi, decorated with 'rope' motifs, and figural vases" (Koehl 2013, 245). This proposal was rejected by Nowicki (2014, 375), who has argued that Koehl's proposal are incorrect. However, in her study of Bronze Age churns in the Aegean during the fourth millennium BCE, Morris (2014) similarly argued for an immigration to explain the introduction of the churn. More research is required to draw any further conclusions.

viewed as elements of a shared repertoire of practices connected to an interregional community of practice centered on mining and metal production. As production intensified and competition between communities arose, the integration of producers within exchange networks positioned them as the agents of power—controlling knowledge, social relationships, and the manufacture and procurement of valuable objects of display and materials believed necessary for funerary practice. For Nile Valley communities, the result would be new attachments to the mining landscape in the Sinai and southern Levant, laying the foundation on which the early Egyptian state would expand into the region during the late fourth millennium. The product was the development of an interregional system of production centered on the exchange in copper and greenstone in networks increasingly controlled by ritual specialists/metal producers, creating the system of power out of which the state would crystalize.

Mining Communities, Mobile Producers, and the Continuity of Cooperation

The contemporary abandonment of certain sites connected with the Chalcolithic system of copper production around 3800 BCE marked a subtle but significant shift in the organization of copper production during the early fourth millennium. The absence of central places at Gilat, En Gedi and Teleilat Ghassul to coordinate community ceremony resulted in a new organization of production across the landscape, resulting in a reconfiguration of power networks while production intensified. The contemporary abandonment of sites in tributary branches of the Nahal Gerar and Nahal Beersheba appears linked to the increasing importance and centralization of local production in the Nahal Besor (Figure 25). This shift should be viewed as connected with the increasing importance of eastern Mediterranean exchange networks and the overland route across north Sinai to the eastern Delta, resulting in higher levels of integration between the communities. Copper and greenstone played a major role in these networks, as supported by the large quantities of ore at Site H in the Nahal Besor (MacDonald 1932, 12; Hauptmann 1989, 128)[94] and the appearance of donkeys remains in the region that attest to the importance overland exchange.

The rise of specialized pastoralism is attested by the marked decrease in hunting and increase in domesticates (Anfinset 2010, 105, with reference to Rosen 1988, 501), suggesting integration into broader exchange networks centered around animal byproduct. Pastoralists appear to have played an important role in connecting communities, as tabular scrapers[95] begin to appear from Upper Egypt in the Nile Valley to Habuba Kabira along the Euphrates (Klimscha 2012, 195-196). Individuals involved in the production of tabular scrapers have been linked with the trade in metals (Rosen 1997, 162–163), which may explain why we see a shared system of mining and metalworking technology continue from the Chalcolithic. Metal producers were thus still integrated into the exchange networks of the southern Levant, connecting communities to the north, south and west. While Anfinset (2010) viewed these groups as middlemen to sedentary elites, exchanging copper as local systems of power grew, I argue power was connected to *participation within these networks*. The new power dynamics of the EB IA should therefore be connected to powerbrokers/mining and metalworking experts embedded within—and maintaining—exchanges linking northeast Africa with Syro-Anatolia through the southern Levant.

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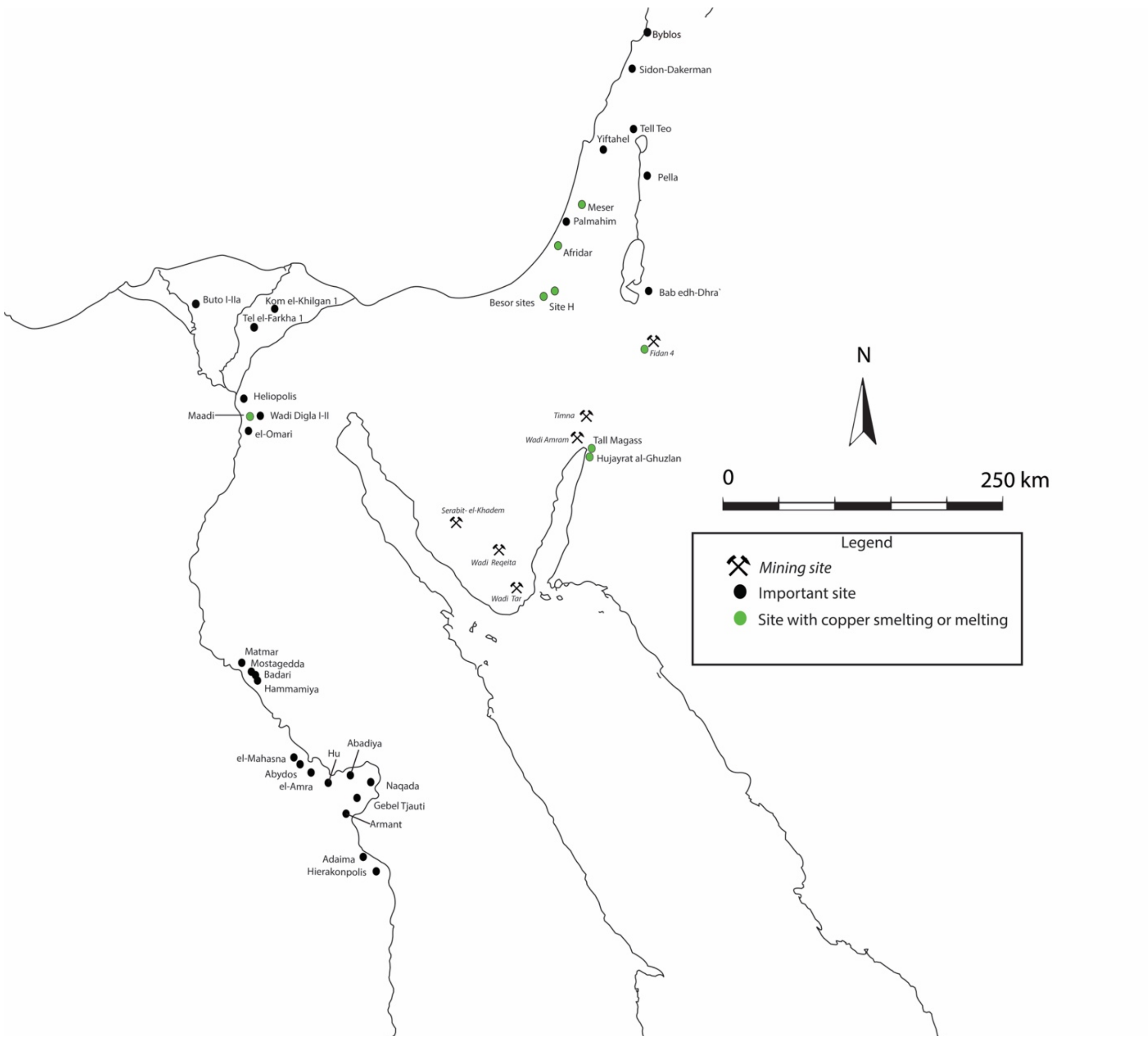
[94] Given the site's location, it is likely from Feinan however it is unknown if the ore was associated with copper production (Genz 2000, 60–61).

[95] Tabular scrapers are a tool believed to be connected with processing of wool (Henry et al. 2017) and can thus be connected to a burgeoning textile industry.

Figure 25. System of metal production during Early Bronze IA and Naqada I-IIB. Map by author.



Evidence of coalition building and economic cooperation between mining communities is attested when we look to the assemblages of settlements, which shared similar practices, techniques, and taboos about who participated in production. The sites of Tall al-Magass and Tall Hujayrat al-Ghuzlan—respectively founded ca. 4250 BCE and 4000 BCE (Klimscha 2009, 369)—appear to have been integrated into the broader system of exchange and economic cooperation that connected both to the Besor-Beersheba region as well as Sinai, the Delta, and Nile Valley

(Klimscha 2012, 189–197). While the production refuse and the material assemblage from the sites speak to cooperation with settlements in the Nahal Beersheba, Sinai, Delta and Nile Valley (Klimscha 2012, 189–197),[96] the communities are said to reflect an identity that is unique in the landscape and "neither Ghassul-Beersheba nor Early Bronze I" (Klimscha 2009, 391). Evidence of extensive metalworking debris at Tel Hujayrat al-Ghuzlan is radiocarbon dated toward the end of the site's occupation ca. 3700/3600 BCE (Klimscha 2009, 392) and provides a window into the shared technologies between communities, which appear connected west toward the Delta and Nile Valley.

In terms of the organization of copper production, the manufacture of mining tools at Tall Hujayrat al-Ghuzlan establishes a connection between the community and the nearby mines at Wadi Amram and Timna, where shaft-and-gallery mining had been employed since the Chalcolithic (Shaw and Drenka 2018) and where evidence of smelting was attested at Site 39b (Rothenberg and Merkel 1995, Ben-Yosef et al. 2008). Once the ore was procured it was brought back to site for beneficiation, attested by the various grinding stones stained green—notably, the querns are reported to be the same type used to grind cereals and pigments creating a connection between mining technology and the tools used for food preparation (Klimscha 2012, 186). Twenty-six kilograms of slag was collected throughout the site (Klimscha 2012, 186), reflecting continuity with Chalcolithic crucible smelting and demonstrating the possibility that a portion of the community was engaged in production (Pfeiffer 2009, 311). Production refuse included 259

[96] Such contact is supported by the presence of Red Sea shell found at Bir es-Safadi, the fragment of a lost-wax cast copper scepter, as well as pear-shaped stone macehead, placing the community at this site within the same community of practice as metal working elites in the Beersheba region and Egypt (Klimscha 2012, 1921-98, with references).

fragments and five complete one-sided ceramic casting molds for rectangular and oval ingots (Figure 12:6), 564 fragments of various sized and shaped crucibles with round or rectangular socketed handles, hammer stones, 5 complete molds, and an entire oval copper ingot (Khalil et al. 2003, 172). From the 600+ fragments of crucibles excavated from Tall Hujayrat al-Ghuzlan, three types of crucibles were identified by Pfeiffer (2009), all of which were said to resemble big spoons with socketed handles that would have allowed one to insert a stick for handling (e.g., Figure 21:2; Klimscha 2012, 186). These crucibles find parallels in the Beersheba region as well as at Ashkelon-Afridar (Golani 2004, 2014), Meser, and the site of Fidan 4 in Feinan (Pfeiffer 2009). The different types of crucibles varied in their material and size (13-20 cm diameter) and were hypothesized to have served different functions including smelting, refining, and casting copper (Pfeiffer 2009, 308-309). The connection between copper production and cooking is notable when we consider the spoon-shaped crucibles are very similar to the spoons and ladles from domestic wares—typically the realm of women. The lack of standardization across sites in both crucible size and shape has been interpreted as the mark of individual craftsmanship (Pfeiffer 2009, 310), yet the technology itself was relatively standardized reflecting close interactions between producers in these different centers of production in the southern Levant. Such typological parallels recall similarities to Badarian ivory spoons used for the scooping of greenstone pigment and thus hint at the early nature of contact between groups (Figure 21).

Evidence for the integration of the community at Tall Hujayrat al-Ghuzlan into the broader networks of west Asia and northeast Africa is supported by the manufacture of ingots, revealing the role of export as a primary goal. Interestingly, both rectangular[97] and oval[98] ingots appear to weigh just around 1kg, reflecting the importance of these shapes and standardized weights (Figure 12:6 and 7).[99] Analysis of the complete ingot from the site has confirmed ores from Timna were mined (Hauptmann, Khalil, and Schmitt-Strecker 2004), however Klimscha (2012, 186) states that trace elements make it possible another source was used, potentially Feinan, Sinai, or somewhere else. Given the proximity of Wadi Amram to the Red Sea sites paired with a similar isotopic signature to that of ores from the MBS at Feinan (Ketelaer and Hauptmann 2016), the site may have also served as a location from which ore was mined by the community at Tall Hujayrat al-Ghuzlan.[100] Klimscha (2012, 188) has argued that the production of ingots can only be carried out if there is a market and means of transportation, which implies a distinct network for the distribution of artefacts as well as knowledge of local needs. With regard to transportation, the presence of donkeys from the site reflects the importance of overland travel (Benecke 2009). As markets tend to be regulated by the presence of value equivalencies, it is significant that the complete ingot from the site finds parallel to oval ingots at Hacinebi that measured 15 x 5 and similarly weighed 1kg (Figure 12:1; Özbal, Adriaens, and Earl 1999, 64). We can recall that the

[97] Pfeiffer (2009, 208) reports rectangular ingot molds measured 10.5 x 13 cm and between 0.9-2.4 cm in thickness and are estimated to have held a volume ranging between 60 to 120 ccm.

[98] Oval ingots measured 13.8 x 8.6 cm and are estimated to have held a volume between 40 to 50 ccm (Pfeiffer 2009, 208).

[99] Note that the oval ingots reflect continuity with the Chalcolithic mode of production attested at Shiqmim and Abu Matar (Figures 12:2 and 3).

[100] However, Ben Yosef (2018) has rightly reminded us that we simply known too little of the sources in Arabia, Sinai, and the Eastern Desert in general to draw conclusions.

cumulative weight of the gold rings from Nahal Qanah similarly weighed 1kg as did the cumulative weight of gold from Varna (Chapter 4; Klimscha 2013, 97). The shared shape and weight thus seem to provide support that the earliest standard for exchange came out of metal networks, within which producers were embedded.

Evidence that pastoral groups continued to play a key role in connecting communities to the north is reinforced by the spatial distribution of artifacts tied with a burgeoning textile industry. Specialized basalt spindle whorls produced from one region east of the Jordan Valley are thus found distributed from the eastern Delta through the inland route in the southern Levant, up to the plain of Antioch (Savage 2011). This pattern led Savage (2011) to argue for the importance of an overland, inland route connecting northeast Africa with Syro-Anatolia through the southern Levant.[101] This distribution pattern gains nuance when we consider the spatial distribution of tabular scrapers, which link Upper Egypt with Habuba Kabira likewise supporting contact via the movement of pastoral groups across the landscape (Klimscha 2012, 195-196). It should be recalled that the producers of these textile tools were connected with the exchange in metals (Rosen 1997, 162–163). While Hauptmann (2007, 296) argued that the interruption in the metal-procurement network contributed to the abandonment of the Chalcolithic system, evidence that these groups continued importing metal from Anatolia is implied by the appearance of a certain ceramic ware

[101] These spindle whorls appear to have been the product of a specialized production system out of the Jordan Valley, leading Savage (2011) to propose that they were a prestigious commodity traded to communities along the main exchange route. However, it is also possible that exogamy—specifically patrilocality—played a key role in integrating the landscape. When we consider that pastoral communities were connected to mining and copper production, the use of women as a tool to foster and maintain relationships with sedentary villages might provide nuance to the distribution of textile tools, as well as the connection between smelting and domestic spaces.

mimicking metal forms. Braun (2015) has thus convincingly argued for a connection between the metals trade and the exchange of Grey Burnished Ware (GBW)—one of the characteristic ceramic forms of the period that is relatively rare in the south and east (Greenberg 2019, 29).[102] Philip and Rehren (1996, 143-145) proposed that GBW reflected ceramic skeuomorphs of silver vessels used in serving wares, implying silver was more widespread than previously assumed and that feasting and consumption may have played an integral role in fostering and maintaining social ties. Indeed, it is believed that the importance of complex imported metals during the Chalcolithic was on the basis of the silvery color produced by the metal (Rehren, Hess, and Philip 1997, 637). Such a proposal supports an interaction model that expresses continuity with the metals exchange networks to the north in Syro-Anatolia, continuing the system of production potentially dating back to at least the sixth millennium. The appearance of GBW thus seemingly points to the *intensification* of pre-existing contacts with the north and the rise of a regional system of copper production.[103]

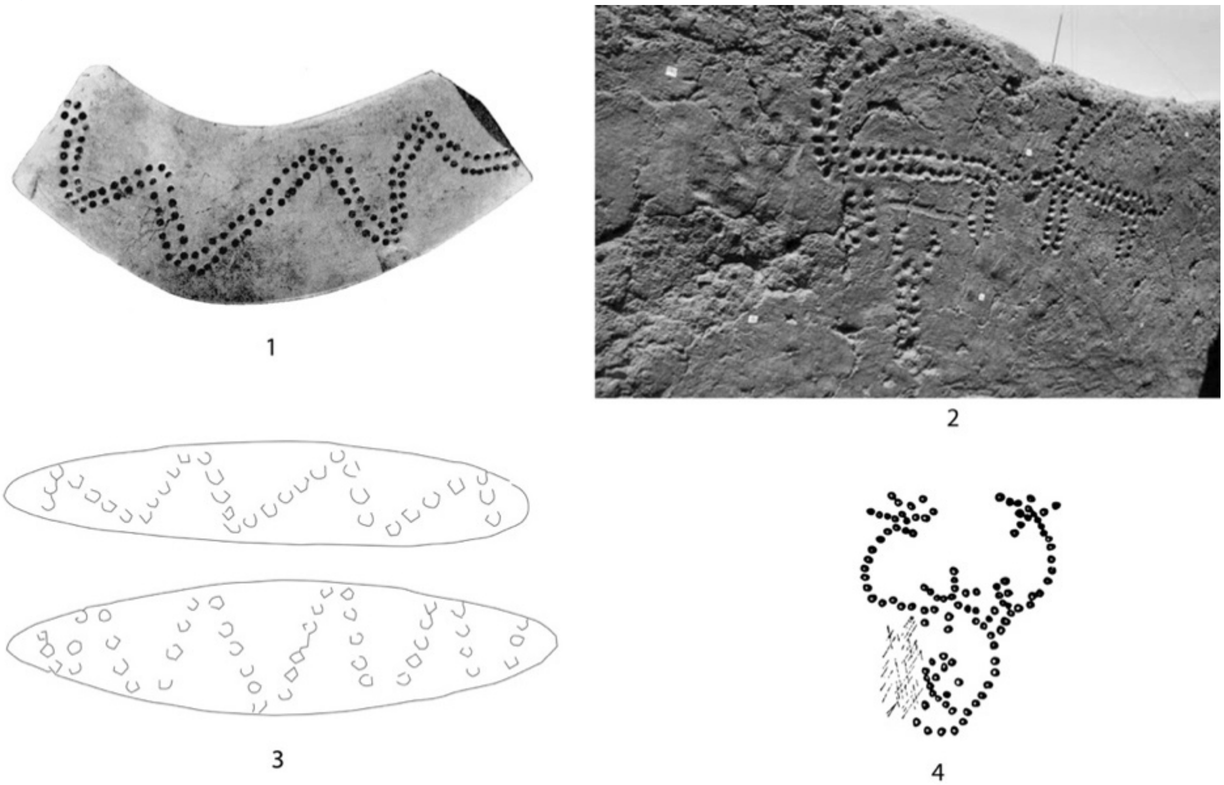
[102] This type of vessel was produced in the region of the Jezreel Valley, east Samaria and the central Jordan valley (Goren and Zuckermann 2000, 174-175).

[103] The increased reliance of communities on one another speaks to new forms of power in the landscape. Indeed, the increasing economic importance of copper in the region may have had a direct correlation to the appearance of rock-cut shaft tombs in the EB IA, which appear at sites connected with the north-south exchange network that would have connected southeastern Anatolian communities with the southern Levant through the Jordan Valley (e.g., Bab edh-Dhra). While cave burials continued into the EB IA, interment also now included cutting vertical shafts into the bedrock, opening into an underground chamber where individuals were interred. Such technological know-how appears to mimic the Beersheba settlement spaces as well as shaft-and-gallery mining at Feinan, which is first attested during the EB I at Feinan. Indeed, shaft tombs appear to provide the crude pre-cursor to the more developed, monumental mastaba tombs that appear in early Egypt. The appearance of shaft tombs at Bab edh-Dhra during a period of increased production begs the question of whether these new mortuary practices reflected the economic specialization of this community. The ideology of rebirth and symbolism so characteristic of the Chalcolithic and associated with prestige goods may have thus moved underground as more of the population became integrated into this burgeoning system of production.

Within the context of cooperation between pastoral groups and settled communities, it is important to recognize that the temporary integration of individuals into local communities will result in a shared set of practices to mediate contact and allow the group to achieve its collective goals. For the initial introduction of extractive metallurgy to the southern Levant, it was argued that the integration of northern communities was the result of small-scale migrations (Chapter 4). For Egypt, I proposed that glazed steatite beads and faience provided possible proxy data for the transfer of metallurgical knowledge between pastoral groups in the Nile Valley and metalworking communities in the Beersheba-Ghassul settlements—the result of increasing economic cooperation mediated by a shared worldview surrounding copper production (Chapter 5). During the EB IA, several lines of evidence support continued cooperation between Nile Valley pastoralists and the community at Tall Hujayrat al-Ghuzlan. Imports from the Nile Valley include twister bladelets only thought to come from Upper Egypt, a stone, pear-shaped macehead used as an interregional symbol of power,[104] shells from the Nile Valley, as well as wide brimmed stone vessels attested at Maadi, Buto, Badari and Mostagedda, and a slate palette imported from the Nile Valley at Tall al-Magass (Klimscha 2012, 192-194).

[104] Although note that pear-shaped maceheads appear in the Nile Valley at a higher frequency than in the southern Levant (Klimscha 2012, 194 with references).

Figure 26. Pointillé technique in Nile Valley and southern Levant during Chalcolithic and EB I. 1) Late Chalcolithic, Bir es-Safadi ivory (Perrot 1959, fig. 5); 2) decorated plaster wall at EB IA Tall Hujayrat al-Ghuzlan (Klimscha 2012, fig. 10); 3) copper sheet placed in Tomb 1410 at Naqada during (late?) Predynastic (Petrie and Quibell 1896, 48, pl. LXIV, 100-101); 4) "Hathor" head punched into copper saw from EB IB Kfar Monash hoard (Hestrin and Tadmor 1963, fig. 9).



Evidence that the nature of cooperation between communities led to the transfer of technological knowledge is reflected in the use of a decorative technique on site. Of significance here is a decorated wall at Tall Hujayrat al-Ghuzlan that depicts an ibex and another animal, drawing stylistic similarity to rock art from Sinai and the Eastern Desert (Figure 26:2; Klimscha 2012, 189, fig.10). The technique employed to decorate the wall consisted of punching small holes into wet plaster to form a desired shape. Such a technique was used to form a zig-zag pattern on an ivory horn at Chalcolithic Bir es-Safadi (Figure 26:1; Perrot 1959, fig. 5), as well as on the rolled copper sheeting found at the knees of a man from Tomb 1480 from Naqada (Figure 26:3, Petrie and Quibell 1896, 48, pl. LXIV, 100-101). The zig-zag pattern on the ivory and copper also appears on a stone vessel at Tall Hujaryat al-Ghuzlan, the pattern of which can be traced to a "sanctuary" in the Wadi Rum (Klimscha 2012, 194, fig. 7). This technique was also used to create the "Hathor head" on a copper saw in the EB IB Kfar Monash hoard, which appears to be connected with Nile Valley groups (Hestrin and Tadmor 1963, fig. 9). On a purely practical level, the same technique is attested in plaster, ivory, copper and stone, and is used to draw images that are shared within certain communities linked to the mining and production of copper. We can begin hypothesizing that the nature of interaction between Nile Valley groups and the mining community at Tall Hujayrat al-Ghuzlan was intense and involved high levels of integration in the community. The copper tools attested on site included awls, chisels, and flanged axe blades, none of which were paralleled in flint suggesting a newfound importance of copper for local industry and perhaps community identity (Pfeiffer 2009, 306-307; Klimscha 2012, 197). The community appears to have developed in its local context as a result of increased interaction between the Beersheba system and the Nile Valley during the Chalcolithic, which explains the unique character of the site and the maintenance of relations between communities.

While shared practices and techniques can accompany intensive economic cooperation, it is also important to recognize that learning a specific technique or technology will often result in the adoption of the social significance of such practices. As such, the appearance of this motif on the wall becomes significant when we recognize that it potentially formed part of a cultic area—an interpretation supported by the deposit of a sealed vessel containing thousands of beads beneath the plastered wall said to have formed a central space in the community. Visually these beads are said to be analogous to those at Badari, while a few hundred of the beads were made of a white paste and glazed steatite frit (Klimscha 2012, 189). Klimscha (2012, 189-190) has connected the production of these beads to that of metallurgy on the basis of the copper powder required for glazing—as well as the pyro-technology needed to melt the material for the glaze—and suggested the similarity in production points toward the specialized manufacture by one individual. Such a proposal suggests that the knowledge was restricted to certain members of the population, which is similar to what we see with smelting.

While more analysis is needed, the description seems to reflect the same technique employed to make the beads from Peqi`in (Bar Yosef et al. 2004) and supports the proposal that bead technology may reflect the transfer of extractive metallurgy to Nile Valley groups during the fifth and early fourth millennium (Chapter 5). The specialization of bead manufacture as a secondary industry connected with metallurgical production thus fits within the larger landscape of increasing specialization connected to pastoral industries. We should recall that the introduction of Badarian bead technology correlates with the emergence of a new system of belief centered on the importance of greenstone, which I argued was the local manifestation of Chalcolithic worldview connected with copper as a life-cycle metaphor. The burial of such beads under a cultic wall at Tall Hujayrat al-Ghuzlan led Klimscha (2012, 189) to draw a parallel to the foundation practices from Early Dynastic temples in Egypt, raising questions about the connection between Chalcolithic/EB I practices in the southern Levant and the origins of later Egyptian practices in the Nile Valley. It is here that we must turn to the Sinai to explore the nature of pastoral groups in the region.

Sinai and Nile Valley Pastoralists

The potential precursor in the southern Levant of later elite Egyptian cult practice recalls the parallel between the Judean Desert as a funerary landscape and the Nile Valley practice of burial on the west bank (Ilan and Rowan 2015, 84). When we begin to piece together the various lines of evidence for cooperation between pastoral groups around mining greenstone and copper production, we can start to craft a complex picture of how economic cooperation led to the construct of a shared worldview and identity around mining and metal production that manifested in local contexts. One of the major lines of evidence that can help us to better understand this picture of technology transfer is the appearance of *nawamis* in Sinai during the fifth millennium (Liritzis et al. 2016). The appearance of these mortuary structures is thus contemporary with the shifts we see in Badarian mortuary practices involving greenstone (Chapter 5) as well as the foundation of Tall Magass and later Hujayrat al-Ghuzlan. *Nawamis* are a type of funerary architecture that emerges in central and southern Sinai, seemingly following a route from the Wadi Arabah down to southeastern Sinai where copper mining took place near Wadi Reqeita (Figure 25) and west past Um Bogma where ore was also mined, then into the Delta (Bar-Yosef et al. 1986). Architecturally the *nawamis* are circular in form measuring 3-6 m in diameter, 2 m high and built of flat stones (Bar-Yosef et al. 1986). Approximately 21 fields comprised of 200 structures and over 1000 burials were reported by Bar-Yosef et al. (1983, 52-53).

Nawamis are argued here to provide both an economic and ideological link between Nile Valley pastoralists and the metalworking communities in the southern Levant within which they were highly integrated. Support for this claim derives from the spatial layout of these mortuary shrines, wherein the door to almost all of these structures was oriented toward the *west*, interpreted as reflecting a belief system that associated the dead with the setting (vs. rising) sun (Bar-Yosef et al. 1983, 57). While Bar-Yosef et al. (1983, 57) pointed out that the layout appears to reflect connections with the Predynastic/Early Dynastic system of belief, we might nuance this picture by connecting it to the Chalcolithic funerary landscape of the Judean Desert, comprised of a west bank necropolis and mortuary shrine at En Gedi—a direct parallel to later Egyptian practices (Ilan and Rowan 2015, 84). When we consider the importance of mobility and the body for the fifth and early fourth millennium pastoral communities in the Nile Valley (Wengrow 2003, 2006), the presence of such structures may thus reflect a pastoral manifestation of this ideology.

Evidence of a connection between Nile Valley pastoralists and the groups that constructed the Sinai *nawamis* is reflected in the mortuary assemblages of these structures. Contemporary interaction is thus confirmed by the presence of transverse arrowheads, Naqada I ceramics, shell bracelets, faience beads, and a thin piece of copper wire (Bar-Yosef et al. 1986, 56).[105] The lead isotopes of the copper from these Sinai tombs is consistent with that of Feinan, suggesting the

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[105] Bar-Yosef et al. (1986, Table 10, figs. 7.13 and 12.10) also reported finding copper pins and points in *nawamis* Gunna 4, 10, 101. It is potentially significant that the metal is all similar with the exception of a copper point from Gunna 101, which was made from arsenical copper (1.46% As; Bar-Yosef et al. 1986, Table 10). The appearance of these pins in mortuary contexts in Sinai places the consumption context in line with the Nile Valley so than the southern Levant (Anfinset 2010). can conclude that the communities who occupied these mortuary spaces procured the metal from the same network.

communities that constructed these mortuary shrines formed coalitions with both regions.[106] However, given that the lead isotope ratios from Wadi Amram fall within the same field as the ore from the MBS at Feinan (Ketelaer and Hauptmann 2016, 178-180), it is possible that the some of the copper may have derived from the mining communities in the Gulf of Aqaba, punctuating the contact between Sinai and the site of Tall Hujayrat al-Ghuzlan and Tall Magass.

The identity and nature of the communities who built the *nawamis* and their role in the EB I copper trade has been greatly debated. The earliest evidence attesting to the mining of copper from the region dates to the early EB IA (ca. 3800-3600 BCE), when some of the copper objects from Maadi are said to be consistent with ore from the Um Bogma region of southwestern Sinai (Abdel-Motelib et al. 2012). It is thus possible that Nile Valley pastoralists collaborated with both Delta communities and the southern Levant around the procurement of copper ore. Despite this evidence for contact between the Nile Valley and Sinai, some scholars have nevertheless proposed indigenous groups of nomads in Sinai were involved in the mining and transportation of ore from Sinai to the Delta (e.g., Bar-Yosef et *al*.1983, 58; Hartung 2013, 185). Interestingly, Milevski (2009, 136–137) has discussed the lack of evidence for middlemen or merchants as a specific class, yet still maintained that they existed–either related to producers or independent from them–but nevertheless closely linked to those in power. Abdel-Motelib et al. (2012, 52) have even proposed

[106] The presence of square-sectioned copper awls in some of the *nawamis* was argued by Ilan and Sebbanne (1989, 153) to demonstrate that these communities had a knowledge of smelting and that the awls were made of copper from southern Sinai. However, Avner (2002) rejected that the cross-section of awls can be used as chronological indicators between the Chalcolithic and the EB I as both square and round awls appear in EB II levels at Arad Furthermore, while square cross-section awls do not appear prior to the EB I, they do continue into the EB III and thus a later date (EB II/III) should not be ruled out. Indeed, Bar-Yosef et al. (1986) dated these to the late fourth millennium on the basis of associated finds.

these groups exchanged copper ore for agricultural goods and small trinkets that appear in these funerary monuments, seemingly reiterating other claims that copper was not important nor viewed as a ritually charged material by these groups. While Anfinset (2010, 104) has argued all of the evidence for this is all circumstantial, the proposal that nomadic groups in Sinai functioned as middlemen does not explain the number of similarities we find between the groups who built and buried their dead in the *nawamis* and the similar practices attested east in the Judean Desert and west in the Nile Valley. Moreover, such explanations do not acknowledge that the Sinai was exploited by highly mobile individuals from the Beersheba-Ghassulian communities of the southern Levant during the Chalcolithic to mine greenstone and potentially copper ore (Beit-Arieh 2003, 98). Conversely, Oren and Gilead (1981) proposed Chalcolithic communities from the Nahal Besor were responsible for constructing the *nawamis* given the nature of sites that appear in northeastern Sinai. None of these proposals are convincing, however, as they do not factor into account the importance of mobility for Nile Valley communities (Wengrow 2003, 2006), allowing for nuance to the nature of contact between communities.

The possibility that these groups were Nile Valley pastoralists is significant when we consider the origins of the power networks through which the state was later able to control the mining industry by the late fourth millennium as well as the places they visit to lay claim over the industry (Chapter 7). Evidence that these groups participated in long-distance exchanges dating back to the fifth millennium is supported by the identification of mining in the region near Serabit el-Khadem, exploited for its turquoise and greenstone by Beersheba-Ghassul groups (Beit-Arieh 2003, 98). Claims that greenstone and turquoise appear in contemporary contexts at Nabta Playa in the western desert (Kobusiewicz et al. 2004, 570) suggest mining communities who interacted with or formed part of Beersheba-Ghassulian communities were integrated into broader exchange networks to the west by the fifth millennium, reinforcing economic cooperation between Nile Valley communities and the Late Chalcolithic communities of the southern Levant specifically around the procurement of greenstone. With the cessation of the Judean Desert funerary landscape, it is possible that this aspect of ritual praxis connected to the region of Teleilat Ghassul and En Gedi may have played a role in the movement of copper west to the Nile Valley.

When we consider the pastoral origins of the Egyptian state, evidence from Sinai also supports a model wherein the later Egyptian military drew its origins from joint mining operations in the Sinai and southern Levant. With regard to migration of Nile Valley pastoralists to Sinai, Anfinset (2010, 104, with reference to Horowitz 1976) proposed the occupation of the region during ca. 5000-2500 BCE—when the *nawamis* were present—coincided with a wetter, more humid environment, resulting in an ideal atmosphere for pastoralism. Based on modern pastoral activity in the region, Bar-Yosef et *al*. (1983, 58-59) proposed winter and late spring as the best grazing time and may have been when these communities exploited the region. The season for bringing one's herd to Sinai for grazing may have thus resulted in the construct of a ritual calendar by which copper mines were exploited during the grazing season.

When we look to the dynastic period texts, it appears the Egyptian military mined in winter and early spring—an indication of the optimal timing for such expeditions and a potential reflection of the early cooperation between early pastoral groups in the fifth and fourth millennium. Support for this proposal derives from an inscription at Serabit el-Khadem dated to the sixth regnal year of Amenemhet III (ca. 1849 BCE), wherein Horurre, god's seal bearer, describes how he traveled to Sinai in the summer—the off season for mining (Shaw 1998, 256). While Shaw (1998, 255-256) acknowledges that the Egyptian state appears to have been seasonal, he ultimately claims mining was done by agriculturalists. The power exerted by the state over agricultural production was no doubt characteristic of the third millennium, however we might ask how this system was first formulated. Interestingly, one of the notable aspects of the Egyptian military is that individuals in the mining expedition also bore nautical titles, suggesting they were part of both maritime and overland expeditions. It is thus noteworthy that the mining season took place during winter to spring season, whereas the Mediterranean sailing season occurred in spring and summer. The ritual calendar of the later Egyptian military therefore seems to be the product of economic cooperation between pastoral groups in the Nile Valley with the southern Levant dating back to the fifth millennium. Support for this proposal is attested by the introduction of pyro-technology for bead production and the crystallization of a belief system centered in regeneration and greenstone/copper ore.

Maadi and Nile Valley Cooperation

When we look to northeast Africa, the early fourth millennium is characterized by its continuity with the Neolithic economy. While the relationship between the Badarian communities and the emerging Naqada communities remains unclear (Stevenson 2016, 431, with references; also Horn 2014), when it comes to maintaining relationships with southern Levantine communities it appears that the social networks were both maintained and indeed intensified as well as ritual practices perpetuated by the people of the Naqada I-IIB. We therefore see the increasing interaction in external networks and the slow adoption of agricultural lifeways in the Nile Valley accompanied by a number of new technologies into the region from the southern Levant. Pre-existing contacts between communities in the Beersheba-Besor-Ghassul region and the Delta, as well as the Red Sea settlements and the Nile Valley, may have contributed to the intensified production of copper during the EB IA as well as the appearance of these new technologies. Evidence of maritime contact between communities is suggested by the foundation of Buto/Tel el Fara'in ca. 3900 BCE (Watrin 2007), contemporary with both the continued occupation of some Late Chalcolithic Beersheba-Ghassul settlements (Burton and Levy 2011) as well as the abandonment of others (Klimscha 2009). The chronological overlap suggests contact between communities during the Chalcolithic and may have led to the small-scale migration of—and sustained contact between—communities from the southern Levant into the Delta. Buto's location along the Canopic branch of the Nile supports maritime contact as the means by which the community was connected to the Levant (cf. (Bard 2015, 98).

A likely port for the southern Levant during the EB IA would have been Asheklon-Afridar given its northern location was not far from the Besor sites (Gophna and Milevski 2003, Golani 2014).[107] Indeed, the site appears to have coordinated with pastoral metalworking communities in the Feinan to refine copper and ship it abroad, reflecting a division of labor wherein certain settlements began specializing in fewer aspects of production, resulting in the development of an economy of scale.[108] Evidence that the networks of the fifth and early fourth millennium may have

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[107] An Egyptian vessel found 300 m off the coast of Atlit dated to the EB IB/late Predynastic was interpreted by Braun (2011, 108) as food for sailors, supporting proposals that maritime traffic extended north up the coast during the second half of the fourth millennium.

[108] The presence of 18 heating installations similar to those at Abu Matar (Golani 2014) attest to an increased scale of production as well as the continuity of Chalcolithic technology. Like the Beersheba settlements, the crucibles were hemispherical in shape and ranged in diameter from 10 to 20 cm (Golani 2004), slightly larger than the 8-12 cm

led to the intensification of production is supported by a pre-existing Chalcolithic settlement with ceramics—including *cornets*—similar to those at Beersheba (Golani 2004, 41). The overland *and* maritime connections of Ashkelon-Afridar are supported by the presence of bitumen from the Dead Sea, *Cedrus libani* from Lebanon, and *Quercus cerris* from Turkey, with possible olive oil exported abroad (Gophna and Milevski 2003, 223 with reference to Gophna and Liphschitz 1996). Moreover, the high concentration of donkey remains on-site supports the role of the site in the overland transport of copper presumably from Feinan to the coast (Gophna and Milevski 2003, 223). A new division of labor therefore occurred, wherein it appears pastoral groups in the mining regions came to control the mining and smelting of copper, which was then refined along coastal sites where it was then shipped abroad.

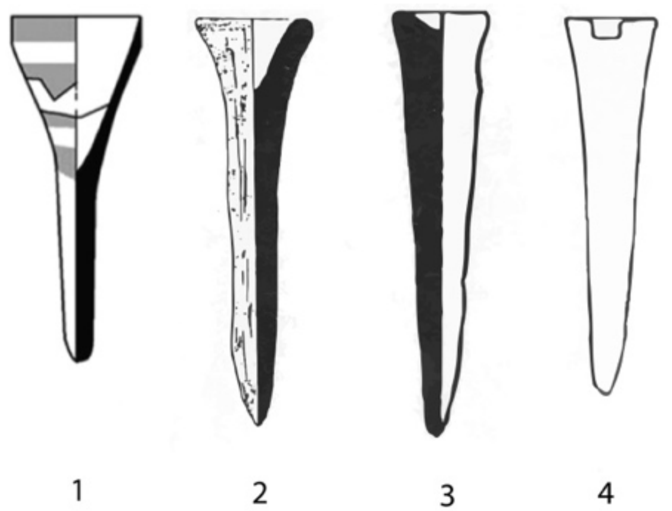
Against this backdrop of intensified economic cooperation between communities, several lines of evidence attest to the integration of immigrants from the southern Levant into local communities in the Delta and Nile Valley. In the Delta, new practices included the presence of southern Levant style ceramics made with local clays on a slow wheel[109] and the presence of V-shaped bowls found in Level (I) at Buto (Watrin 2007, 8). In one instance a V-shaped bowl was reused as crucible at Abu Matar (Golden 2010, fig. 7.7), reflecting these bowls were used by metalworking communities. Evidence that metallurgical production may have also been integrated

diameters of the preceding period (Pfeiffer 2009, 312). The increased volume capacity supports intensified production however, rather than smelting it appears refining of metal took place (Golani 2014).

[109] Note that the slow wheel develops and diffuses during the Ubaid period, when communities becomes integrated into the sphere of exchange. The introduction of extractive metallurgy into the southern Levant appears to coincide with the appearance of the wheel, as well as painted ceramics, ossuaries and the exploitation of the honeybee, suggesting the slow wheel was associated with metal producing communities.

to the site is potentially supported by the introduction of long ceramic objects identified as supposed wall cones (*Grubenkopnagel*) found in Level 1 (Figure 27). While some scholars concluded they were modeled after northern examples at Uruk and Susa (Figure 27:3-4), Faltings (1998, 374-375) proposed they should be identified as mimicking cornets from the southern Levant (Figure 27:1)—a proposal that has been rejected by some scholars (e.g., Joffe 2000a, n.3). Watrin

Figure 27. Comparison of cornets from: 1) southern Levant (after Namdar et al. 2009, fig.1A); 2) Buto (Delta), 3) Susa, and 4) Uruk (nos. 2-3 after Moorey 1990, fig. 3). Not to scale. Line drawings traced by author.



(2004-2005, 52) rejected the cornet proposal the basis of ware type, which is thicker and more coarse, as well as their shape, which is more pointed than southern Levantine cornets. Regarding their shape, while some cornets are more V-shaped in the southern Levant, others mimic the long stem as reflected in the Buto examples (Figure 27:1-2). Moreover, when compared to the wall cones at Susa and Uruk (Figure 27:3-4), the Buto examples contain deeper crevices, rendering them somewhat closer to the cornets of the southern Levant. Certainly, when we consider Ashkelon-Afridar contained cornets (Golani 2004, 41) and that the site—with increased copper refining operations—appears to have been the port from which contact was mediated between communities, cornets appear to be a possible reality. If the *Grubenkopnagel* identified at Buto are local imitations of cornets, there lies the possibility that lost-wax casting took place in the Delta by the early fourth millennium.[110]

As control over the exchange of metal and other socially important goods coalesced between communities, the foundation of Maadi at the nexus of the Nile Valley and Delta suggests a strategic location for riverine contact with communities in the south as well as overland contact to the east via the Darb el-Hagg/Way of Seir across central Sinai (Figure 25). Like Buto, the potential foundation of Maadi as early as 3900 BCE (Hartung 2013, 180-18; 2014) renders the settlement contemporary with sites in the Beersheba region and is only a few generations removed from the foundation of Tall Hujayrat al-Ghuzlan but contemporary with Tall Magass (Klimscha 2009), suggesting the foundation of the site was the product of similar social processes. Evidence for contact with southern Levantine communities derives from the import of certain ceramic storage vessels transporting olive oil or wine, asphalt, Canaanean blades and tabular flint scrapers, and subterranean houses similar to those in the Beersheba region (Hartung 2013, 183-184, with references).[111] Support that copper played a major role throughout Maadi's occupation is suggested by the presence of ore across the site as well as in each stratigraphic level (Rizkana and Seeher

[110] Such a connection may be reflected later by the cult of the serpent goddess *wꜣḏt* at Buto, as the serpent is a motif that first appears in connection with Chalcolithic metal working communities (Amzallag 2016b). That her name is the same word for the color green–the color of the stone of transformation—is remarkable but requires more study.

[111] Both the ceramics and mudbrick architecture from Maadi's last phase of occupation (early Naqada IIC, ca. 3450 BCE) find parallel at Buto during Level IA (Bard 2015, 98). While the nature and duration of an immigrant presence at Maadi and Buto is debated (Hartung et al. 2003, 155-167 vs. Rizkana and Seeher 1989, 80), the cessation of southern Levantine ceramics made on a slow wheel at Buto by Level II (Bard 2015, 98) reflects a marked change in practice, leading Hartung (2014) to conclude that the immigrant presence ceased and Egyptian potters choose not to adopt the slow wheel.

1989, 13) although no evidence of actual smelting or casting is reported. The presence of copper ingots (Figure 12:8 and 9) identical to the ceramic ingot molds at Tall Hujayrat al-Ghuzlan (Figures 12:6 and 7) suggests the Darb el-Hagg rather than the more northern Way of Horus was utilized. Indeed, the lead isotope ratios at Maadi are consistent with an origin from Timna, supporting that the ingots from the site were cast in the Gulf of Aqaba (Abdel-Motelib et al. 2012, 48).[112]

Within the context of a possible migration of individuals from the southern Levant, it appears that the trade networks once concentrated in the Beersheba region shifted west to the Delta, connecting communities in northeast Africa with communities in Syro-Anatolia potentially via both maritime and overland exchange. Evidence for the maintenance of Anatolian copper procurement networks in the Nile Valley and Delta is supported by the presence at Maadi of four axes made with copper containing a high nickel content, signifying an origin in Anatolia (Pernicka and Hauptmann 1989, 137; Abdel-Motleib et al. 2012, 49). The presence of a copper-nickel alloy is important as it expresses continuity with the overland networks connecting Anatolia with the Chalcolithic communities of the southern Levant, wherein arsenic-nickel rich copper is attested in the Nahal Mishmar hoard (Tadmor et al. 1995) and at Teleilat Ghassul in the Jordan Valley (Golden 2010). Moreover, four pieces of ore from Maadi are believed to derive from southeastern Sinai in the region of Sheikh Muksen and Um Bogma (Abdel-Motelib et al. 2012, 49-50), establishing contact with communities who mined in southern Sinai. Recent analysis of a Naqada II needle from Fayoum supported it was cast from ore mined from the Wadi el-Reqeita region of

[112] Large quantities of copper ore excavated in EB IA contexts at Site H in the Nahal Besor is said to originate from Feinan (Hauptmann 2007, 272).

south Sinai (Rademakers et al. 2018). Notably, both Um Bogma and Wadi el-Reqeita are in the general region of *nawamis*, creating a connection between pastoral communities in the Nile Valley and metalworking communities in the Gulf of Aqaba.

Evidence for ties between Maadi and the southern Levant is also suggested by the diverse distribution networks through which the site procured its copper. With regard to consumption practices, Anfinset (2010, 152-154) has demonstrated the utilization of copper at Maadi is similar to that from sites in the Beersheba and Besor regions, where tools were found in domestic contexts but absent from funerary assemblages. Such an observation provides a contrast to the Nile Valley, where almost all copper is found in mortuary assemblages (Anfinset 2010, 144-152). Within the context of a burgeoning funerary economy during the Naqada I-IIB (Wengrow 2006, 72-98), the presence of copper in Nile Valley tomb assemblage emphasizes its significance for mortuary display its local environment. Furthermore, the typology of the copper objects finds parallel with the assemblages from the EB I southern Levant (Anfinset 2010, 147), attesting to the nature of economic cooperation between communities in the Besor region and Nile Valley.

Evidence for contact between communities at Maadi and the Nile Valley is supported by the presence of metal south of the Delta. Tomb 3131 at Matmar is dated to the Naqada IC/IIA (Watrin 2007, Table 1) contained a 3-pound axe made with 1.28% Ni deposited alongside an imported vase from the southern Levant dated to the EB I as well as the leg bones of a young animal, perhaps as a meat offering (Brunton 1948, 16, 17, 21, 23, pls. VIII:20 XVI, 47; Watrin 2003, 570). The tomb was reported to have been constructed with freestanding boards (Brunton 1948, 17-18, 22, pl. XIII,20), forming a connection between the axe as a prestige tool (connected to the woodworking industry abroad?), reflecting the importance of riverine and maritime trade by the Naqada late I/early II. In addition to the axe from Matmar, evidence for interaction between Maadi and the Nile Valley around the exchange of copper is attested by the presence of a copper harpoon at the site that is typologically similar to those from both Upper Egypt and the southern Levant (Anfinset 2010, 153). It should be recalled that copper with a high nickel content was also used to produce some of the lost-wax cast standards and maceheads in the Nahal Mishmar hoard (Key 1980; Golden 2010, 165) as well the axe from Teleilat Ghassul (Golden 2010, 77, citing personal communication with Hauptmann), emphasizing continuity with the Chalcolithic mode of production in the Nile Valley. Indeed, when we consider that the high nickel copper is believed to come from a source in Anatolia, the oval ingots from Maadi (Figure 12:8) are of interest here not only because they are almost identical to those from Tall Hujayrat al-Ghuzlan (Figure12:6), but because both find parallel to an ingot mold from Hacinebi from the upper Euphrates (Figure 12:1; Stein 2001, 278, fig.8.5), reflecting participation in an interconnected system. The parallels between these sites provide support that individuals in the Nile Valley and Delta maintained interaction with individuals in the Anatolian sphere of interaction prior to the Naqada IIC/D (ca. 3450 BCE).

While no evidence of smelting has been positively identified at Maadi, we cannot discount the possibility that the decentralized presence of ore reflects continuity with the previous production system wherein ore was transported back to settlements for smelting, perhaps as part of fostering community cohesion (Chapter 4). Indeed, the spatial distribution of ore draws parallels to Tall Hujayrat al-Ghuzlan, where ore was located throughout the site, connected with community participation in mining (Klimscha 2013b). However, smelting would have been restricted to certain individuals and the concentration of ingots in one area of the site suggests a degree of control and specialization, similar to contemporary sites of Fidan 4 (Adams and Genz 1995). Evidence of further continuity in practice is suggested by the presence of four subterranean structures at Maadi that recall those from the Beersheba Valley.[113] Structural differences such as a lack of tunnels connecting structures and the presence of mudbrick walls (Rizkana and Seeher 1989, pl. XV:1-2) have generated interpretations centered on emulation versus migration (Hartung 2013, 184). Braun (2011, 110) noted that an apsidal stone structure dug 2m into the soil in a later phase of the site (Rizkana and Seeher 1989, 49-56) finds parallels in the northern and southern Levant. Its appearance in the Nile Valley for a subterranean dwelling suggests a local variation of domestic structures farther to the north that may have been expressive of an identity tied to participation in networks external to the Levant.

Evidence for Nile Valley pastoral collaboration with the Delta prior to the Naqada IIC/D is supported by several lines of evidence and shed light on the origins and organization of Maadi. The presence of wide brimmed vessels from Badari, Mostagedda, Merimde, Buto, Tall Hujayrat al-Ghuzlan and Marsa Matruh demonstrates cooperation networks extended from the Upper Nile Valley to the Mediterranean Sea, as well as east to the Gulf of Aqaba (Klimscha 2012, 194). The nature of collaboration may explain the presence of a copper harpoon cast in a southern type at Maadi. While no copper objects were interred within any of the 547 graves at Maadi (Rizkana and Seeher 1989, 13), Nile Valley mortuary practices do manifest in the nearby contemporary cemeteries at Wadi Digla and Heliopolis, wherein copper objects are absent but slate palettes are present alongside ochre and malachite (Anfinset 2010, 152, with reference to Debono and

[113] These subterranean structures were interpreted as storage rooms by Hartung (2013).

Mortensen 1988, 34). The presence of Nile Valley funerary practices in such close proximity to Maadi suggests intimate contact between pastoral groups and settled communities, raising the possibility that the foundation of the site around 3900/3800 BCE was the product of collaboration between Nile Valley pastoralists and agriculturalists from the southern Levant and Delta. Moreover, the presence of tabular scrapers at the site—connected with specialized wool economy in pastoral groups—provides nuance to Rothenberg's (1972) original proposal that the Timnian horizon characterized pastoral groups in the eastern Delta, Sinai, and Negev connected with mining and copper production.[114] Pastoral groups south of Arad and west into the eastern Delta thus forming a continuous landscape of exchange, suggesting the mining of metal from the Wadi Arabah, Sinai, and later Eastern Desert may have formed the joint enterprise around which shared material practices manifested. We may therefore propose that coalitions had formulated between Nile Valley corporate groups and settlements in the Delta and southern Levant by the first half of the fourth millennium, organized around the mining and movement of copper ore from the Wadi Arabah, Sinai, and Eastern Desert.

The Settling Down of a Mobile Metalworking Elite

While it is accepted that immigrants from the southern Levant may have migrated to the Delta, certain Chalcolithic practices also appear to continue farther south in connection with the rise of new power structures around central communal burial grounds. The introduction of several new technological practices in the Nile Valley attest to the intensified interaction between certain

[114] See also Rosen 2011b.

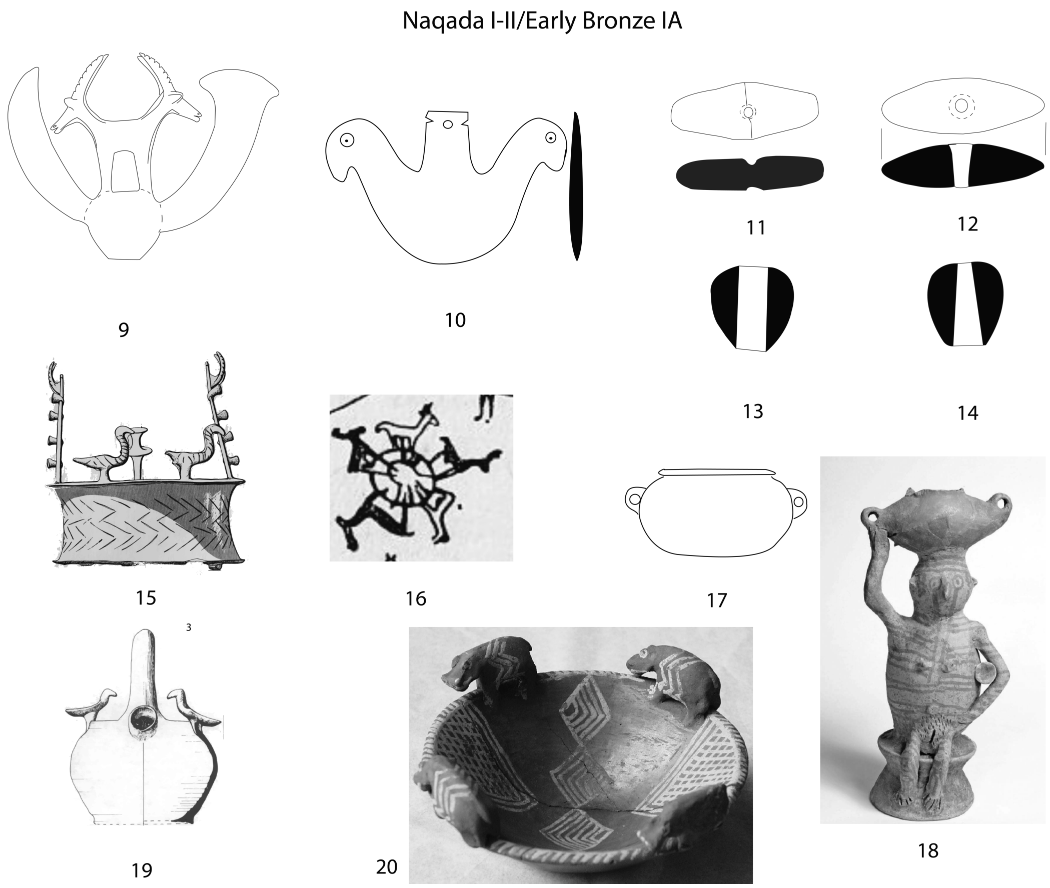
pastoral groups and communities in the north, if not reflecting the potential for small-scale migration of communities from the southern Levant to the region given the close cooperation between communities. The adoption of mudbrick architecture at Maadi and Buto is thus similar to the last phase of Chalcolithic settlement the subterranean structures at Abu Matar and Shiqmim, which were replaced by rectangular mudbrick/*pisé* buildings on stone foundations (Levy and Alon 1985, 75), suggesting the adoption of certain domestic-centered technologies were the product of increasing contact between communities. In the Nile Valley, the founding of new central places appears to reflect elements from both sedentary centers in the north (e.g., mudbrick architecture) as well as retain elements the pastoral lifestyle; Wengrow (2006, 76-80) has characterized such settlement processes as "towns on the move." The second line of evidence linking the Nile Valley with northern practices is supported by the newfound emphasis on grain-based comestibles, tied to the newly attested production of beer and bread production and accompanied by the local production of coarse ware serving vessels (Wengrow 2006, 94ff. with references). Moreover, it requires shifts in the reliance on agriculture and thus structure of labor practices, which appears to have played an increasingly important role in connection with the rise of mortuary shrines in the Nile Valley. In the absence of institutionalized coercion, these new practices require the cooperation of communities and an ideological system of belief that unites them in effort to invest time, labor and materials in this new funerary economy, leading to the rise of new power structures similarly structured around the control over the funerary landscape as was the case in the Chalcolithic southern Levant (see below).

Within this context of domestic consumption, new cultic serving vessels create a connection between the Nile Valley and metalworking communities of the southern Levant.

Amiran (1986) discussed the introduction of a new cultic vessel used to pour beer in the southern Levant during the EB IA. The vessel finds typological parallels at Byblos, suggesting it was introduced from the north, however the clay birds attached around the perimeter of the rim are similar to those from one of the crowns in the Nahal Mishmar hoard (Figure 28:15 vs. 19), establishing the significance of this motif for the community who used this vessel. The introduction of applying clay figurines to cultic vessels is similarly attested in the Nile Valley in contemporary contexts at el-Mahasna in Tomb H29, where a C-ware bowl was decorated with four hippopotami (Figure 28:20); similar bowls are attested in Tomb 2646 at Matmar (BM 63408). The beer vessel with parallels at Byblos is latter attested on the Narmer palette (Amiran 1986), creating a connection between cultic ritual and the consumption of beer connected with the economic foundations of the state. When we consider the role that metalsmiths-pastoralists played a role in connecting communities, the introduction of a beer vessel in the southern Levant raises questions about the role of pastoralists in the adoption of new subsistence practices.

As people began to grow increasingly reliant on a portion of the community to remain sedentary, evidence that mobility was still important to local power structures is evident by the continued participation of Nile Valley communities in joint mining expeditions with the southern Levant. Evidence connecting communities specifically around mining is proposed by the appearance of double pointed “maceheads” (Figure 28:12; Cialowicz 1989, fig. 1:6) that are almost identical to the so-called mining picks in Feinan (Figure 28:11; Adams and Genz 1995), as well as piriform maceheads in the Nahal Mishmar hoard (Figures 28:13 vs. 14). Another local practice attested in the Nile Valley is the introduction of wavy-handled containers, reflecting close contacts with communities of the EB I southern Levant (Petrie and Quibell 1896, pl. XXXI). Indeed, a fully

Figure 28. Material similarities between Nile Valley groups and mining/metalworking communities in the southern Levant ca. 3800-3450 BCE. Not to scale. Images adapted by author. See Table 11 for references.



developed stone vessel industry appears rather rapidly during the Naqada and draws parallel in the production techniques used in the carving of basalt vessels of the Chalcolithic and EB I southern Levant. Moreover, decorated ceramic forms appear to mimic Chalcolithic churns attested in stone (Figure 28:17; Petrie and Quibell 1896, pl. XXXV), drawing parallels with the vessel held by the Lady of Gilat (Figure 28:18). Such parallels speak to the active participation of Nile Valley communities in external networks with the southern Levant and regions farther abroad, seemingly connected via overland routes through the Sinai, north into the southern Levant and up into Syria, as well as maritime contact via the Delta at Buto.

Mortuary Landscapes as Central Places and the Concentration of Power in the Body

It is against the rising importance of beer and bread production that new central places arise in the Nile Valley during the Naqada I-IIA/B, concentrated around the permanent settlements at Badari, Naqada, and Hierakonpolis.[115] These centers are indicated by the development of three distinct local production traditions of coarse ware and flint objects not found in funerary assemblages, supporting the development of daily interactions tied to new cognitive attachments to place (Wengrow 2006, 90, with reference to Friedman 1994, Holmes 1989). It is significant that the foundation of these sites is relatively contemporary with the abandonment of the Chalcolithic mortuary shrines at Teleilat Ghassul and the Beersheba settlement system. Given the embeddedness of producers within exchange networks, the locations of both Hierakonpolis and Naqada at the confluence of east-west wadis leading to some of the most profitable mineral resources of the Eastern Desert should not be viewed as coincidental, as several shared practices appear in these mortuary centers.

The foundation of Hierakonpolis around 3800/3700 BCE[116] was located on the west bank of the Nile, just downstream from the entrance to the Wadi Baramiya, where copper and gold was located in the Eastern Desert. At Hierakonpolis, the emergence of an elite necropolis (HK6

[115] A ritual center is also believed to have also formulated at el-Mahasna (Anderson 2011) and Abydos.

[116] At Hierakonpolis, radiocarbon dates from timber used in the construction of a pillar at HK6 Structure E8 dated to 3790-3640 BCE (2-sigma) (Friedman 2009, 88, n.27)

(Friedman 2008) and large enclosure potentially used for public feasting and ceremony (HK29A (Friedman 2009) appears to have structured the investment of time, materials, labor, and knowledge into the spaces of the dead. The site reveals various lines of evidence for the centralization of surplus and labor investment in constructing and maintaining the site. These include specialized firing installations (HK11C; Takamiya 2008) as well as a beer brewing facility (HK24A; Geller 1992), reflecting the importance of consumption and communal practice around mortuary rites of passage.[117]

The foundation of Hierakonpolis on the west bank of the Nile appears to reflect a close parallel to the mortuary ideology expressed in the Judean Desert funerary landscape (Ilan and Rowan 2015) and the *nawamis* from Sinai (Bar Yosef et al. 1983). However, various lines of evidence also express contact with regions to the north in Syro-Anatolia, where beer was brewed and copper with nickel was produced. Moreover, the investment of community resources around mortuary rites of passage recalls similar processes that resulted in social complexity during the Late Chalcolithic in the southern Levant. These acts structured the daily practices of living around the commemoration of the dead, resulting in community identity and cohesion. Such investment in the funerary landscape was also detected at Naqada during the Naqada II when wooden planks and furniture begin to appear in tomb assemblages, domesticizing the funerary space while simultaneously showcasing participation in long-distance timber procurement networks

[117] In their study of the brewing technologies at Hierakonpolis (Naqada IB) and Tel el-Farkha in the Delta (Naqada IIB), Adamski and Rosińska-Balik (2014) concluded that the technology at Hierakonpolis could have been introduced from somewhere else—which remains inconclusive—but that by the Naqada IIB it appear beer was consumed on a wide scale. It is therefore possible that the community at Hierakonpolis reflects a community who had just procured this knowledge vs. the community at Tel el-Farkha appear to have individuals who were already well-versed in the technology.

(Wengrow 2006, 137). Within the contexts of shared practices tied to economic cooperation, wooden funerary structures are also known from the Judean Desert during the Chalcolithic (Davidovich et al. 2013), providing yet another practice attested between communities. Indeed, the later name of Hierakonpolis—city of the hawk (Horus)—again recalls the importance of the human-bird/prominent-nose motif in the Late Chalcolithic southern Levant. Connections with mining at Naqada are likewise suggested by the later name of the city, which literally translates to "city of gold," reflecting its early association with mining and metal production in the region. However, it is possible that copper may have been the original reason for the location of the city.

In their survey of gold mining in the Eastern Desert and Sudan, Klemm and Klemm (2013, 3) proposed nomadic groups first discovered, worked, and traded gold placer nuggets in the region during the fourth millennium BCE, playing a small role in the landscape. Of relevance here, however, is that primary gold deposits may have been discovered *as a result of searching for copper* given its co-occurrence in auriferous quartz veins, resulting in green stains that would have functioned as visual indicators for prospectors (Klemm and Klemm 2013, 4, citing Tawab et al. 1991).[118] The manifestation of central places as mortuary shrines in the Nile Valley may thus reflect the local perpetuation of the southern Levantine ritual mode of production.

The development of mortuary shrines as central places on the west bank of the Nile is connected with the coalescing of power and the rise of pastoral powerbrokers connected with economic cooperation abroad which would eventually lead to the institution of kingship by the

[118] Such was the case at Wadi Dara and Umm Balad, where copper and gold were mined together by the Old Kingdom (Castel 1992).

Naqada III. We can recall that in complex stateless societies, the pooling of resources is achieved through persuasion and the use of taboo by managerial leaders. These are individuals who the community sanctions to obtain a position of status in the absence of institutionalized coercion (Stanish 2017). One of the ways in which communities will pool resources is through the community buying into an ideological system that serves to explain an economic reality (Stanish 2017). The pooling of agricultural resources presumably for feasting around mortuary rites of passage once again appears to reflect the localized manifestation of similar social realities and power strategies as during the Chalcolithic in the southern Levant.

Within the context of local forms of Chalcolithic mortuary rites, one of the newly attested aspects of burial during the Naqada II is the interchangeability of human and zoomorphic features on certain bodies, connected with newfound social differentiation. At Naqada in the Nile Valley, Tomb 1480 contained an individual whose skull had been removed but was replaced with an incised ostrich egg depicting two deer (Petrie and Quibell 1896, 28, 30, pls. LXIV:100-101, XLVII:21).[119] The individual wore a flint dagger on the hip, suggesting participation in an external community of exchange where metal weapons were prominent objects of display. The burial also contained a slate bird-shaped palette positioned between the chest and knees, where two decorated rolled sheets of copper were placed. These are the same rolled sheets of copper that were made using the same pointillé technique employed to decorate ivory from Bir es-Safadi during the Late

[119] Later Naqada III depictions of animal standards with human arms such as on the Narmer palette suggest the origins of this ideological system of belief can be traced back to the at least the early Naqada II, if not earlier as suggested by the Naqada IC depiction of a man wearing a horned headdress holding a mace on a vase from Naqada (Figure 33, bottom). Within the context of later divine kingship, specifically the belief that the king is Horus reincarnated, its origins may trace back to this early period and even to the Late Chalcolithic system of belief, wherein reincarnation with zoomorphic features may have been part of the worldview.

Chalcolithic (Perrot 1959, fig. 5), the sacred wall from Tall Hujayrat al-Ghuzlan (Klimscha 2012, fig. 10), as well as the copper saw from the later EB IB/Naqada IIIB Egyptian hoard at Kfar Monash in the coastal plain of Israel (Figure 26:4; Hestrin and Tadmor 1963, fig. 9). This individual clearly was connected to metalworking communities abroad, and the interchangeability of skull with bird egg seemingly recalls the prominent-nose/human-bird motif so indicative of the Late Chalcolithic, an identity possibly performed by the ritualists at Teleilat Ghassul. Indeed, the rise of elites in society is attested in the assemblage of Tomb 23 from the elite cemetery (HK6) at Hierakonpolis, which contained among other things a life-sized statue and painted plaster with figural and geometric designs (Friedman 2008, 1159-1168), bringing to mind both the decoration of the mortuary shrines at En Gedi (Ussishkin 1971, 1980), Teleilat Ghassul (Drabsch 2015, Drabsch and Bourke 2014), and the cultic wall at Teleilat Ghassul (Klimscha 2012, 191). Masks from the elite cemetery (Friedman 2008) appears to reflect the possibility of public performance and thus the importance of ritualists in the community, providing nuance to the community investment in certain bodies and thus collective acceptance that specific individuals were imbued with more power than others.

These new burial practices should thus be connected with changing power dynamics between groups, connected to emergent claims over the landscape and the shift from managerial leaders to chieftains potentially beginning to wield coercive power in society. Wengrow (2006, 114-120) proposed that the decreased mobility of some groups resulted in new expressions of dominance over the wild, manifest as animals, as well as violent acts of dismemberment. Accordingly, this new treatment of certain bodies would have made possible “the distribution of remains from particular individuals between multiple locations, and hence between multiple arenas of commemoration…provid(ing) a map of memory though which this extension could be expressed in a shared idiom of place, encompassing both the living and the dead" (Wengrow 2006, 121). In effect, the dismemberment of the dead allowed for the physical claims to the landscape. Given these burials would have taken place at different geographic points, the community would have created new attachments to the landscape as differentiated individuals were buried across the Nile Valley and perhaps regions farther abroad. This violent act of dismemberment as political performance coincides with an increase in the appearance of stone maceheads in Nile Valley funerary assemblages (Cialowicz 1989) as well as Egyptian maceheads in the southern Levant (Czarnowicz 2014a). Participation in metal working communities in the southern Levant therefore appears tied to the rise of the macehead a symbol of power to showcase participation in external networks abroad, later becoming *the* symbol of institutionalized coercion by the Egyptian state. We can nuance this picture by framing the distribution of body parts as a way to foster community cohesion around the dispersal of certain bodies—a localized version of secondary burial rites in the Chalcolithic (Shalem 2017).

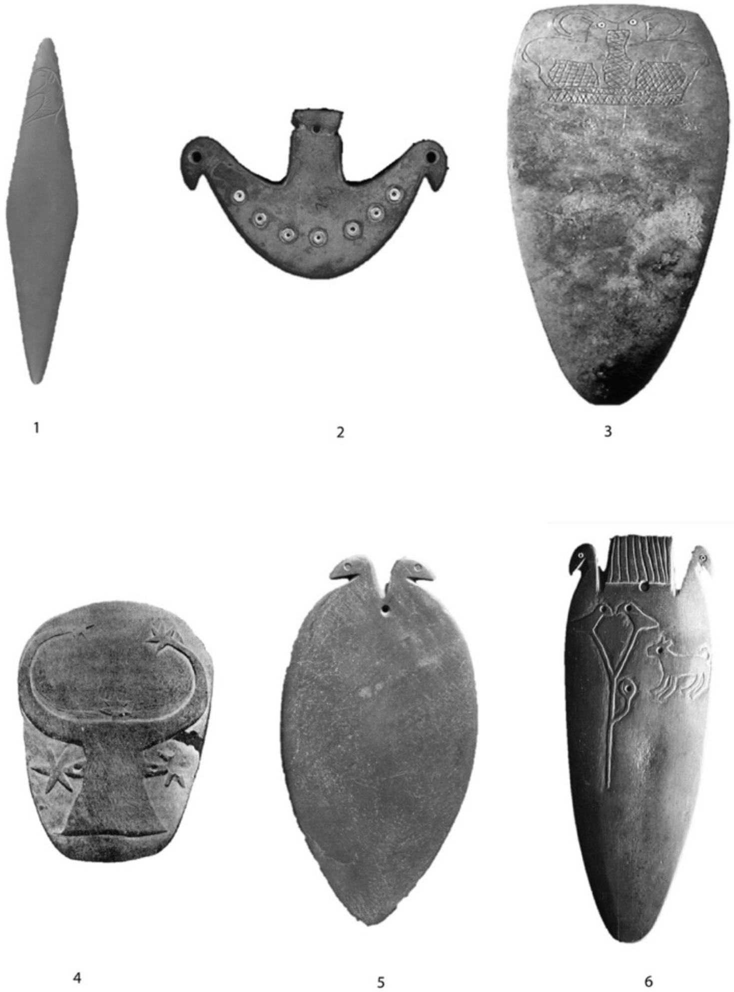
The rise of these mortuary centers may have been connected with a shift in the belief system, as palettes begin to be carved almost exclusively with stone from the Wadi Hammamat and take the shape of a range of zoomorphic forms (Stevenson 2009b). It is therefore during the Naqada IIA-B that rhomboidal palettes of the Badarian/Naqada I shift to include non-human creatures of all kinds—elephants, fish, hippopotami, etc, providing yet another parallel to the Late Chalcolithic wherein the appearance of ossuaries decorated with various zoomorphic motifs was connected to a new system of belief potentially centered on the reincarnation of the individual (Ilan and Rowan

2019). Secondary burial in decorated ceramic ossuaries appear to cease as a practice in the southern Levant with the reorganization of the Chalcolithic system. In the Nile Valley and Delta, however, it is during the mid-fourth millennium that groups *begin* interring the dead in pot burials by the Naqada II (Power and Tristant 2016, 1476), seemingly expressing local continuity of this practice. At el-Amrah, a ceramic house model dated to the Naqada III (Randall-Maciver and Mace 1902) bears striking resemblance in form and technology to the ossuaries from the Late Chalcolithic (Figure 29). While no bones were inside, the conceptualization of such a regenerative receptacle is familiar.

Figure 29. Ceramic ossuary from Azor, Chalcolithic (BM 135740). Ceramic "house" model from el-Amrah, Naqada III (BM EA35505). Not to scale.

The connection between ossuaries as regeneration receptacles and slate palettes as tool to grind greenstone to foster regeneration provides a connection between the Late Chalcolithic belief system and the local changes in ritual praxis in the Nile Valley. Some of the motifs on Naqada palettes are shared with motifs found in the Nahal Mishmar hoard. One example is the ibex and birds in a tête-à-tête stance on palettes (Figure 30:3, 6) bringing to mind the double-ibex motif on the lost-wax-cast standard at Nahal Mishmar (Figure 28:9). Such a motif is then seemingly paralleled in the double bird palettes (Figure 30:2). Indeed, one of the more prominent motifs on

Figure 30. Naqada I-II Palettes (see Table 12 for references).

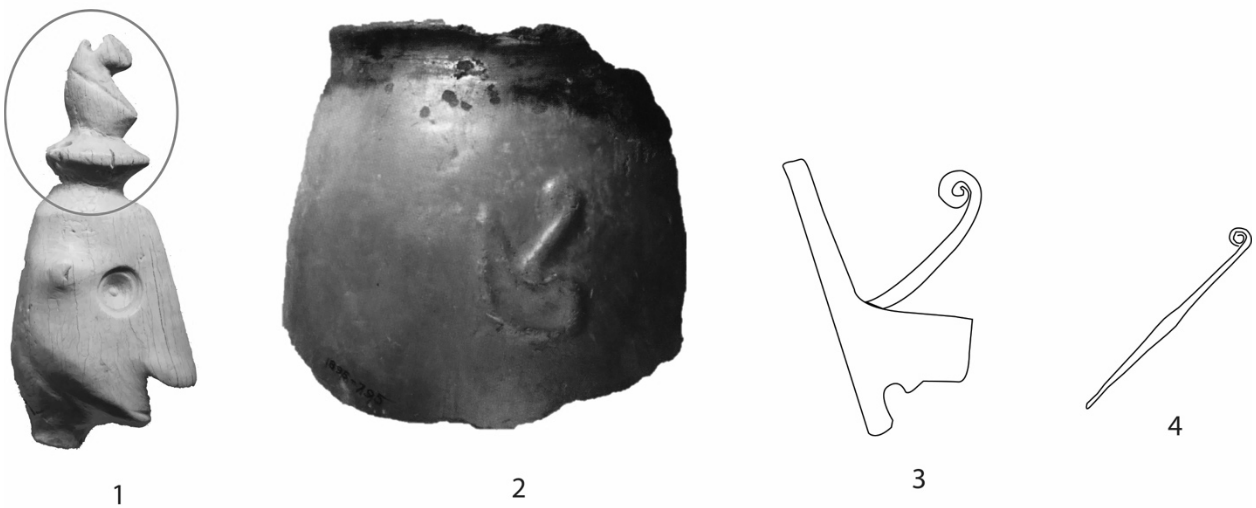


these palettes is the bird (Figures 30:2, 5, 6), first attested during the Badarian on ivory combs and spoons (Chapter 5), reinforcing the importance of the prominent-nose/human-bird motif in reincarnation/regeneration, providing the ritual framework within which kingship would arise. These changes in mortuary practice correlate with the shift to mining only greywacke from the Wadi Hammamat reflected a newfound social symbolism attached to the landscape (Stevenson 2009)—perhaps connected with the presence of copper and gold in the region. It should be recalled that these palettes first appear alongside greenstone and a new system of belief argued to be connected with economic participation in the copper production of the southern Levant.

Metalworking Ritualists, Red Crowns, and Copper Pins

The treatment of different bodies as imbued with more power than others to negotiate claims of space should be tied to the rise of ritual practitioners connected with the mortuary cult centers, laying the economic and ideological foundation on which kingship would crystalize during the Naqada III. It is thus important that within the context of numerous shared practices around cult, funerary rituals, and the continued participation of certain groups in external exchange networks connected with copper production, we see the first appearance of key symbols central to the Egyptian king's power and identity—specifically, the Red Crown and the mace. When we consider the pastoral origins of the Egyptian state in the Nile Valley, it should come as no surprise that these symbols appear in Upper Egypt, argued here to be the product of Nile Valley groups continued economic cooperation with copper producing communities in the southern Levant. Baines (1995, 96) suggested that it is too coincidental that the symbol depicted on an early fourth millennium sherd from Tomb 1610 at Naqada (Figure 31:2) resembles the later Red Crown (Figure 31:3). He thus ultimately proposed it was "probably the formal ancestor of the crown" (Baines 1995, 96). However, the function of the symbol is little understood. The appearance of this power symbol at Naqada on a *ceramic* sherd seemingly establishes an early connection to the centralization of resources at the site, presumably for community ceremony. Managerial leaders will often employ reciprocity as a form of redistribution, drawing on magic and taboo to persuade the community that such exchanges are required (Stanish 2017). Such a model was argued for the intensification of copper production during the Late Chalcolithic in the southern Levant and such a model is likewise proposed for the Predynastic Nile Valley.

Figure 31. Late Chalcolithic and Predynastic awl in Red Crown. Line drawings in nos. 3 and 4 traced by author. 1) Levy 2014, 41; 2) Red Crown, Naqada Tomb 1610; 3) Schematic of Red Crown, Gardiner S3; 4) Pin, curled Naqada Tomb 218 (Petrie and Quibell 1896, 21, pl. LXV, 15).



Within this environment of practices connected with participation in copper producing communities in west Asia, during the Naqada I a copper pin begins to appear in burial assemblages in the Nile Valley (Figure 31:4; Petrie and Quibell 1896, pl. LXV:15), which I argue should be connected to new forms of display marking participation in metalworking communities outside of the Nile Valley. In terms of their form, these pins looped inward at one end and taper to a point at the other (Figure 31:4). They were produced with a square-cross section that was forged to a point (Czarnowicz 2012, 353, fig. 4.1-6), locating them within the same production tradition as square-sectioned copper awls dating to Naqada I in the Delta and the EB I in the southern Levant.[120] Anfinset (2010, 147) has indicated these pins are found in the earliest graves (S.D.30, with reference to Petrie 1917, 52), establishing a connection with both the figurine from Bir es-Safadi (Figure 31:1) and the sherd from Naqada with the ancestor of the Red Crown (Figure 31:2). Indeed, Anfinset (2010, 145, 147) also notes that these pins concentrate around Naqada and that some burial contexts reflect that they were worn near people's heads as "hairpins." These two points further strengthens my hypothesis. A connection between these pins and kingship is supported by their distribution: by the Naqada II these pins become associated with elite male burials and are attested in the tombs of later kings of Egypt.[121] While their original function remains enigmatic,[122]

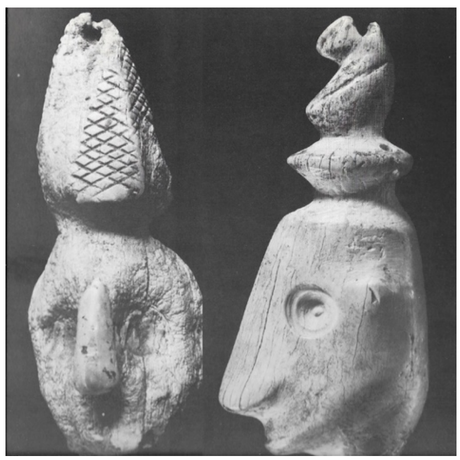
[120] Square-sectioned awls appear at Maadi during the Naqada I (Anfinset 2010). In the southern Levant, Ilan and Sebbane (1989, 149, fig. 5) discuss square-sectioned awls at various "EB I" sites and sought to connect them with more labor-efficient production choices as a result of increased demand of copper and the rise of a market economy. Note, however, that the sites that they discuss—Small Tel Malhata, Arad, Tel Erani, Azor and in the *nawamis* in southern Sinai—all also date to the EB IB and have an Egyptian presence on site, complicating our understanding of directional influence. Czarnowicz (2012, 353, fig. 4.1-6, with reference) also discusses how these pins were found at at Ashkelon-Afridar, En Besor, and along Way of Horus–all locations connected with EB IB copper procurement network. At Ashkelon, the most recent publication of the material from Site E by Golani has resulted in an interpretation that the metal was heading for Egypt (Golani 2014).

[121] Czarnowicz (2012, 353, with references) has discussed that the spatial distribution of these pins appear at: Kom el-Ahmar in the western Delta (Needler 1984, 290-292, figs. 22:92-93, 201, 202) and at Abydos in the tomb of Qa'a (Petrie 1901b, pl. XLIV:48), Djet (Petrie 1901b, pl. XXXVIII: 92), and Djer (Petrie 1901b, pl. XXXV: 93, 95). Czarnowicz (2012, 353) also cites a silver pin of this type found in the late Dynasty 2 tomb of the king Khasekhemwy at Abydos, wherein the handle bore the serekh of Aha, the Dynasty 1 rule (Dreyer et al. 2006, 114-115, Taf. 27b). The importance of this finding supports a connection between this pin and kingship. The possession of a pin with Aha's cartouche may reflect the passing on the Red Crown as a symbol of kingship. We can supplement Czarnowicz's discussion here by adding to the list a subsidiary burial associated with Tomb 3503(A) at Saqqara dated to Dynasty 1, where one of these pins (9.4 cm) was found in a wooden box placed in front of a man on his left side and interpreted as belonging to his craft (Emery 1954, 63, 143 fig. 86, 207:3, pl. XXXI:b284).

[122] Interpretations of the smaller pins have included use as thorn extractors (Petrie and Quibell 1896, 48) and dress/hair pins (Baumgartel 1960, cited in Anfinset 2010, 143). The larger pins found at Tel el-Farkha include use as clothing pins (Needler, cited in Czarnowicz 2012, 353) and most recently as a tool used in fishing communities (perhaps in rope manufacture) whose economic importance resulted in it the tool becoming the symbol of the Delta (Czarnowicz 2012, 353).With regard to the large pins, these were discovered in settlement context in Kom W Phase 5 (Czarnowicz 2012, Table 1), which dates to the Naqada IIIB-C1, contemporary with Dynasty 0/1. Within Wengrow's (2006) model for power strategies of the Naqada III elites—which builds from Baines' (1995) earlier argument that the

Czarnowicz (2012, 353) pointed out the similarity between the shape of this pin and the spiral motif associated on the Red Crown (Figure 31:3-4); he proposed the pin was such an important tool for an industry in the Delta given it became the symbol of the king's costumery. However, the attestation of the Red Crown on the vessel sherd from Naqada has resulted in proposals that this symbol later associated with the institution of kingship originated in the south (Baines 1995, 96). However, an overlooked piece of evidence provides some much-needed nuance to the discussion, locating the origin of this form not in the Nile Valley, but in the Chalcolithic southern Levant.

Figure 32. Ivory Figurines with cultic headdress from Abu Matar (left) and Bir es-Safadi (right; Perrot 1978, pl. 53 and 54).



From Bir es-Safdi in the Beersheba region, an ivory figurine of a male was carved wearing an almost identical headpiece to the Red Crown depicted on the Naqada 1 sherd (Figure 32. right). Greenstone pigment was also found inside the eye socket of a similar ivory figurine at the

institutionalization of kingship relied on the co-option of earlier ritual symbols—elites asserted control over ritual knowledge by monumentalizing traditional symbols of power, which included the ripple-flaked knives, grinding palettes, and the macehead. It is proposed here that these larger pins fall into this category of monumentalizing. The largest of these pins at Tel el-Farkha measured 16 cm (Figure 35:42).

contemporary and nearby metalworking center of Abu Matar (Perrot 1959, 9), providing parallels to ritual practices attested in the Nile Valley (Horn 2014, 57-59). These ivory figurines are carved with the prominent-nose motif, seemingly connecting them with the belief that individuals would be reborn—or potentially reincarnated—with zoomorphic features. As has been discussed, the bird motif appears connected with ritualists and provides a parallel to the later Egyptian belief that the king was Horus incarnate. Within this context, another figurine from Abu Matar was found with a woven headpiece that, when placed next to the Bir es-Safadi figurine, looks similar to the White crown traditionally associated with Upper Egypt (Figure 32, left).

Evidence that the pin was connected to metalworking communities across west Asia is supported by its widespread distribution. Parallels for these pins are attested in communities located along known routes connected with the transregional exchange in metals, textiles, obsidian and semi-precious stones during the late fifth to early fourth millennium. Such pins are attested in Iran at Sialk I, Hissar I, and Shah Tepe (Anfinset 2010, 145) and appear along the coast of Southeastern Anatolia at Mersin in Late Chalcolithic contexts (Garstang 1943, fig. 11). As argued in Chapter 4, the Beersheba settlements were highly integrated into the metal exchange networks of west Asia during the fifth and early fourth millennium. The introduction of this pin to the Nile Valley and Delta—argued here to be through participation in communities in the southern Levant––resulted in the localization of a transregional form that would last as a symbol of power in Egyptian society for millennia, pinned into the Red Crown as a prominent emblem in the presentation of kingship. Indeed, these pins appear around the same time that we see the first pictorial depictions of the macehead, which would later become the symbol of institutionalized coercion of the state. From a painted Naqada IC vessel at Abydos, an individual with horns or feathers and a tail holds the macehead and appears at a larger scale than the two nearby individuals. The individual's costumery is similar to the ritual servitors at Teleilat Ghassul (Figure 33), where it should be recalled that metal was found placed in the plaster fresco to evoke metal in the cultic headgear of one of the ritualists (Figure 15:2). Moreover the use of scale recalls the same technique employed in the frescoes at Ghassul to indicate importance.

Within burial contexts, archaeological evidence appears to attest to the fact that these pins were worn in organic headdresses, as attested in several burials at Abydos during the Naqada III (=EB IB). This comes from Tomb U368, pit tomb was lined with reed mats and contained a man positioned in a crouched position, head facing west, interred with a copper pin close to his head, malachite in the left hand and near the chest, and an iconic fish tail knife (Hikade 2003, 143, with reference).[123] Noteworthy is the lining of pit graves with reed mats that this was a technique employed in furnace construction at Abu Matar (Golden 2010, 120), in ossuaries in the Chalcolithic southern Levant, and in Cave 2 near the Nahal Mishmar hoard (Bar-Adon 1980). Within the context of rebirth, these pit burials may have been symbolic of furnaces, with the placement of the malachite within this tomb symbolic of the placement of the ore in the furnace—the individual ready to be recast into the next life. When we pair the ore in the assemblage with the fishtail knife—believed to be the predecessor of the psš-kf, or, ritual tool later connected with opening-of-the-mouth (rebirth) ceremony (Hikade 2003)—it supports a proposal wherein the

[123] Tomb U-141 (Naqada IC/IIA) is reported to have similarities with a reed lined pit, malachite, resin, fishtail knife, stone vessels, 55 transverse arrowheads, a copper pin and silver pin (Hikade 2003, 144-145, with reference). The similarity in these two graves with regard to a reed-lined pit with the presence of both metal, malachite, and a fishtail knife appears to be the local manifestation of a regenerative ideology and ritual connected with copper producing communities in the Besor/Beersheba/Arabah Valleys.

Figure 33. Comparison between ritualists in Chalcolithic southern Levant and Naqada I Nile Valley. Top: Ritualists with zoomorphic features at different scale, Teleilat Ghassul, Late Chalcolithic (Drabsch and Bourke 2014, fig. 5). Bottom: Ritualists with maces and zoomorphic features at different scales, Abydos, Naqada IC.

overall assemblage may symbolize the regeneration of the individual by mimicking the smelting process. That this individual is an elite is suggested by the pin near his head (Figure 35:18 for similar type), which would have been placed in a cap or crown of some kind similar to the Red Crown (Figure 31:3-4). Given the rise of certain elites in society, the connection of the pin in a headdress recalls the ivory figurine from Bir es-Safadi figurine depicted wearing a similar headdress with a pin in it (Figure 31:1), as well as the insertion of metal into the headdress of the ritualists at Teleilat Ghassul (Drabsch and Bourke 2014, fig. 10). Within its local context, the individual in this burial may have been a ritual specialist or leader whose wearing of this headpiece reflected the now localized symbol of power—the origin of which was connected with Late Chalcolithic metalworking circles of the southern Levant.

Additional evidence supporting the identification of this copper pin with the curled object sticking out of the Red Crown is attested in several of the Pyramid Texts. Dated to the reign of Unas, the last king of Dynasty 5, an enigmatic *ẖꜣbt/šbt/ḥmꜣṯt*-wire is mentioned in connection with *wꜣḏt* (Goebs 2008, 160 with references). Goebs (2008, 160) has drawn attention to the importance of this object, citing PT 268 §373c wherein the "wire" is described alone as one of the symbols the deceased obtains on his journey. The use of *ẖꜣbt* "the bent one" (WB III, 362) to describe this part of the crown thus draws parallel to the appearance of these pins. With regard to its shape, Fehling (1986) proposed the wire mentioned in the Pyramid Texts was the inverted wire of the *wꜣḏt* eye; however, Goebs (2008, 168, n. 411) has referred to this proposal as "far-fetched" given the association of the curl with a plant/spiral motif (Goebs 2008, 158, with reference to Ward 1971, 106-107). While the connection between plant and spiral derives from a belief that the crown was made from organic material, Goebs (2008) has also raised the possibility that *wꜣḏt* could refer to the serpent goddess. Notably, the eye of Horus is also called the *wꜣḏt* eye, which translates to "regeneration" (Horn 2014) given the healing properties of greenstone. When we consider the importance of the pin potentially derived from its materiality—that is, as a copper tool[124] that came *from* greenstone—the explicit reference made to the king as "foremost (*tpj*) of the *šbt*-wire of the Green/Fresh one" in PT 570 §1459a (Goebs 2008, 91, n.206) may hint at his early role as a ritual

[124] Goebs (2008, 166, n.411) points out that Borchardt (928, 46-47) was the first to propose an identification of the *šbt*-wire as a piece of metal.

servitor in Predynastic communities—the institution that I argue served as the precursor to divine kingship. It is possible, however, that women also served as ritualists, as they were found buried with tattooing needles and during the Predynastic and appear depicted as prominent-nose/human-bird type figures in at least one case, shown in a dancing pose (Figure 23:9). As argued in Chapter 7, these cultic symbols would later be coopted by the king during Naqada III as part of claims over land and industry.

When we consider that the pin may have formed a transregional symbol marking membership in an interregional community of practice centered on the exchange of copper, another spell from the Pyramid Texts appears to encode an archaic connection to *multiple* Red Crowns. PT 286 §427 forms one utterance within a series of spells meant to be recited in a Semitic language meant to ensure the king's successful rebirth into the afterlife (Steiner 2011). These texts deal with a two-headed serpent mother goddess snake named Rīr-Rīr who must coax her children (i.e., other snakes, referred to here as *kbnw*, or Byblites) into not biting the king so that he may survive his journey to the afterlife. When the serpent goddess speaks, the scribe employs a form of syllabic orthography to mark code switching to a Northwest Semitic language, reflecting the orality and original language encoded in the spells.[125] Of relevance to the discussion here is a reference to multiple Red Crowns—emphasizing connections with communities in west Asia given the language of the spell was to be recited in a Northwest Semitic dialect. Following Steiner's (2011, 52) translation, the text states:

[125] In Chapter 7 I propose that the Semitic serpent spell be viewed as a form of performative magic connected with smelting and potentially the death of a ritual practitioner. That its original language is encoded in the Pyramid Texts is argued to reflect the cooperation between Nile Valley and Delta elites in metalworking communities abroad.

PT 286 §427a *ʿ ʿbš w m ꜣ ꜣ ꜣ š w ṯ* (Semitic)
Hurry [pl!] away from Rīr- Rīr, (the ones) whose hand deals death
PT 286 §427b *kbnw zbnw ḥz*(*t*) *nt nwt* (𓋔 𓋔 𓋔)
The Byblites have crawled off. O praised one [fem!] of the Red Crowns,
PT 286 §427c *ꜣꜣꜣ šy ꜣꜣꜣ šy nṯzỉ*(*t*) *nt nwt* (𓋔 𓋔 𓋔)
Rīr- Rīr of the sea, Rīr- Rīr of the sea, exalted one [fem.] of the Red Crowns
PT 286 §427d *ỉꜣ.ṯ rn.ỉ*
May you [fem.] praise my name!

When we consider that the spells may date to the Early Dynastic, if not earlier, the mention of *multiple* Red Crowns in a spell in the king's burial chamber is meaningful. Consider that these pins may have been used as tattooing needles in the Nile Valley, we should recall Friedman et al. (2018, 123) conclusion that tattoos may have "differed between sexes, referencing perhaps status, bravery, cult/*magical knowledge* or protection" (emphasis added). It is possible that this tool was thus not important to the economy of the Delta, but rather to the Nile Valley, were a ritual mode of production structured the ever-increasingly important emergence of the funerary economy that would lay the foundation of the Egyptian state. In light of the close cultic connections between these practices and the communities to which they belonged, we must thus revisit Baines' (1995, 96) proposal that the Red Crown originated in Upper Egypt. The widespread distribution of these pins along known copper exchange networks link Iran in the east to southern Anatolia at Mersin, south into the southern Levant and finally into Upper Egypt, where pastoralist groups participated in joint-mining expeditions to the Wadi Arabah and Sinai for greenstone. It is therefore proposed that the precursor to the Red Crown was part of the cultic paraphernalia worn by ritual servitors in the southern Levant during the Late Chalcolithic and came to play a major role in the later king as chief ritualist.

Beer Production, Bread Molds, Crucibles and Copper

The Naqada I-IIB/EB IA presents an image of community cohesion crystalizing around central mortuary places in the Nile Valley, seemingly coordinated by community-sanctioned leaders whose power may have derived from their ability to manipulate or control access to greenstone. These new communities reflect the continuity of certain practices first attested in the southern Levant, albeit practiced within their local contexts. The introduction and widespread adoption of brewing beer and baking bread for ceremonial consumption led to new forms of labor organization coordinated by these central mortuary places (Wengrow 2006, 72-98 Stevenson 2016, 439). By the Naqada IIB, the widespread adoption of beer production—and thus barley and bread-baking—speaks to a landscape of cooperation in the Nile Valley and raises the question of where this knowledge was procured (Adamski and Rosińska-Balik 2014). When we look at the evidence more closely, several lines support a connection between the introduction of coarse wares, bevel-rim bowls and bread production in the Uruk sphere (Wengrow 2006,94-95), where copper was exchanged, pointing to the role of metalsmiths in the transfer between communities.

Chazan and Lehner (1990) have discussed the connections between Nile Valley coarse wares and bevel-rim bowls in the Uruk settlements and proposed the similarities may reflect a connection to bread baking. Wengrow (2006, 94-97) proposed that the technology could have been introduced into the Nile Valley via networks in the Levant but noted the lack of bevel-rim bowls in the region.[126] An overland route through the southern Levant is known to have connected the eastern Delta with the plain of Antioch via pastoral groups in a burgeoning textile economy

[126] A bevel-rim bowl *was* reported from Tel Aviv (Ritter-Kaplan 1979), possibly locating this form in the landscape.

(Savage 2011), connected with the exchange of metal. It is thus entirely feasible that this new technology was transferred via these overland networks, emphasizing the importance of economic cooperation with these regions. Alternatively, it is entirely possible such contact was via maritime exchange networks given the rise of boat imagery in the desert regions (Lancaster 2016) and the local attestation of cedar at Hierakonpolis and Ashkelon.[127] Özbal (1997, cited by Stein 2001, 297) has proposed a connection between bevel-rim bowls and copper production, a claim which was inspired by the presence of a piece of unrefined malachite found adhering to the inside of a bevel rim bowl at Hacinebi (Stein 2001, 297). Moreover, a Late Chalcolithic bevel-rim bowl from the Tehran Plain—a region connected to the trade in metals—is reported to have contained beeswax (Mayyas et al. 2012), signifying a potential connection with lost-wax casting and providing nuance to our understanding of these networks during the fifth and fourth millennia BCE (Thoury et al. 2016).

In the Nile Valley, a connection between bread baking and copper production is similarly attested by the bread molds. By the Naqada III, the coarse wares that are typologically similar to the bevel-rim bowl transform into *bedja*-bread molds. These molds are believed to have been preheated, the dough was then placed inside, and the bread cooked, thus functioning as a portable oven (Chazan and Lehner 1990, 29). The idea of cooking from the inside of the *bedja* mold is also shared with crucible smelting, wherein the ore was placed inside the crucible with charcoal and heated from above. Noteworthy is that *bedja* bread molds are attested as crucibles during Dynasty

[127] Contact between Nile Valley communities and the northern Levant is supported by the presence of cedar from Lebanon at Hierakonpolis in the Ceremonial Area (Wengrow 2006, 83, with reference to Freedman 1996, 24) as well as at Abydos Tomb U-127 dated to the Naqada IID (Bietak 2010, 142, n. 20).

4 as attested at Heit el-Ghurob in copper production workshop and are also depicted in a scene from the Dynasty 5 Tomb of Niankh-khnum and Khnum-hotep (Lehner 1998, 11), suggesting their use as crucibles was not a one-time occurrence. The similarities between bevel-rim bowls, coarse wares, and *bedja* bread molds establish a connection between domestic technologies and metal production.

The connection between beer, bread, and crucibles in the Nile Valley appears to find support in the linguistic evidence during the Old Kingdom. Davey (2018) has discussed the terminology of crucibles, which include the words *ḏs* and *bd*, *bḏ*, and *bḏ.t*. In his review, he discusses how Miller (1990) connected *ḏs* to beer brewing vessels at Deir el-Medina (Davey 2018, 500). He similarly notes that *bḏ* (*bedja*) appears to have been spelled different ways—including as *bḏꜣ*—and was connected with bread molds. However, he argues there is no reason to connect crucibles to bread molds and thus proposes that the word was a Semitic loan word connected with crucible refining (Davey 2018, 500-501). Such an assumption about there being no context for connecting crucibles with *bedja* bread molds glosses over the archaeological attestations of these bread molds used in actual copper production. Moreover, the similarities shared between bevel-rim bowls and coarse wares (from where *bedja* bread molds are believed by some to have originated) create a technological connection between bread technology and metallurgical practice. This is further punctuated when we consider the semiotic association of *ds* to beer brewing, wherein such a technology was likely learned from the communities in the Uruk sphere of exchange. When we consider that metal producers/pastoralists appear to have played a major role in connecting communities around the exchange of metal, textiles, and portable stones, therein lies the possibility that these technologies were learned by local Nile Valley groups via the economic cooperation with communities in Syro-Anatolia. Alternatively, it is possible that such a technology was brought to the Nile Valley and Delta via the migration of individuals from these northern networks. In all probability, it was likely a transfer that involved multiple spheres of interaction and integration. Nevertheless, the increasing importance of bread and beer production to the burgeoning funerary economy can be linked to metalworking groups, who played an active role in the structuring of economic networks and local funerary rites of passage.

The importance of grain-based consumables such as beer must be understood within their context as a psychoactive substance. These mood-altering substances have been linked to establishing new forms of complexity (Wadley and Hayden 2015, with references), positioning metalworking ritualists engaged in external communities abroad in a position to co-opt the community and its material resources. The use of psychotropics in the southwest Asia as an elite practice has gained attention in the last decade (Stein 2009, 2014, 2017). Indeed, various scholars agree that bread and beer production may have been a driving factor in the adoption of agricultural subsistence economic in west Asia, allowing for a system of reward to manipulate and control labor (Wadley and Hayden 2015, 575-576, with references).[128] The adoption of this new technology is thus accompanied by the rise of grain stalks on decorated ceramics. This motif appears on a number of the copper objects from the Nahal Mishmar Cave, including crowns (nos. 9, 12, 14) and embedded into the design of standards (19, 30-39, 41-48, 55?, 56, 60, 71?, 7281, 85-68, 100?104-105, 110, 123, 154, 162,), suggesting the connection between grain and early

[128] I would like to thank Matei Tichindelean for bringing this reference to my attention.

metalworking communities. Indeed, this iconography is employed in early Sumerian to write ŠE, for grain (Miller, Jones, and Pittman 2016, 61, fig.8a). Noteworthy is that this specific motif also continues to have significance in metal working circles in the EB I, as attested on an axe from the Kfar Monash hoard (Hestrin and Tadmor 1963, 267, fig. 2:1 & 4, pls. 24:F & 25:B). If this iconography *is* indeed depicting a barley stalk, it may be a connection of the importance of ritual consumption connected to mortuary rites of passage.

We must thus bear in mind that technological systems are not just borrowed but rather *learned* through legitimate peripheral participation. One thus plays an active role in a community of practice, observing, witnessing rituals and stories, and embodying the practices to which technologies are attached. The Naqada I-IIB/EB IA thus saw the intensification of economic cooperation between southern Levantine and Nile Valley/Delta communities in the Syro-Anatolian sphere of interaction at a time when local economies were becoming increasingly dependent on outside networks and the rise of the Uruk sphere of exchange was crystallizing. The nature of this interaction thus laid the groundwork for the emergence of the state during the Naqada IIC-III, when the advent of kingship would result in claims over the funerary industry as chief ritualist, and over the mines as master metalsmith.

Chapter 7: Copper, Coercion, and the Birth of the Egyptian State (ca. 3450-3100 BCE)

"In my opinion, we now have an increasing amount of factual data without any innovative approach to the reconstruction of the historical process that led to the establishment of the Thinite state in the late 4th millennium BC" (Fattovich 2012, 260)

By the mid-fourth millennium the intensification of economic cooperation between various communities in the Nile Valley, Delta, and southern Levant resulted in the need for new forms of display during the Naqada IIC/D-III. As part of this process, we can now contextualize the adoption of Nile Valley material culture and practices in the Delta as part of a much more complex process of economic cooperation whose roots lie in the Naqada I-IIB period (Stevenson 2016, 440-441). The abandonment of Maadi shortly before the Naqada IIC (ca. 3450 BCE) may therefore have marked the beginning of small-scale migrations from the Nile Valley into the eastern Delta *and southern Levant*, presumably to participate in a burgeoning prestige goods economy centered on wine, olive oil, and metals (Wengrow 2006, 83-87). The mechanisms that led to these new systems of dependency must thus both be viewed in relation to local developments as well as synchronized with the social transformations taking place in Syria and southeast Anatolia during the mid-to-late Uruk period (Frangipane 2018). It is not a not a coincidence that within the span of 100 to 150 years—that is, five to six generations—the foundations of the state crystallized in Egypt around the same time as the mid-to-late Uruk period between 3450 and 3350/3300 BCE. It is thus during this short period of time that we see kingship institutionalized, elite symbols of power codified, and a system of writing develop in both regions (Dee et al. 2013, 8). The intensified interaction among communities in the Nile Delta, southern Levant, and Syro-

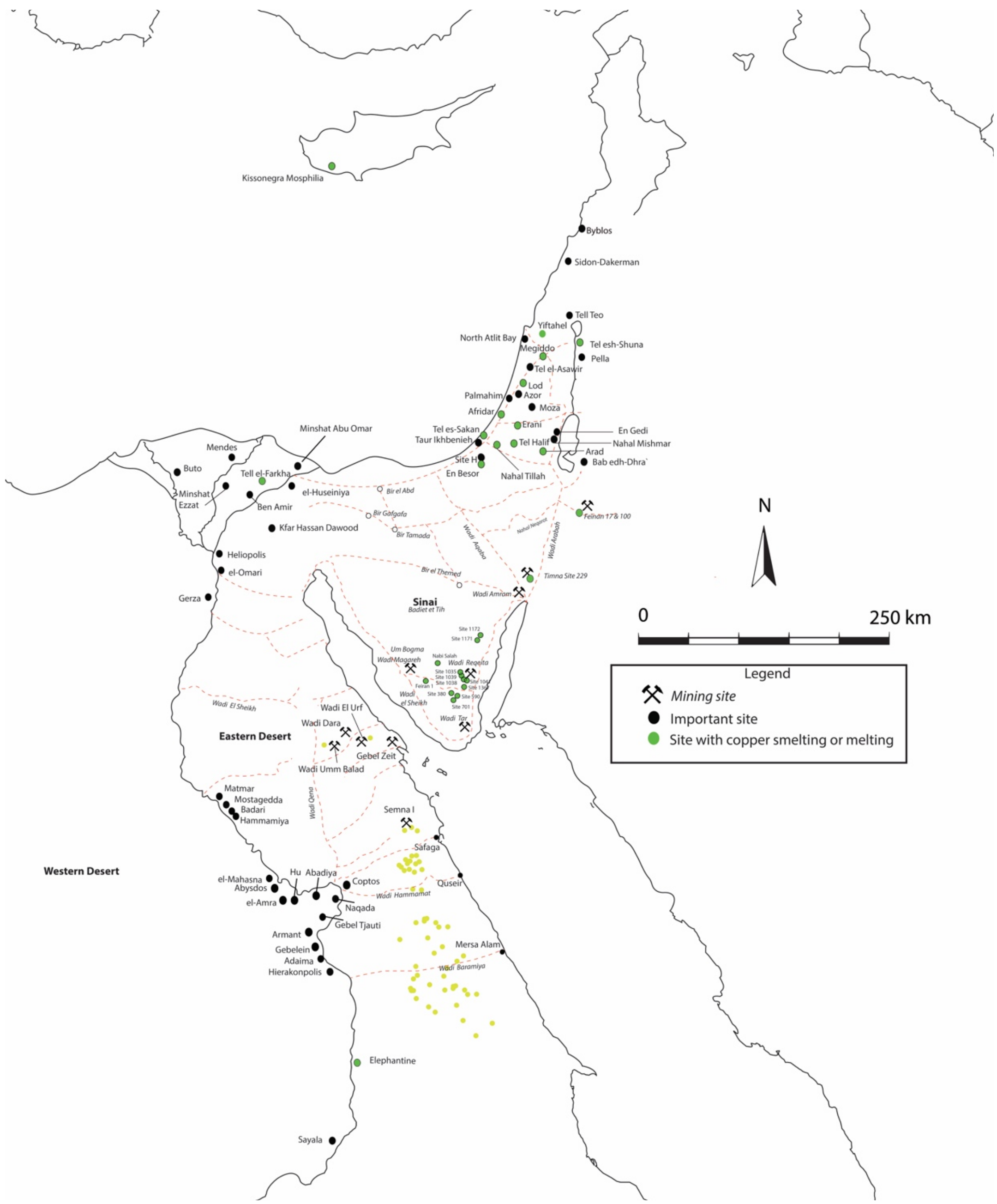
Mesopotamian sphere of interaction would therefore marks a new phase in Egypt-Levantine mining operations, wherein political centralization resulted in the monopolization of the mining industry by early elites (Trigger 1983, 39-40).

This chapter argues that mining and metal production played an important role in both the economy of the early Egyptian state as well as its ideological system of legitimation. Economically, the state would come to control networks of both agricultural production for beer and bread as well as greenstone procurement—a key substance for community regeneration. Given the social importance of greenstone for community renewal, claims over the mining industry should thus be directly connected to claims over the funerary economy. By the Naqada III, the king would come to incorporate symbols and motifs from the Uruk sphere of interaction sphere *as well as* from the Late Chalcolithic southern Levant, resulting in the formation of a unique political identity that presented the king as chief ritualist presiding over a funerary economy whose core was constructed around mining and metallurgical production.

Naqada IIC/D-IIIA: Changing Landscapes, Identities, and Power Structures

The Naqada IIC-D is characterized by fundamental transformations in both local identities, community cult, and changing power dynamics. As portions of the landscape became increasingly reliant on a sedentary existence, it is during this time that access to the world outside of the Nile Valley came to play a key role in the consolidation of power and the construct of elite communal identities (Stevenson 2016, 438-443) . Coalition building was required to facilitate such a sustained and intensive interaction—the result of which was the construction of a community with access to social and material resources abroad that would lay the foundation of the state. Against this backdrop a shift takes place, wherein display objects and knowledge of artistic production become restricted to communities who appear to participate in external networks (Wengrow 2006, 152-

Figure 34. System of metal procurement and production EB IB/Naqada IIC-III. Map by author.



153, with reference to Baines 1994). During the Naqada IIC various objects once associated with early Predynastic ritual thus seemingly disappear from burial assemblages, including zoomorphic figurines, decorated ivories, and ceramics made with Nile Valley soil depicting scenes of hunting (Stevenson 2016, 438-439). The simplification of burial practices correlates with the newfound emphasis in certain tomb assemblages on material from outside the Nile Valley, reflected in the shift from ritual vessels made from Nile Valley soils depicting hunting scenes to the manufacture of storage vessels made from marl clay collected from the desert (Stevenson 2016, 440). Referred to as R-ware (rough ware), these vessels were ideal for storage, transport over long distances, and began to be decorated with scenes believed to depict the afterlife, reflecting the importance of these peripheral areas for the funerary economy (Stevenson 2016, 440 with references). Locally, Stevenson (2016, 440-442) proposed this newfound control over production of these vessels may have upset the pre-existing power strategies of previous groups as increasing reliance arose on networked political strategies. These vessels therefore demonstrate a shift toward the rise of a community power and identity linked to the desert regions and external networks abroad.

In the desert regions, where the mineral resources of the land came to be later associated with the realm of the gods (Aufrère 1991), these groups would come to form new attachments to the landscape. The rock art depicted in these peripheral regions seem to have been accompanied by rites of passage for these elite groups (Lankester 2016). Indeed, the same motifs in desert rock art scenes can be found on the decorated wares from the Nile Valley (Wengrow 2003b), reflecting the practices of an elite group who controlled the waterways and traversed the wadis to the mines: in other words, the foundation of the Egyptian expedition community. The potential for conflict between coalitions is suggested by the desecration of Tomb 23 at Hierakonpolis, wherein the structure was burned and the life-sized statue smashed (Friedman 2008, 22). As part of the rise of the state, these groups would come to adopt the symbols that mark participation in exchange networks abroad as well as centuries old symbols tied to the ideological foundations of the mining community.

Eastern Mediterranean Identities in Nile Valley Assemblages

In the Nile Valley, the introduction of new practices, identities, and power structures emphasize the importance of riverine transport, ritual serving vessels, and procuring exotica from the outside world.[129] Whereas the range of metal objects prior to the mid-fourth millennium was limited to beads, awls, needles, tools and pins with a curled looped, during the Naqada IIC-D we see the appearance of gold, silver and a range of weapon forms associated with communities in Syro-Anatolia (Figure 35). It is during this time that potential indirect evidence of metallurgical production as a prestige industry begins to materialize in Nile Valley tomb assemblages, attesting to the increasing importance of mining and metal production for local economies and identities. Within the context of funerary display, by the Naqada IIC objects interred with certain individuals

[129] Such interaction is buttressed by new ceramic forms mimicking cut away spout jars in the eastern Mediterranean (Petrie and Quibell 1896, XXVI: 58a-d), the continued appearance of coarse ware bowls (Petrie and Quibell 1896, pl. XXXVIII, 25, 28) similar in appearance to bevel-rim bowls from sites like Habuba Kabira and Hacinebi (Millard 1988, Stein 1999, fig. 4), as well as the appearance of the tree of life motif on new painted wares (Petrie and Quibell 1896, pl. XXIX: 54, 59, pl. XXXV: 71, 72; LII, see pottery marks). The importance of riverine and maritime contact is supported by the increasing inclusion of boat models in tomb assemblages at sites such as Naqada (Petrie and Quibell 1896, pl. XXXVI: 80-81) and Tomb 3078 at Matmar, where a boat model interred with two children was found filled with tubers placed in a bowl with bread (Brunton 1948, pl. XIII: 25). From Tomb 3080, two 5.5 cm long copper awls were found buried under a slate palette, placed under the head of an adolescent: one was circular in section while the other contained a square section (Brunton 1948, 15), reflecting parallels to the presence of both round and square-sectioned awls at Arad during the EB IB and Ashkelon-Afridar (Golani 2014). Tombs 2702, 3067, 3127 from Matmar were also reported to contain the iconic pin with a curled end (one in a bone case), as well as one found in cemetery 300 and another from a disturbed tomb dated to Dynasty 4-6 300 (Brunton 1948), attesting to the longevity–and thus significance–of this form.

seem to project the deceased's knowledge of metalworking. Anfinset (2010, 126) has summarized the evidence as follows: mud crucibles in Tomb 522 at Naqada (Baumgartel 1970, pl. XXII),[130] mud crucibles from Graves 56 and 58 in Cemetery 17 at Khor Bahan (Reisner 1910, 118, 120-121), and a blackware sherd with a piece of ore attached to its rim from Hierakonpolis (Adams 1974, 80).[131] A similar phenomenon was reported at Hacinebi in contemporary contexts, wherein a bevel-rim bowl had ore attached to its interior surface (Stein 2001). The inclusion of material potentially connected with metallurgical production recalls the Late Chalcolithic ossuary shaman burial at Nahal Qanah where a casting spill was included as part of a rich metallurgical assemblage (Golden 1998, 86, 2010, 56, 172-173).

Evidence that southern Levantine copper technologies continued in the Nile Valley as late as the Naqada III is suggested by the evidence at Elephantine. Smelting at the site is reported within a settlement context during the Naqada IID-IIIA/B (Kaiser et al. 1997). From Levels II in the region of the Middle Kingdom Satet Temple on the eastern side of the island, the excavators report fragments of a pit furnace, copper ore, lumps of copper and slag, and a piece of an ingot, suggesting both the processing and smelting of the ore (Pfeiffer 2009, 322). The dating of these finds derives from a small area near the furnace which contained thick layer of Naqada III/Dynasty 0 material (Kaiser et al. 1997, 124, cited in Pfeiffer 2009, 323). In the succeeding phase, production

[130] Note this tomb was mixed with material from Dynasty 4-6 (Petrie and Quibell 1896, 6).

[131] A possible crucible was also reported in predynastic levels from Area 2000 at Hamamiya (Brunton and Cayton-Thompson 1928, pl. LV). It is a dull red burnish ceramic with a spout and three handles, the inside reported to be "black and greasy," which resulted in its initial identification as a pottery lamp (Brunton and Cayton-Thompson 1928, 43, 61, pl. LIV:21). More analysis needs to be completed on these objects before we can draw any definitive conclusions.

refuse consisted of "charcoal, sherds, slag, remains of firing installations and pits," as well as a heavily vitrified clay furnace with copper prills, pieces of copper wire, pins, ore, and a "funnel-shaped clay artifact," suggesting a possible blow pipe or tuyère (Pfeiffer 2009, 322, with reference to Kaiser et al. 1997, 123-124). Between Layers II and III were more fragments of a furnace, metal lumps, slag, ore fragments, a fragmented ingot and a crucible (Pfeiffer 2009, 322, with reference to Kaiser et al. 1997, 124). While the absence of archeometallurgical analyses prevents a positive identification of the production choices and stages on site, the nature of the material points to smelting within a settlement context (Tadmor 2002, 247). Indeed, Pfeiffer (2009, 322) cites the presence of an ingot as signifying that all three stages of the production chain were carried out in the same location, revealing that the Nile Valley as far south as Elephantine was integrated into interregional networks with the north, reflecting a similar system of production from the Chalcolithic/EB I southern Levant. Moreover, in her study of metallurgical production refuse during the fourth millennium, Pfeiffer (2009, 324-325) described the Elephantine furnace as similar to those from the Chalcolithic southern Levant. The site is thus important for demonstrating that the production system in Upper Egypt may have found its origins in the Late Chalcolithic southern Levant.

Against this backdrop of intensified production in the southern Levant, Sinai and southeastern Anatolia we have seen that new copper weapons emerge in Nile Valley funerary assemblages, connected with local individuals participating in exchange networks extending beyond the southern Levantine littoral.[132] Alongside the production of tools such as axes and

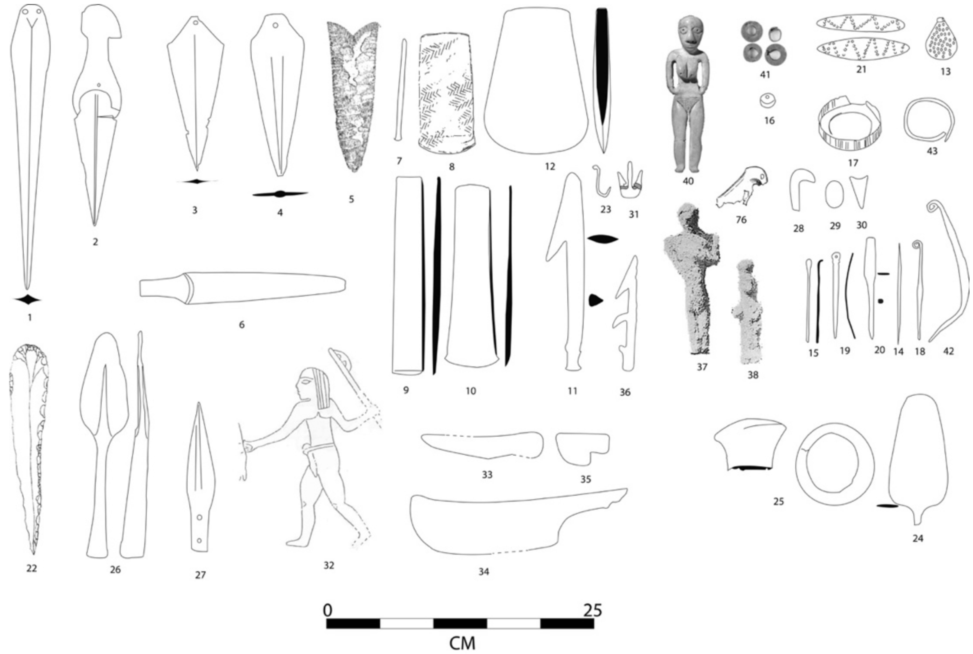
[132] Indeed, individuals in the Nile Valley also appear highly integrated into systems beyond the southern Levantine littoral, supported by the presence of stones described as weights in a number of graves at Naqada (Graves 461, 1773,

chisels, new weapon forms include the dagger (Figure 35:1-4), spearhead (Figure 35:26-27), and crescent axe (Figure 35:32). Within this context, harpoons previously carved from bone are now cast in copper (Figure 35:11, 36), a trend that first emerged in the Delta at Maadi and that signifies the importance of the Naqada IIC as an outgrowth of prior networks (Chapter 6). Indeed, Czarnowicz (2018) has proposed the harpoon—employed as the weapon to hunt elephants and hippopotami since the Neolithic—became a local symbol of power after the Naqada IID/IIIA when it was used ceremonially as a spear. The casting of such a traditional object into copper recalls the practice of casting skeuomorphs during times of intensified production of a new technology, as was the case for the Late Chalcolithic (Gošić 2015).[133] The transformation of the harpoon into metal reflects the increasing importance of metal to the economy—indeed, there is a decrease in hunting during this period, becoming increasingly tied to elite communities and thus control over the prestige commodities that protect Egypt's participation in networks abroad. The shift in the harpoon to a local form of spear is therefore argued to be reflective of the increasing social significance of copper for display purposes in society.

1873, 1866, 1563), which ranged in shape and weight (188.7-211.5 grams, Petrie and Quibell 1896, 54). Metrological analysis is needed to be able to say more.

[133] The casting of harpoons into copper may have also served a more practical role, as the material was arsenical copper from Sinai (Rehren and Pernicka 2014), which would have resulted in a stronger weapon. A possible reason for this shift in the casting of harpoons into metal have been the result of increasing scale of ivory production, attested by the spread of ivory around the eastern Mediterranean (Massa and Palmisano 2018). While the ivory may be from Syria, the intense influence of artistic influence on elite material practices suggests Egyptian export of ivory played a major role in exchange networks with the north. The disappearance of ivory from funerary assemblages may thus be reflective of increasing control over these networks for exchanges abroad. As a weapon to kill hippopotami, the harpoon appears to thus transform into the local equivalent of a spear (Czarnowicz 2018).

Figure 35. Badarian and Predynastic copper objects from Nile Valley and Delta (see Table 13 for references). Images adapted by author.



The typological similarities in weapons found at various sites in the Nile Valley suggests that the group of individuals involved in procurement strategies abroad was relatively restricted. At el-Amrah, two graves dated to the Naqada IIC-D contained daggers both in copper and precious metals (Figures 35:2-3). Grave b 230—a plundered rock cut shaft tomb with no body—contained a silver dagger 23.5 cm in length with an ivory handle dated to the Naqada IIC-D (Petschel 2011, 350, n.1). The carved handle is reportedly very similar to other ivory handles found at Abydos in three tombs (U-127, U-273, and U-261, see Petschel 2011, 352, cat. No. 3-5). Typologically, this dagger is similar to a 15cm copper dagger from Grave a 131 at el-Amrah (Petschel 2011, cat.no. 240). From Hamra Dum, a grave with round shaft 2 m deep contained silver knives (Figure 35:4), copper axes, and a stone macehead, dated to Naqada IID-IIIA/B on typological grounds (Petschel

2011, 498, no. 242, with reference to Baumgartel 1960, 8-9). In Tomb 836 from Naqada, a local man was buried with a long copper dagger (Figure 35:1), reflecting participation in northern networks. The copper dagger was 26.5 cm in length and was placed on the hip of a skeleton, marking a new period of wealth in burials (Petrie and Quibell 1896, 22-23, 48, Plate LXV, 3, LXXXII). The dagger was cast with a high midrib and is pierced twice through the tang for rivets to attach a handle that is now missing (Petschel 2011, 496, no. 237).[134] Within this tomb, Petrie and Quibell reported beads of carnelian, lapis lazuli, and other stones placed around the head, neck, and on a glove or mitten worn on the hands. A small black ceramic vase was placed in front of the head, a bird-shaped slate placed behind the head of the interred individual (Petrie and Quibell 1898, 23, pl. XLVII, 26). The interment of a gazelle in the SW corner of the tomb also expresses continuity with communal burial of the Neolithic, as does the placement of the body, with the hands drawn up, cupping the face. This tomb is remarkable as this individual is clearly of local origin, reflected in the type of burial (pit burial) and certain elements of the assemblage (gazelle burial). However, his participation in external networks abroad is emphasized by the total assemblage. When combined, these new weapon forms appear connected to the curation of an elite identity whose power appears connected to participation abroad yet still displayed in the funerary landscape.

[134] Petrie accepted the date of the dagger as pre-3000 BCE (Petrie and Quibell 1896, 48). In their discussion of the Kfar Monash hoard, Hestrin and Tadmor (1963, 283) cite Tomb 836 at Naqada as a parallel for the daggers found in the hoard. Indeed, one in particular is almost identical to that from Tomb 836 (Hestrin and Tadmor 1963, fig. 12.4), as both contain a double-pierced butt as well as similar length (the Kfar Monash is 25.5 cm vs. the 26.5 cm in Tomb 836). Noteworthy are the parallels between this dagger and those from the Azor tombs, which are also EB IB in date (Ben Tor 1975).

Hierakonpolis Tomb 100—Rise of the King as Chief Ritualist

One of the new forms of expressing legitimacy looks to have blended traditional symbols tied to mortuary practice with novel symbols connected with external networks in Syro-Anatolia. This mix of legitimacy derived from traditional and innovative symbols is best expressed in Tomb 100 at Hierakonpolis, wherein it is believed an early leader was buried (Case and Crowfoot Payne 1962). The tomb was a large structure built of mud bricks wherein one of the walls was decorated with a mud plaster fresco, depicting what is believed to be the deceased's funerary procession (Case and Crowfoot Payne 1962, 18; Baines 1995; Wengrow 2006, 115). The scene contains a mixture of smaller narratives within the larger structure and is generally interpreted as a royal tomb of sorts (Figure 36). Given that symbols mark membership in a community of practice, the symbols and practices reflected in Tomb 100 at Hierakonpolis attest to the rise of a political identity borne out of control over the funerary landscape and economic participation abroad. Traditional displays of power connected with the funerary economy include the practice of plastering a mortuary shrine and painting it with a funerary procession, a tradition that expresses continuity with the Late Chalcolithic mortuary shrines at En Gedi (Ussishkin 1980)[135] as well as at Teleilat Ghassul (Drabsch and Bourke 2014) and potentially even Tall Hujayrat al-Ghuzlan (Klimscha 2012, 189-191). Paralleled practices relating to the composition of the frescoes of the southern Levant and Tomb 100 include the use of narrative, the scaling of individuals, the lack of green pigment, and

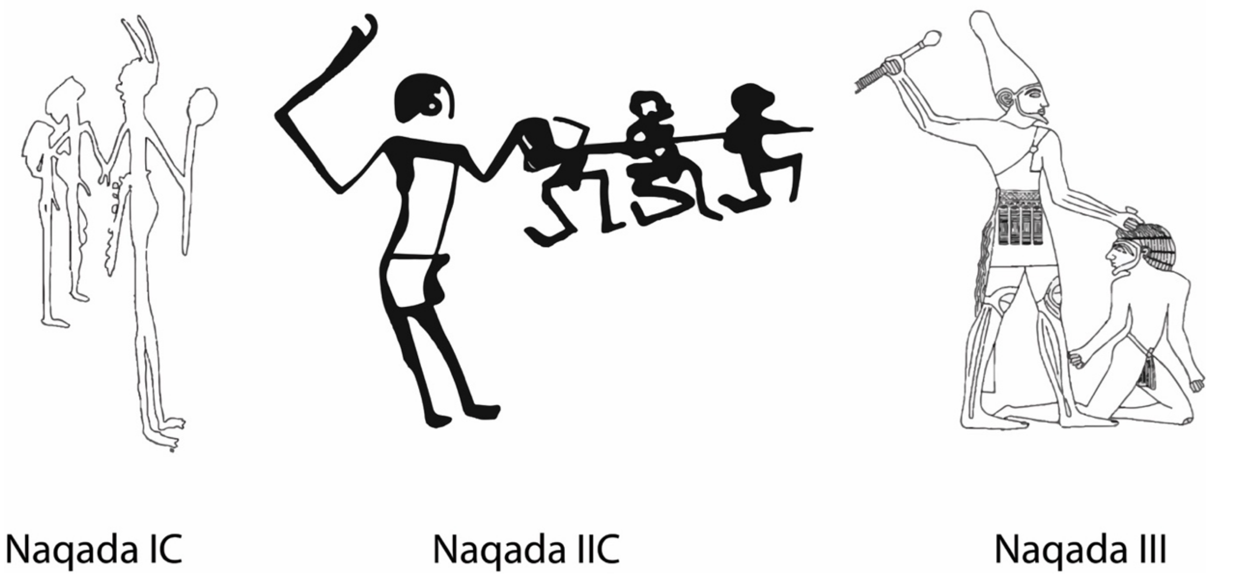
[135] Within this context of shared practices, it should be recalled that the technique used to manufacture the ibex on the decorated plaster wall at Tall Hujayrat al-Ghuzzlan (Klimscha 2012) find parallel both in copper sheets punched with a zig-zag design at Naqada (Figure 35.21), the motif of which is found on a stone vessel fragment at Hujayrat al-Ghuzlan (Klimscha 2012). Indeed, the attestation of similar practices is further punctuated by the hoard of beads found under the wall in a practice later attested in Early Dynastic temples; the beads are similar to those from Badari (Klimscha 2012, fig. 10).

the funerary context surrounding production. The incorporation of localized motifs during the Naqada IIC—alongside Mesopotamian style boats and the master-of-animals motif—reinforce that elite forms of legitimacy relied on both control over the mortuary landscape and the knowledge networks tied to the outside world.

Figure 36. Tomb 100, Hierakonpolis (Quibell and Green 1902, pl. LXXV-LLXXVIII).

Of relevance here is the innovation expressed in the use of macehead, which appears for the first time as a tool of overt coercion (Figure 37, center). While maceheads are attested in the Delta by the fifth millennium (Stevenson 2008), the first appearance of the macehead in the Nile Valley is on a vase from Abydos dated to the Naqada IC (Figure 37, left). Here, the mace differs from that in Tomb 100 as it is held in the hand by an individual who is larger than the other two figures in the scene and whose costumery reflects the interchangeability of human and animal (Figure 37, left). All of these elements are attested at Teleilat Ghassul, locating the mace within a community of practice centered on economic cooperation dating back to the fifth millennium. Klimscha (2018, 106) reminds us that the adoption of new specialized weaponry is part of a broader sociotechnical package of learning, wherein how to properly use the object cannot be taught without "proper training in how to use it or without a set and consensus of rules both ideological and symbolically backing up the social substructure." While no figures are *depicted* in a smiting stance in the southern Levant, the smiting of an adolescent boy aged approximately 13 from Shiqmim attests to the use of the mace during the Late Chalcolithic. Trauma on the left side of the

Figure 37. Transformation in iconography of Nile Valley power during fourth millennium. Left: Decorated jar, Tomb U-239 from Abydos. Center: Tomb 100, Hierakonpolis. Right: Narmer palette, Hierakonpolis (after Andelković 2011, fig. 3.2).



boy's skull was said to be consistent with the area *later Egyptian kings were portrayed as striking given right-handed combat* (Dawson, Levy, and Smith 2003, 18-19, emphasis added). From Tomb 100 at Hierakonpolis the depiction of the smiting motif, with arm raised overhead (Figure 37, center), therefore appears to be an innovation to an older motif connected with landscapes of display dating back to the fifth millennium. However, during the Naqada IIC it is employed within a system of competition and overt violence, leading to the mace as the paradigmatic symbol of the state's coercive power (Figure 37, right).

When placed within the context of Chalcolithic mortuary practice, argued to have continued and evolved in its local context in the Nile Valley, we may begin to nuance previous interpretations that this was a royal tomb. The scene has been interpreted by Williams, Logan, and Murnane (1987, 271-272) as potentially reflecting the funerary context of the *sed* festival, which is traditionally a ceremonial event meant to regenerate the king's rule. We can nuance this proposal by viewing the later *sed* festival as an outgrowth of a much earlier ceremony connected with the deceased of chief ritualist or shaman. It should be recalled that in the southern Levant, the ritualists of these public sanctuaries were most likely metalsmiths, and that the shrines served as central places in the community to organize economic activity and labor. The continuity of so many practices in the Nile Valley begs the question of the role of metal and mining in these early communities. Given the central role of greenstone in funerary culture from the beginning of the Badarian, we might question whether the rise of the king as chief ritualist can be connected to the mines, controlling the material connected with funerary transformation. Tomb 100 therefore provides a seeming glimpse into the unique curation of an elite Nile Valley identity whose origins can be traced back into the Chalcolithic southern Levant, but whose integration into exchanges with the outside world led to a unique identity that continued to flourish.

Eastern Delta Connections and Intensified Mining

When we look at the intensified cooperation between Nile Valley communities and the Delta, the importance of mining greenstone and copper becomes clear when we examine the settlement pattern during the Naqada IIC-D. Throughout dynastic history, the eastern Delta has always been a strategic location for launching expeditions into Sinai and the southern Levant. The importance of the region is first attested during the Naqada I, when Maadi was settled at the north tip of the Nile Valley and connected with the mining communities in the Gulf of Aqaba. Interest in the region continued to intensify by the Naqada IIA-B when Tel el-Farkha (Chlodnicki, Cialowicz, and Maczyńska 2012, 11) and Kom el-Khilgan (Midant-Reynes et al. 2004) were founded in the region, coinciding with the introduction of new practices that appear fully developed, such a brewing technology (Adamski and Rosińska-Balik 2014). The importance of this region for the production and exchange of copper is reflected by the sudden foundation of settlements during the Naqada IID at Minshat Abu Omar, Minshat Ezzat, and Kfar Hassan Dawood (see Figure 34; Hartung 2013, 189). Additionally, temporary sites along the north Sinai into the southern Levant reflect increased activity along the Way of Horus, correlating with intensified mining in Sinai and the southern Levant (Oren 1973, 203, Oren and Yekutieli 1992). The importance of the eastern Delta as a strategic location for maintaining relationships abroad is supported by the concentration of sites in the region and the potential for a port at Tel Ibrahim Awad, where a temple dates back to at least Naqada IID (van Haarlem 2005, 196).

Tel el-Farkha thus formed the center of exchange in the region and played a central role in maintaining economic cooperation with communities in the southern Levant (Chlodnicki, Cialowicz, and Maczyńska 2012, Chlodnicki and Cialowicz 2018). Settled before the abandonment of Maadi during the Naqada IIC-IIIA, the metallurgical assemblage from Tel el-Farkha consisted of copper rods, fishhooks, harpoons, knives, awls, pins with loops, and fragments from bracelets (Czarnowicz 2012). Typologically, some of the artifacts find parallels in the southern Levant, including a knife only attested at Ashkelon (Czarnowicz 2012, 351), as well as several copper pins with the curled loop found in contemporary contexts at Ashkelon, Tel Erani, and along the Way of Horus (Czarnowicz 2012, 353).[136] Significant is that these are all sites with a Nile Valley/Delta presence and are connected with the system of copper production. The presence of two unique gold sheet figurines in a cache of carved ivory are interpreted as a ruler and his son,[137] attesting to an early connection between political leadership and metal working. Indeed the gold sheeting hammered around the core recalls the later associations to the skin of the gods as described as gold.

Tel el-Farkha is the earliest site with evidence of secondary production in the Nile Valley and Delta and appears to have been connected with metalworking communities in both the southern Levant and southern Sinai.[138] With regard to the procurement strategies on site, the analyzed assemblage is said to include objects with an as-cast structure, made from arsenical copper with lead isotope ratios consistent with sources in Sinai (Rehren and Pernicka 2014, 244, 248, 250-251).[139] While no smelting slags are attested on site, analysis of a casting prill revealed a

[136] It should be recalled that the distribution of these pins begins in the fifth millennium in communities connected with the trade in metals and continues uninterrupted into the Nile Valley and southern Levant. In Chapter 6, I proposed the pin may have been used as a tattooing needle or pigment applicator in connection with greenstone, which later becomes associated with the Red Crown. Tassie (2003, 99) has similarly suggested five unalloyed copper needles found at Kfar Hasan Dawood in the eastern Delta dated to the Predynastic-Early Dynastic may provide evidence that copper needles/awls were used in tattooing practices.

[137] The different scales of the figurines appear to reflect continuity with Tomb 100 at Hierakonpolis and the Naqada IC vase from Abydos, expressing the hierarchical relationships between figures. These figurines provide an early parallel for the later life-sized copper statues of Pepi and his son during Dynasty 6 and are thus believed to be early rulers.

[138] Note it is believed that casting took place at Maadi, however no metallurgical refuse has been positively identified.

[139] The lack of evidence for hammering, annealing, alloying, as well as the purposeful selection of certain metal for hardness and ductility led Rehren and Pernicka (2014, 244, 251) to propose the objects might have been heavily

highly alloyed arsenical copper, pointing toward the melting of an imported ingot or artifact in a crucible (Rehren and Pernicka 2014, 238).[140] The eastern Delta appears to have been part of the same technological horizon as the southern Levant. This claim is supported by the manufacture techniques of the pins with loops, wherein the angular cross-sections reveal the possibility that sheet copper was rolled up and hammered to form (Rehren and Pernicka 2014, 244). This technique is first employed by southern Levantine smiths during the EB I, which led Ilan and Sebbane (1989, 143-144, 147) to argue that the development of a square-sectioned awl required less labor to make than the round-sectioned awls of the Chalcolithic and thus reflected increasing production. Tel el-Farkha thus reveals that the eastern Delta formed a strategic point to launch expeditions both across the Way of Horus and into the Sinai Peninsula (Figure 34).[141]

The exploitation of Sinai dates to at least the Naqada I-IIB, based on the presence of ore at Maadi consistent with that of Um Bogma (Abdel-Motleib et al. 2012), although it appears that

worked given the thinness and levels of corrosion. However, they acknowledge that there is no evidence for such a claim.

[140] A reconstructed crucible from a preliminary report by Czarnowicz (2012, fig. 8 and 9) appears to be a local form of the socketed crucibles attested throughout the southern Levant, however it does not appear in the final publication and thus the identification cannot be considered. However, if such a crucible were at the site, it would locate Tel el-Farkha within the technological system of the southern Levant.

[141] From the Naqada IIC and on the eastern Delta came to form a politically charged space for the Egyptian state to launch expeditions to Sinai and abroad throughout the dynastic period. Indeed, it was along the Way of Horus that Oren's survey demonstrated the highest level of activity occurred during the Predynastic and Dynasty 1 (EB I-II) and the New Kingdom. Acknowledging the social interaction that must have taken place, Oren (1979, 185) maintained that the Egyptians used this north Sinai route early on to "springboard" their way into the southern Levant for more than just trade. This proposal thus aligns with Rothenberg's (1979) belief that the eastern Delta, north Sinai, and southern Levant formed one cultural horizon. In a recent analysis of Middle and Late Bronze Age metallurgical production tools in the southern Levant, this claim was echoed by Yahalom-Mack (2019).

southern Levantine communities exploited this region during the Late Chalcolithic[142] and the first exploitation dates potentially to the Late Natufian (Bar-Yosef Mayer and Porat 2008). The increased interaction in southeastern Sinai during the Naqada IIC-IIIA is attested by the recent analysis of a Naqada II needle from the Fayoum whose lead isotope ratios were consistent with the lead isotope ratios for both Semna I and Wadi Reqeita (Rademakers et al. 2018). The presence of antimony as a trace element led Rademakers et al. (2018, 177-178) to identify Wadi Reqeita as the most likely source. When we combine the evidence from Maadi, Tel el-Farkha and the Fayoum, we are able to support the identification of Sinai as an important location for copper for communities in the Delta already by Naqada I. In southeastern Sinai, a clustering of sites around Nabi Salah and Skeikh Muhsein (Figure 34) were dated to the EB II/Dynasty 1 on the basis of flint and ceramics that were similar to those at Arad, resulting in reconstructions where Arad controlled the copper trade in Sinai (Beit-Arieh 1983, Amiran, Beit-Arieh, and Glass 1973, Beit-Arieh 2003). However, it is now understood that the copper from Arad is consistent with that from Feinan and not Sinai (Hauptmann, Begemann, and Schmitt-Strecker 1999). Rather, there is evidence to suggest some of these sites dated to the EB I on the basis of lead isotopes from the Fayoum needle and the fact that the assemblages in the region are indicative of forms that begin in the EB I. When we consider the presence of *nawamis* in the region, with their mortuary shrines facing the west,

[142] In his surveys of Sinai, Beit-Arieh (1980) identified a site close to Serabit el-Khadem with a ceramic assemblage similar to the Ghassulian communities and proposed that the turquoise was shipped west to the Nile Valley. Hendrickx and Bavay (2002, 60) refuted this proposal, arguing that turquoise—which is easily misidentified as a result of its resemblance to glazed stone (Horn 2015)—was not exploited until the late Naqada II and therefore not the product of contact with communities in the Levant. Klimscha (2009, 384) reported a calibrated radiocarbon date from a piece of wood at the site, which provided a date consistent with the Chalcolithic, ca. 4240-3960 BCE. Evidence pre-dating occupation in the region is supported by activity in a turquoise mine at Jebel `Adeideh located 9 km south of Bir Nasb and radiocarbon dated to 6th millennium BCE (Avner 2002, 44, n.18).

we must question whether these were built to house the deceased on mining expeditions, a practice later attested in the region when individuals erect stela in the mining camps after the *nawamis* disappear by the end of the Old Kingdom (Gardiner and Peet 1955, Gardiner, Peet, and Černy 1952).

The community at Tel el-Farkha was in contact with regions in the north, supported by the presence of imported metal. While most of the objects reported from Tel el-Farkha contain 0.5-3 wt % As, two bracelet fragments contained high levels of sulfur and lead (4-5 wt % Pb) suggesting they were not made from local ores. Rather, Rehren and Pernicka (2014, 247) indicated the high lead content may reflect intentional selection for its silvery color as well as a knowledge that such amounts of lead would result in a higher fluidity of the cast, creating a contrast with the other copper analyzed from the Tel el-Farkha assemblage. A copper rod also stands out from the assemblage as it contained 14 wt % Ag and 20 wt % Au, well over the typical percentages for trace elements found in copper (Rehren and Pernicka 2014, 246). Copper alloys with silver and gold are known from the late fourth millennium around communities in the eastern Mediterranean and western Asia but the origin of this metal is unknown (Rehren and Pernicka 2014, 249 for references), although we cannot discount the possibility of Nubia. Indeed, at Elephantine four A-Group sherds were reported from the level with smelting evidence (Kaiser et al. 1997), leading Tadmor (2002, 247) to remind us of the important economic position of Nubia and the export of copper to the region. When we consider the role of Tel el-Farkha in the eastern Delta, it played a major role in facilitating exchange and no doubt formed a center of power in a landscape that was connected via eastern Mediterranean networks.

EB IB: Expanding Borders of the Early State and Community Interaction

The transformations that took place in the Nile Valley and Delta resulted in the integration of the southern Levant into this sphere of exchange. The region was thus strategically important for its coastline and the overland networks connecting communities. Between 3450 to 3100 BCE, varying degrees of an Egyptian presence appear unevenly across the landscape (Regev et al. 2012). Evidence that the region was becoming increasingly integrated into northern and southern exchange networks and the Egyptian state's strategic apparatus to maintain networks north is supported by number of new practices. These include the appearance of fortified centers (de Miroschedji et al. 2001, de Miroschedji and Sadeq 2005), monumental architecture at Megiddo (Adams, Finkelstein, and Ussishkin 2014), and a number of non-local practices rooted in both the Nile Valley and Delta, which include mudbrick architecture without a stone foundation, brick dimensions matching those of Egyptian building standards in the Delta (e.g., En Besor), bread molds, imported *and* locally made ceramic vessels, faience, and the appearance of serekhs with the names of Narmer (Braun 2011).

Whereas individuals and small communities appear integrated with local communities, the presence of completely new settlements indicate the immigration of entire communities, conceivably reflecting the need to control certain nodes on the landscape. At En Besor (Kempinski 1992, Gophna 1992) and Tel es-Sakan (de Miroschedji et al. 2001, de Miroschedji and Sadeq 2005) we therefore see that the first stages of settlement were marked by the presence of a foreign population. These sites contain certain characteristics that point to a sustained non-local presence, including architecture similar to sites such as Tel el-Farkha in the Delta (Chlodnicki, Cialowicz, and Maczyńska 2012). Petrographic analysis from the first layer of settlement at En-Besor reveals that over 90% of the material is non-local, suggesting the individuals who settled the community brought provisions with them and only later began to exploit the region's resources (Gophna and Buzgalo 2000).

While some sites expressed new foundations, the levels of integration between certain groups varied. We therefore find an "Egyptian" presence at Tel Erani (Czarnowicz et al. 2014), Ashkelon-Afridar (Golani 2014, 122), Taur Ikhbeineh (Oren and Yekutieli 1992), Halif Terrace (Gophna 1972; Seger et al. 1990; Alon and Yekutieli 1995), Nahal Tillah (Levy et al. 1997) and a handful of other sites from the region. While inhabitants at some sites actively maintained identity boundaries (En Besor), evidence also supports high levels of integration between local and non-local communities at sites such as Nahal Tillah, where an Egyptian presence was identified (Levy et al. 1997). A study of the spatial patterning of the zooarchaeological assemblage has demonstrated peaceful interaction and a high level of social integration between these communities with no detectable effort exerted to maintain social boundaries on the basis of foodways (Kansa, Kansa, and Levy 2006). Indeed, the excavators concluded the non-local population appeared highly integrated within and even reliant on local communities based on their consumption practices, reporting "evidence for complex and overlapping ties between the immigrants and the local community" (Kansa, Kansa, and Levy 2006, 89). This high level of integration is said to "show little evidence for economic or social leadership" (Kansa, Kansa, and Levy 2006, 89). They specifically state that a lack of administrative presence is "intimately tied with the local community and shows little evidence for economic or social leadership," concluding that the relationship of dependence may have been one where the “Egyptians” on site received the “leftovers” of comestibles. In his study on the interaction between Egyptians in the southern Levant, Kansa (2001) concluded a weak institutional presence. Allentuck (2015, 56-57) also demonstrated the sharing of knowledge between communities around different types of practice. Within the context of foodways, the Egyptian preference for cattle forelimbs is attested as early as the Naqada III at Abydos, Naqada and Hierakonpolis, wherein furniture is decorated with cattle limbs and cattle with bound limbs during Naqada IIC at Hierakonpolis Tomb 100 (Allentuck 2015). At the site of Horvat ‘Illin Tahit, such a preference is reflected in the local community but altered to fit its local context, allowing us to infer that ritual practices were part of this landscape of economic cooperation (Allentuck 2015). When taken together and situated within the broader context of economic cooperation between communities dating back to the fifth millennium, the nature of interaction supports more recent proposals that the southern Levant was viewed as part of the landscape of the early state (Andelković 2012)—not as a colony or trade partner, but as a legitimate region that was both economically and ideologically important to the legitimacy of this burgeoning power.

Intensified Mining and Metallurgical Production in the Southern Levant

The presence of the Nile Valley communities in the southern Levant coincided with an increased scale of copper production and intensification of the division of labor between sites. Shalev (1994, 1995) argued for increasing community specialization as a result of the shift from “vertical specialization" to "horizontal" specialization,[143] wherein numerous sites began to specialize in an aspect of the production chain. While such shifts may have occurred in the EB IA, they become more pronounced after the abandonment of Tall Hujayrat al-Ghuzlan and Maadi around 3600/3550 BCE (Klimscha 2009). While mining at Timna is attested at Eilot Quarry (Ben-Yosef et al. 2008, 2876), evidence that efforts may have intensified at Feinan is suggested by the foundation of the sites like Fidan 4 (Adams and Genz 1995) and Feinan 100 (Wright et al. 1998). These two sites thus appear linked to the broader exchange networks toward the coast and overland networks to the north. The potential relocation of a portion of the communities from Timna/Wadi Amram to Feinan as a result of increased production is suggested by the same use of mining picks and grooved hammerstones (Hauptman 2007, 137-138, 147; Adams and Genz 1995, Fig 8:1) as well as shared material culture. Indeed, the excavators originally dated Fidan 4 to the Chalcolithic on the basis of its ceramic and flint parallels with Tall al-Magass (Adams and Genz 1995, 16-17), demonstrating the paralleled practices between assemblages. Evidence for collaboration between mining communities in the Feinan and Timna regions is supported by the introduction of shaft-and-gallery mining at Feinan during the mid- fourth millennium, employed to exploit the more economically profitable ore bodies (Baker and Mattingly 2008, 103; Weisgerber 2006, 5).[144]

[143] Genz (2000, 62) has challenged this interpretation, however, pointing to the absence of molds from settlement contexts as well as the high concentration of tool manufacture in EB II–IV at Khirbet Hamra Ifdan, when production was verging on an industrial scale (Gidding 2016). As such, he maintains there is a lack of evidence to support that metal played a major role in the rise of fortified villages centers during the EB II, resulting in organization models for production rooted in the pastoral nomad sector of society (Genz 2000).

[144] This technique consists of carving vertical shafts into the earth, leading into underground galleries. Areas exploited during the EB I include Wadi Jariye (Hauptmann 2007, 132), in the valley of Madsus near Umm ez-Zuhur, near Khirbet Hamra Ifdan (Hauptmann 2007, 131), and Qalb Ratiye (Hauptmann et al. 1985; Hauptmann 2007, 113-114). The adoption of this new mining technique was linked to wider efforts to exploit Dolomite Limestone Shale (DLS) mineralizations, which were more economically profitable. The DLS mineralizations are manganese rich with a low

With regard to the organization of production, mining tools were manufactured at the small settlement of Fidan 4 and used in the nearby mines (Adams and Genz 1995). Ore was thus brought back to the site for processing in a larger apsidal structure that functioned as a community space (Adams and Genz 1995, 12). Within this structure a range of production related activities took place including ore preparation, secondary processing of the slag, greenstone bead production from the ore, and the processing of wool attested using tabular scrapers (Adams and Genz 1995, 12, 14, fig.8:1).[145] Smelting appears to have been restricted to one household, wherein copper production refuse was found in a domestic cooking contexts within a bounded courtyard (Adams and Genz 1995). The crucibles are said to be the same socketed spoon-like crucibles attested across various mining and metal working centers in the southern Levant, emphasizing the connection to domestic practices. Such a division of labor within the community recalls Golden's (2014, 566) proposal that an elder was in charge of smelting and an apprentice took care of ore preparation and slag processing at Chalcolithic Abu Matar and raises questions about the role of managerial leaders within the community.

While a set of the population was thus restricted to production, Adams (2002) notes that the site itself does not appear to have been specialized (i.e., its *sole* purpose was not the exploitation of copper ore). He therefore proposed the community was involved in the exchange of copper ores

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iron content never exceeding 3%. The manganese thus acted as a fluxing agent and is believed to have introduced lead into the charge, increasing the fluidity of the cast and resulting in the need for less secondary processing of the slag (Hauptmann et al. 1992, 28-29). This is all to say that the system was becoming more economically efficient, allowing for an increase yield in production.

[145] This reconstruction is supported the presence of copper ore, slag, copper prills, and 26 crucible fragments believed to belong to 4-6 spoon-shaped crucibles alongside eight ovens (Adams and Genz 1995).

in order to supplement subsistence—a proposal supported by the number of non-local foodstuffs which included the remnants of olive, date, fig, wheat, barley, grape, and lentils, attesting to their use in cooking (Adams and Genz 1995, 10, 19, fig. 8.2; Adams 2002). Rather, when we look at the whole assemblage the community appears to have pastoral in origin, specializing in both copper, textile, and bead production. Similar material was found at Feinan 100, where surface collection turned up a remarkable number of objects drawing parallels to the Fidan 4 assemblage, mostly: ceramics, tabular scrapers, ore, slag, crucibles, spindle whorls, lithics, ceramic molds and stone mining hammers (Wright et al. 1998, 36 and fig. 10.2).These mining communities thus shared the same technologies, material assemblages, and participated in the same networks, expressing cooperation between these communities around the shared endeavor of mining and copper production. Evidence that these communities were engaged in external cooperative relationships is supported by the presence of a handmade, one-sided ceramic mold described as "spoon-shaped" by Hauptmann (2007, 110, fig. 5.19; Wright et al. 1998). This mold is similar to ingot molds found in the Gulf of Aqaba and the ingots at Maadi in the northern Nile Valley and supports collaboration between communities, as well as the integration of Feinan into the intensified networks to the north and west.[146]

The increasing importance of metal in display may have led to tensions between communities. With regard to the importance of the southern Levant for fostering ties abroad,

[146] Wright et al. 1998, 38 described the potential furnace as a "stone-lined fire installation." Furnace technology is said to have developed in the region during the EB II, where clay furnaces were reinforced with stone (Hauptmann 2007). If the report is correct, this would attest to the earliest presence of a stone lined furnace in Feinan and is noteworthy for its parallel in the Eastern Desert (see below).

access to ports would have been important. Gophna and Milevski (2003, 224) proposed EB IB Ashkelon-Afridar and Tel es-Sakan served as the main ports for the region. The importance of Ashkelon-Afridar dates back to at least the EB IA, maybe even earlier given the Chalcolithic settlement on the site. The foundation of an immigrant settlement at Tel es-Sakan (de Miroschedji and Sadeq 2005) may reflect increasing tensions between communities with regard to setting up infrastructure to sail up the coast. Indeed, Genz (2000) notes that there is only evidence for casting at a number of sites, including: Tel Malhatta (Ilan and Sebbane 1989, n.5); Meser (Dothan, 1959, 28); Lod (Wolff 1998, 768); Erani (Ilan and Sebbane 1989, n.5); Tel esh-Shuna (Rehren, Hess, and Philip 1997, 625), Yiftahel (Braun 1997, 92); and Ashkelon-Afridar (Segal, Halicz, and Kamenski 2004, Golani 2014). Toward the end of the period, copper also appears at sites connected with nomadic communities (e.g., Segal and Rosen 2011). In order to emphasize the pastoral component, Genz has pointed out the lack of molds for tools and weapons in settlement contexts.[147] The isotope ratios of the copper artifacts from Ashkelon-Afridar (Golani 2014) and Arad (Hauptmann et al. 1999) were consistent with those at Feinan and Timna, supporting that copper was mined from these sites and exported to specific centers for processing.

Increased interactions with southeastern Anatolia during the Uruk period are also attested in the southern Levant by the appearance of silver and gold portable objects and feasting wares.[148]

[147] He contrasts the southern Levantine regional system of production with that of Anatolia where Muller-Karpe estimates 30 molds in third millennium contexts (Müller-Karpe 1994, 144)

[148] Genz (2000, 58) surveyed the evidence, which includes: six silver spiral/coil earrings and gold bead from Azor (Ben Tor 1975, 24, fig. 12, 9-12); silver earrings from tomb in Tel Avaiv-Qiriyah, a gold ring and a gold cylinder bead from Tel en-Nasbeh; a silver cup from Tel el-Farah North; a silver sheet from Tel esh-Shuna North (Rehren, Hess, and Philip 1997); and a silver pin from charnel house A53 at Bab edh-Dhra (Hauptmann and Weisgerber 1992, 63). Nevertheless, Genz (2000, 58) downplayed the role of interregional markets and influence from the north, juxtaposing the somewhat restricted nature of precious metal evidence in the southern Levant with a site like Byblos, where a

Indeed, copper from the north continued to flow into the region during the EB IB is attested by the Cu-As-Ni alloy fragment from the metalworking debris at Tel esh-Shuna North, where crucible melting of both silver and copper occurred (Rehren, Hess, and Philip 1997, 629). Hauptmann (2007, 299) has described the distribution of this metal concentrated in northern Syria, southeastern Anatolia and the Euphrates, stretching into the southern Levantine landscape via the Jordan Valley and finally into the Delta "like pearls on a string." Such a distribution demonstrates continuity in these networks, where arsenic-nickel rich copper was attested at Teleilat Ghassul in the Jordan Valley (Golden 2010, 77), as well as the tools at Maadi and the axe at Matmar in the Nile Valley (Chapter 6). Such an arrangement speaks to the continuity of the Chalcolithic social networks connecting metalworking communities in the north with those in the south via pastoral groups embedded in overland exchange routes. When viewed in connection with the distribution of basalt spindle whorls, cortex tools and fan scrapers from the Nile Valley to southeastern Anatolia (Savage 2011, Klimscha 2012), the data reinforces the connection between pastoralism, the textile industry, and copper production (Anfinset 2010). The southern Levant was therefore economically and socially important for the growth of the early Egyptian state as it formed one of the major networks through which the state was in contact with the north. That said, we must also recognize the importance of copper and textile to markets in the Uruk sphere of exchange. Indeed, evidence that the southern Levant was transforming into an important system of regional copper production is potentially supported by the lead isotope analysis of metals from Mesopotamia dating to Jemdet

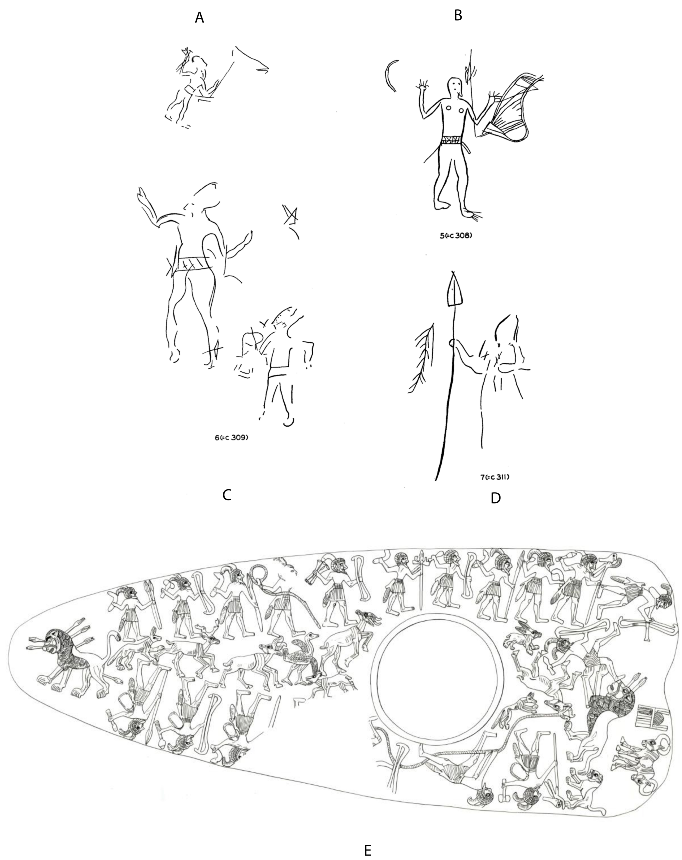
contemporary cemetery contained 233 pieces of silver (with reference to Prag 1978, 36). However, the role of Byblos as a port city does not render it an appropriate parallel to assess the importance of northern networks in the southern Levant, where the social relations of production were organized differently.

Nasr period/EB II, which is said to be consistent with copper sources from Feinan or Timna (Hauptmann 2007, 293, 303, citing Begemann and Schmitt-Strecker 2006). The distribution of copper from Feinan north thus appears to fit with the broader trend of pastoralists who mined and worked metal participating in economic cooperation via overland networks.

Megiddo

The importance of these overland networks may be linked to a Nile Valley/Delta community settlement at Megiddo during the EB IB, strategically located in the Jezreel Valley along a major trade route connecting the western Jordan Valley with the coast. While Megiddo is believed to have been occupied at various times spanning the Neolithic through the EB IA, it is during early EB IB that a series of three cultic structures were constructed in succession, culminating in a monumental temple by the late EB IB (ca. 3100 BCE) (Loud 1948, Adams, Finkelstein, and Ussishkin 2014). The handful of Ghassulian material attests to a sparse population on site during the Chalcolithic (Braun 2013, 6, n.6), however it is during the EB IB that an interest in the region is first attested. The site comprised ceremonial/cultic building and cemeteries (Adams, Finkelstein, and Ussishkin 2014). During the early EB IB in Area J-2 (OI Stratum XIX), a cultic area was constructed at the summit of the site, which was accessed by stone pavement decorated with images, some of which were similar to Egyptian motifs (Adams, Finkelstein, and Ussishkin 2014, 286 with references). These motifs are widely recognized to find parallels in the late Predynastic and reflect the rise of a warrior identity (Figure 38), which should be connected with participation in the Uruk networks.

Figure 38. Warrior imagery from: A-D) the stone pavement at Megiddo, dated to the EB IBI (Loud 1948, pl. 273) and E) on the Hunters Palette, dated to the Naqada IIIA (Hendrickx 2011, fig. 12).



The pastoral origins of the community at Megiddo is attested in the next phase of construction, wherein a broadroom building (Temple 4050) was constructed on top of the cultic sanctuary not long after it was built (J-3, OI Stratum XIX). Avner (2018, 50) has thus argued for a connection between the architectural layout of the Megiddo cult structure and desert populations, proposing Temple 4050 reflects continuity with a much older system of belief that can be traced back to the fifth millennium in the desert. Recall that the first mortuary shrines of the Chalcolithic at Teleilat Ghassul, En Gedi and Gilat all shared elements that were born out of what Avner (2018) argues is a codified system of belief with connections to the desert Sinai and Negev communities.

The shared cultic features include the dual temples connected with fertility rites, the broadroom structure and the enclosure wall (Avner 2018). The shared origin of these temples and mortuary shrines also appear to reinforce the connections between Nile Valley similarities to these desert communities. Such a proposal attests to the local, nomadic origins of both these early communities and late religious institutions.

Toward the end of the EB IB2 a monumental temple precinct was built on top of two previous cult spaces (J-4), contemporary with the Naqada IIIB/Dynasty 0 (Adams, Finkelstein, and Ussishkin 2014, Table 1). Referred to a as the Great Temple, the ceremonial precinct comprised of two broadroom temples enclosed by a temenos wall. In front of the temple the Egyptianizing motifs in the earlier pavement were retained, attesting to their importance for the space (Loud 1948, 61; Yekutieli 2008).[149] Potential evidence for a connection with Egyptian elites is supported by the construction of Tomb 910 during this period—the largest known Bronze Age tomb in the southern Levant—which finds parallels in the Nile Valley during the Early Dynastic (Ilan 2013, 139-140). A connection with the region as an important locale is supported by the presence of a predynastic Egyptian vessel found 300 m off the coast of Atlit, argued by Braun (2011, 108) to have been food for Egyptian sailors. Its presence off the coast supports a model wherein maritime traffic sailed north from the Delta by the EB IB.

With regard to the importance of Megiddo for metal production, the strategic location of the site along a major trade route in metals, textiles and other goods begs the question of whether

[149] When contextualized within the broader landscape of an Egyptian presence in the region, it is noteworthy that the abandonment of the Great Temple at Megiddo during the EB II (Adams, Finkelstein, and Ussishkin 2014, Regev et al. 2014) correlates with a decreased Egyptian presence in the southern Levant.

production took place on site. Evidence of on-site production is attested on the East Slope of the tell in the "stratified area," where Engberg and Shipton (1934, fig.13:A) reported finding a broken terracotta mold for axes (Reg. no 32.2690). The mold was recently reconstructed and analyzed by Shalev (2013) via pXRF, which revealed the inside contained copper residues three times higher than other analyzed areas, resulting in the conclusion that this mold was used to produce axe or adze blanks. The mold was dated to the EB I by Shalev (2013, pl. 74).

In addition to this concrete evidence of casting axes, we are also provided with potential indirect evidence for production. Within the context of the similarities between the Megiddo cult precinct and the Chalcolithic mortuary structures, the most obvious connection is the architectural layout between the Level J-2 temple at Megiddo, dated to the early EB IB, and the mortuary shrine at En Gedi, traditionally dated to the Chalcolithic. Kempinski (1972) was the first to discuss these similarities, which were later elaborated on by Ussishkin (2015), who identified a number of parallels outside of architecture. These included the presence of a stone circle inside the enclosure, the direction of the temple and its placement on a hill, and the presence of cornets. Ussishkin (2015) interpreted this feature as a water cult basin, an interpretation based on the proposal that the En Gedi brick feature was a lustral basin on the basis of similarities with the Sin Temple of Khafaje (Kempinski 1972). However, Mazar (2000) refuted such a proposal and argued that the feature may have been enclosing a sacred tree. This proposal was supported on the basis of various ethnographic lines of evidence wherein the base of sacred trees is marked by a platform. However we understand these features, the presence of cornets in a sacred area raises questions about metallurgical practices during the EB IB in what appears to be an institutionalized cult space.

While it has long been maintained that cornets disappeared after the Chalcolithic period, cornets and their stems were reportedly excavated from residual contexts at Megiddo spanning J-2 through J-4 during the EB IB. While more analysis is needed, Joffe (2000b, 165) proposed that they appear to have been decorated with EB IB motifs, signifying that their use continued long past the Chalcolithic (Ussishkin 2015, 88). It should be recalled that an argument was put forward about the continuity of cornets in the Delta at Buto (Chapter 6). Indeed, Rehren, Hess, and Philip (1997, 637) have argued that the Chalcolithic mode of production continued into the EB IB as supported by the presence the presence of a lost-wax cast macehead from the Kfar Monash hoard (Figure 39:4), the presence of silver vessels, and the continued production of arsenic-nickel rich copper. When we consider the presence of the axe mold on site, we must acknowledge the possibility that the cornets may have been connected to local apiculture potentially connected with casting.

Kfar Monash Hoard and Nile Valley Elites in the southern Levant

When we consider the distance between Megiddo and the Kfar Monash hoard, we must look for connections between Egyptian presence and the hoard. The assemblage contains over 800 small copper plaques, known from several other sites in the region (Shalev 1994, 635). The hoard also contained 30 weapons and tools, including six axes (10.5-17.5 cm in length), three of which included incised markings (Hestrin and Tadmor 1935, Pl. 25B), 11 adzes (14-17 cm x 4.6 cm width), three chisels, four daggers, one knife, two long curved knives (60 cm), and four spearheads of different lengths (up to 66 cm), a peg, a saw incised in the pointillé technique,[150] a crescent, and a macehead, as well as a silver sheet and carnelian beads (Hestrin and Tadmor 1963). Use-wear analysis demonstrated that the tools had been heavily worn down (Hauptmann, Schmitt-Strecker, and Begemann 2011, 70), suggesting they were not produced directly for burial purposes. That these were ceremonial in use is inferred by the size of some of the spearheads, which weighed upwards of 2 kg and are over 60 cm long (Figure 39:3). With regard to the function of such large spears, Hestrin and Tadmor (1963, n. 46) pointed out the parallel to the oversized spearheads holding up the shrine under which Narmer sits on his monumental macehead (Figure 45). Additional connections between Nile Valley groups and the Kfar Monash hoard were established by Sebbane (2003), who drew attention to the Hunter's palette (Figure 38:E) and an image of a man with a large spear on the pavement from the Megiddo temple (Figure 38:D), strengthening the ties of this assemblage with an Egyptian presence in the region. Support that they functioned in a ceremonial context is suggested by their use in support for the shrine under which Narmer sites on his macehead, as well as the excessive weight of the spear (Figure 44; Hestrin and Tadmor 1963, 281).

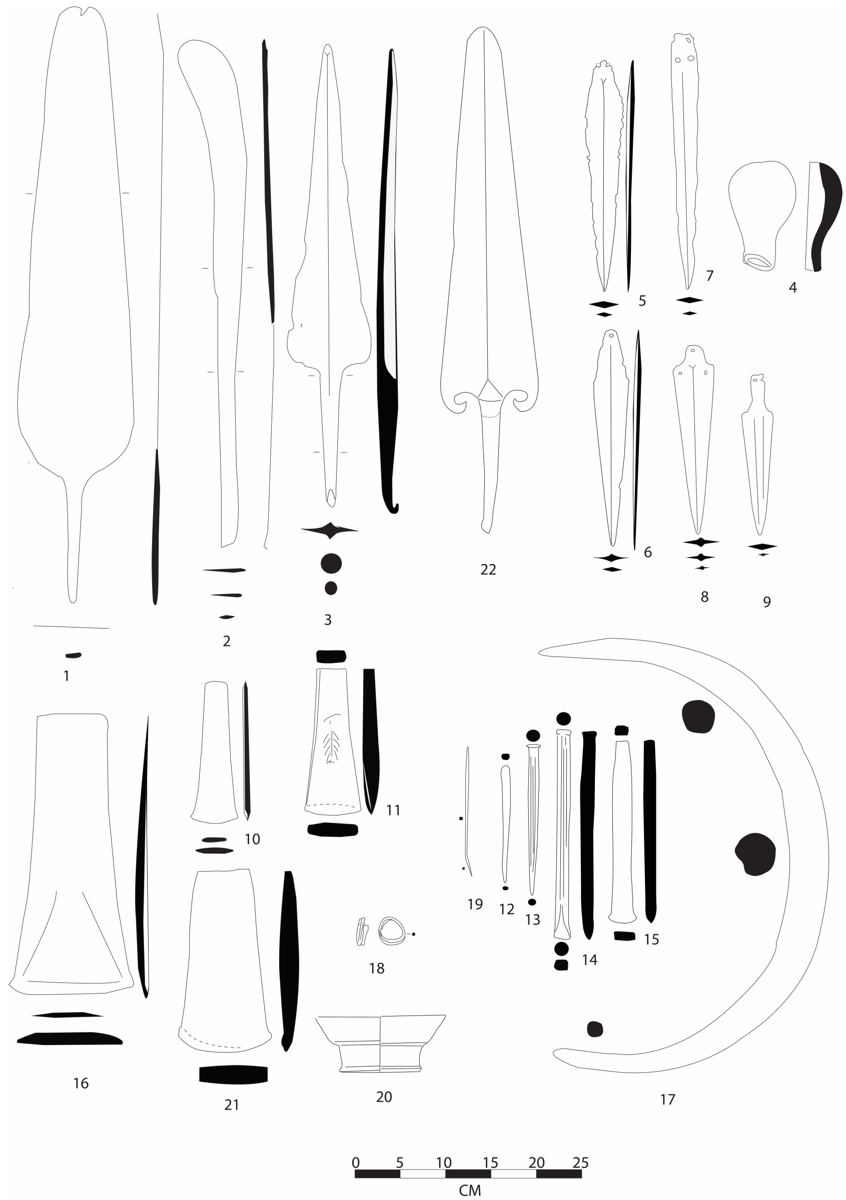
The lack of context has led to various interpretations of the hoard. Hestrin and Tadmor (1963, 288) proposed Egyptian woodworkers in the southern Levant hid the hoard, whereas Tadmor (2002) later connected it with trade with Nubia and Egypt. Assuming Egyptian colonization of the region, Yekutieli (2008) postulated the hoard belonged to soldiers on a mission in the "contact zone." Hauptmann, Schmitt-Strecker, and Begemann (2011, 75-76) rejected that

[150] The incised decoration on the saw was interpreted as a cow's head with horns by Hestrin and Tadmor (1963, 272).

the hoard be viewed as trade connections between Egypt/Nubia and the southern Levant on the basis that neither the chemical or lead isotope analysis suggests a Nubian origin of the metal.[151] Indeed, out of the 35 analyzed objects there were four made from arsenical copper (Key 1963), reflecting the Egyptian preference for ore no doubt from Sinai. The lack of standardization attested in the trace elements of typologically similar adzes led Key (1963, 290) to propose smiths imported ingots from the region. The recent lead isotope and trace element analysis by Hauptmann et al. (2011) similarly concluded that the adzes, while typologically Egyptian, were made with a Cu-As-

[151] They cite the ore fragment from Buhen reported by El Gayar and Jones (1989), which contained 30% Cu and 0.18% Au. Smelting such an ore would have resulted in 0.005% Au in the finished object, which is much higher than what is seen in the Kfar Monash hoard (Hauptmann, Schmitt-Strecker, and Begemann 2011).

Figure 39. Early Bronze IB copper objects from southern Levant (see Table 13 for references). Line drawings traced by author.



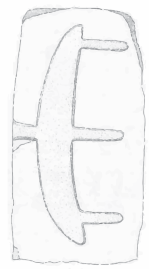
Ni metal whose origin points toward an eastern Anatolia source but whose unique isotopic signature has yet to be identified, reinforcing contact with the north through the Jordan Valley.[152]

[152] Significant is that a Cu-As-Ni metal was also employed in the Nahal Mishmar Hoard (Tadmor et al. 1995), at Givat Ha'Oranim during the Late Chalcolithic-EB IA (Namdar et al. 2004), at Maadi and Matmar during the Naqada I-II

While the Kfar Monash hoard finds typological parallels to forms in the Nile Valley and Delta, support for close interactions with the north is also attested by the presence of a crescent axe (Figure 40:3) found a few hundred meters from the hoard's original find spot a few years after its excavation, resulting in the proposal that it was part of the EB IB assemblage (Gophna 1968, Tadmor 2002). However, the lack of archaeological association of the axe with the hoard has led several scholars to reject this proposal, favoring an EB II or even EB III date for the axe on the basis of similar crescent axes at Jericho and Bab edh-Dhra dated to the EB III (Hauptmann, Schmitt-Strecker, and Begemann 2011, Ben Tor 1971). Nevertheless, Sass and Sebbane (2006) have convincingly argued for an EB IB date on the basis of several lines of evidence. The first is a cylinder seal impression from secured contexts dated to Level V at Uruk (ca. 3400/3300 BCE). The scene depicts a robed man holding a crescent axe in front of an attendant and temple façade, implying that this was a symbol reserved for an elite leader, priest, or mix of both (Figure 40:4; Sass and Sebbane 2006, fig. 4), establishing a chronological connect of this form to the second half of the fourth millennium in Uruk. Next, from Tel Halawa they cite half of a bivalve stone mold for the production of these axes (Figure 40:1), creating a chronological connection with the early third millennium (Sass and Sebbane 2006, 83-84). The last line of support derives from the appearance of a warrior with a dagger in his belt, holding this axe carved in a local style dated to the Predynastic (Figure 40:2), strengthening the connection of the axe with the hoard as well as providing nuance to an EB IB date (Sass and Sebbane 2006).

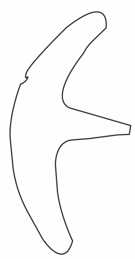
(Pernicka and Hauptmann 1989), as well as at Tel esh-Shuna in the north Jordan Valley during the EB IB (Rehren, Hess, and Philip 1997), suggesting continuity with northern trade networks from the Chalcolithic through the EB IB.

Figure 40. Crescent axes during the late fourth millennium BCE. Images adapted by author.

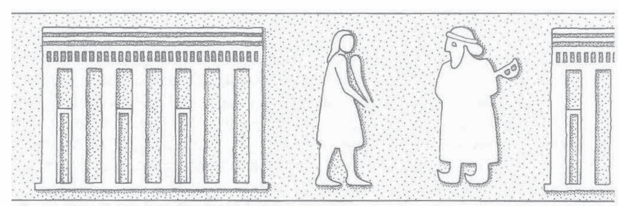


1. Crescent axe mold from: Tell Halawa (after Luth 1989a, 170)

2. Line drawing of warrior with fenestrated axe, Predynastic (style). Purchased by Heinrich Shafer in Qena, Upper Egypt (after Krauss 1995, 154)



3. Crescent axe potentially associated with Kfar Monash (after Miron 1992, pl. 14:220)



4. Composite of cylinder seal imressions n. 10, from Uruk, Level V, (Late Uruk period, after drawing by Boehmer [1999, pl. 35] in Sass and Sebbane 2006)

While weapons came to form an integral part of certain Nile Valley and Delta identities, in the southern Levant their presence appears connected with Nile Valley individuals (Anfinset 2010, 152). At Azor in the Shephelah, two artificial rock-cut tombs contained Egyptian-style ceramics, two identical copper daggers (Ben Tor 1975, fig. 13:5, pl. 21:4) with parallels in the Nile Valley (Tadmor 2002), as well as a ripple-flaked knife (Ben Tor 1975, fig. 13:5, pl. 21:4). The latter is a ceremonial form of weapon whose production was so highly centralized that it is believed all ripple-flaked knives were produced in one workshop in the region of Abydos during the Naqada IID (Hikade 2003). The nature of the assemblage led the excavator to conclude that the objects were not imported to the region, but rather were the personal items of the deceased, brought to the region by individuals from the Delta and Nile Valley (Ben Tor 1975, 29). Indeed, Sebbane (2003) recognized the Azor daggers and daggers in the Kfar Monash hoard found typological similarity to those in the Nile Valley at Naqada, specifically the javelin or spear. When we look at the nature of these monumental and ceremonial weapons, they fit within an emergent power strategy exercised by Nile Valley elites to express dominance over the system of production.

Naqada III: Monumentality and the Co-option of Ritual in the Body of the King

The increasing participation in the eastern Mediterranean exchange system resulted in fundamental transformations to local power structures and the introduction of new technologies. It is thus during the Naqada III that we see the disappearance of the decorated wares so characteristic of the Naqada IIC-D alongside the rise of monumental funerary architecture, the emergence of writing, and the codification of symbols legitimizing the king (Stevenson 2016, 438-443). Wengrow (2006) has argued that the increasing sedentarism and interconnectivity in the eastern Mediterranean led to the breakdown in the *primary pastoral community*, resulting in the need to develop new ways to emphasize mobility and participation in external networks of exchange. One of the strategies of power during this period employed monumentality to claim traditional symbols of community ritual (e.g., Stevenson 2016, 444-445). In the Nile Valley, these symbols were the macehead (Figures 41, top left), ripple-flaked knife handles (Figure 41, top right),[153] and greywacke palettes for grinding greenstone (Figure 41, bottom). These traditional objects were decorated in an

[153] The decoration of handles attached to ripple-flaked knives—a new knife form that appears during the Naqada IID/IIIA—is significant when we consider these knives were produced in one workshop (clan or kinship group) in the region of Abydos, who had been producing pressure-flaked fishtail knives used in funerary ceremonies dating back to at least the Naqada I (Hikade 2003).

Figure 41. Naqada III monumental forms of display. Scorpion macehead, Gebel al-Arak knife, Narmer palette.

artistic style that finds parallel on Uruk style cylinder seals and perhaps more perishable objects, including: master-of-animals, serpopards, bound captives, and hybrid motifs. The decoration of maceheads as well as cosmetic palettes and carved ivory knife handles thus drew on objects *connected with ritual specialists* dating back to at least the late fifth millennium, encasing them with motifs connected with the outside world and producing them on a monumental level to be showcased in landscapes of display. In what follows, I will nuance previous interpretations of these objects and strategies by arguing that these were selected to legitimize the king as the chief ritualist and master metalsmith, concentrating the power of the state on the body of the king who now presided over the funerary economy.

Monumentality and Claims over Mining Landscapes

Prior to the Naqada III, there is very little evidence to suggest that copper or gold were mined from the Eastern Desert.[154] However, by Naqada IIIB the early state's interest in the mines in this region appears connected with efforts to exert control over all of the greenstone industry—from the Eastern Desert, across the Sinai, and into the southern Levant. The first unequivocal evidence that mining is attested in the Eastern Desert appears at Wadi Dara during Naqada III, when natural draft smelting furnaces were reportedly constructed on the hilltops on site (Tallet, Castel, and Fluzin 2011, 80, n.3). A total of thirty natural draft furnaces were reportedly built on hilltops whose opening faced NE or SW into the prevailing wind. These furnaces were U-shaped and built with stone superstructures, many of which were incorporated into a series of six batteries, however a few were constructed as single furnaces (Castel et al. 1996, 17). The standardization of these furnaces as well as their construction into batteries suggests a date contemporary with the furnaces that appear in Feinan during the late EB IB/EB II (Hauptmann 2007, 228-230). The shared furnace

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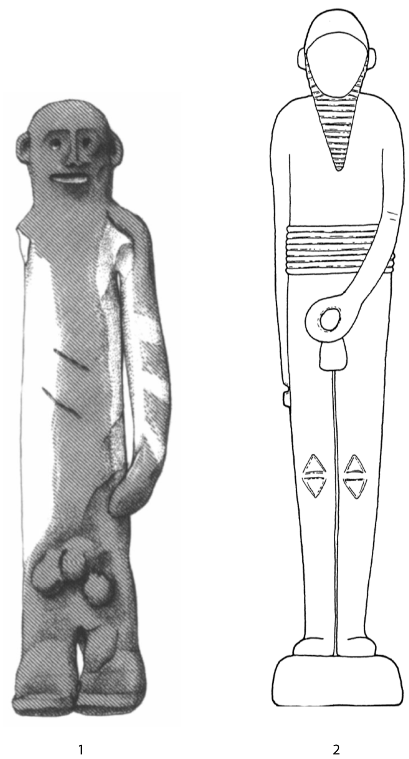
[154] Abdel-Motelib et al. (2012, 8) have argued that, "Before powerful state-like structures had emerged at the end of the 4th millennium, the Naqada Culture obviously did not undertake its own enterprises to get direct access to copper ore from the region of Wadi Um Balad, Wadi Dara, Wadi el-Urf and Wadi Abu Hamad in the northern Eastern Desert" (with reference to Tawab et al, 1990; Castel et al. 1992; Grimal 1993, 1994; Castel et al. 1998; Bomann 1994, 30; 1995, 14-16). Anfinset (2010, 127) proposed that a lack of technological knowledge and/or cultural value of the material may explain why the mines were not exploited earlier. What seems more likely is the importance of Sinai and the southern Levant as central places where people would gather to form temporary but legitimate communities to mine greenstone/copper ore.

technology between the Eastern Desert and Feinan therefore points to collaboration between mining communities during the late EB IB-EB II/Dynasty 1. Nearby Wadi Dara, ceramic data from Umm Balad similarly suggests occupation of the site during the Naqada III (Köhler 1998, 73).

Likewise, east of the Wadi Hammamat, the site of Semna I contained twenty mines and tailings believed to have been worked during the Naqada III on the basis of ceramic evidence (Abdel-Motelib et al. 2012, 33). As only copper ore and hammerstones were reported, the absence of metallurgical production refuse has led surveyors to propose either furnaces may have been present on nearby hilltops or the region was exploited for its *pigment* (Abdel-Motelib et al. 2012, 33, emphasis added).[155] A third option we must not forget to entertain is the crushing and preparation of ore on-site for transport back to settlements, as attested by the smelting workshop at Elephantine dated to the Naqada IID-III (Kaiser et al. 1997). Evidence for a connection between the early kings and the mines is supported by the macroscopic features of the ore from Semna I, which are reportedly similar to the malachite found in the Predynastic tombs at Abydos (Abdel-Motelib 2012, 34).

[155] At the bottom of the hill a 5 x 5m stone structure contained pottery sherds and worked pieces of metamorphic schist, interpreted as palettes or vessels/bracelets known from Predynastic sites (Abdel-Motelib et al. 2012, 34).

Figure 42. Elite depictions of males tied to fertility rites in southern Levant and Nile Valley: 1) Early fourth millennium male fertility figurine from Cave K-1 at Quleh in the southern Levant (Milevski 2002, fig. 8a); 2) Colossal statue from the early shrine at Coptos (reconstructed by Williams 1988, fig. 5).



With regard to mining and metallurgical production, the Coptos colossi appear to form some of the earliest known monumental sculptures,[156] proposed here to assert a newfound dominance over the mining industry. Erected in an early shrine at Coptos near the entrance to the Wadi Hammamat as discovered by Petrie (1896), these three colossal stone statues depict men with belts grasping erect phalli (Figure 42:2, reconstructed with reference). While it was originally believed these statues depicted Min—the god of mining—inscriptions on the side of these statues

[156] It appears a life-sized statue may have also been present in Tomb 23 at Hierakonpolis in the elite cemetery (HK6) during the Naqada I-IIB (Friedman 2008).

have since led to the proposal that the figures depicted were early kings, one of which was inscribed with the name Narmer (Williams 1988). Kemp, Boyce, and Harrell (2002) have pointed to the similarity in the colossi and the standing stones during the Late Predynastic in a similar fashion to the *masseboth* in the Sinai, creating a connection with the spiritual landscape in Sinai (Avner 2002, 2018). While the nature of these statues remains debated, Kemp, Boyce, and Harrell (2002, 236) convincingly argued that they reflect a centralized power structure in the region on the basis of a similar limestone statue at Hierakonpolis over 60 km away, suggesting coordination. Baqué-Manzano (2002, 40) proposed a date of construction between the late Naqada II and early Naqada III (ca. 3450-3300 BCE). Stylistically, these statues find parallel to a clay fertility figurine of a male found inside a Chalcolithic ossuary burial in cave K-1 at Quleh in the Shephelah (Figure 42:1; Milevski 2002, 138, fig. 8). Such a preserved stylistic similarity potentially reflects the nature of contact between communities. Similarly, the colossi resemble the much smaller lost-wax-cast figurines found in the hoard at Tel Judaidah dated to Amuq G during the Late Uruk/Jemdet Nasr period (Braidwood, Braidwood, and Haines 1960, 303, Yener et al. 1996), reflecting the confluence of tradition and innovation among communities in contact during the fourth millennium. Kemp, Boyce, and Harrell (2002, 236) further maintain that the appearance of these statues at Coptos–a city that is geographically close to *nb.t*—which was tied with the god Seth and kingship and potentially miners—reflects its placement in a local Predynastic political polity. The placement of these statues in an early shrine at Coptos at the mouth of the Wadi Hammamat leading to the greywacke, gold, and copper mines of the Eastern Desert is important.

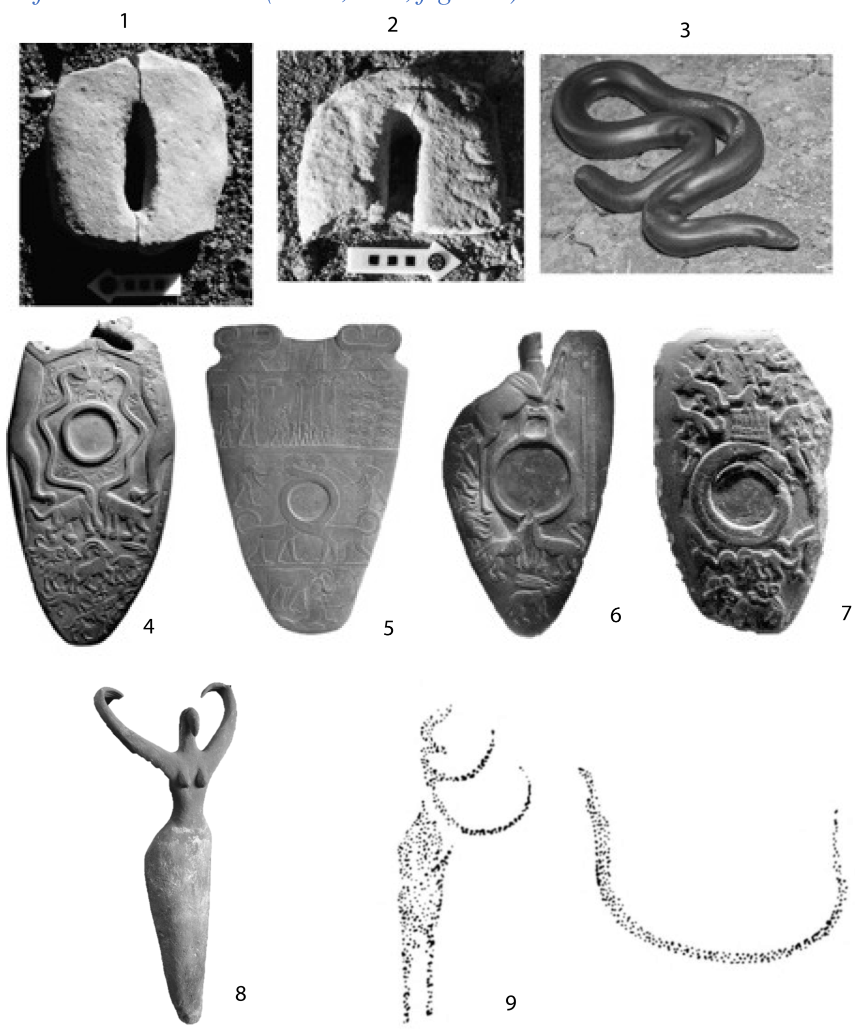
During the predynastic, the deserts appear to be ritual spaces where rites of passage may have been enacted to reify the communal identity of early elites (Lankester 2016), argued here to have been miners. By the dynastic era, epigraphic evidence reflects the deserts as the mineral universe of the gods (Aufrère 1991), however there is little to suggest this was the case during the Naqada III (Baines 1991). Rather, the emphasis on the king as chief ritualist in control of the mines, and thus funerary economy—came to play a critical role in the construct of kingship. During the Naqada III, Narmer appears to have coopted the Coptos statues by writing his name on one of them (Williams 1988), perhaps as a political act to claim control over the greywacke, gold, and greenstone of the Wadi Hammamat. In the Wadi el-Gash, a serekh with Narmer's name is believed to have led toward the copper mines in the Eastern Desert (Resk Ibrahim and Tallet 2009, 179, n.2). Indeed, this practice of marking the landscape with one's name is also attested in western Sinai at Wadi Ameyra where an inscription was left by Iry-Hor, attesting to an institutionalized presence by the Naqada IIIB/Dynasty 0 (Tallet and Laisney 2012).[157] We might similarly understand the numerous serekhs in the southern Levant at sites connected with the system of copper production (e.g., Arad; Amiran 1974) as also reflective of an ideological expression of control over the system of production.

Decorated Palettes and the Cooption of the Greenstone Production

Control over the mining landscape should be viewed as connected with the cooption of palettes as the tools by which greenstone was ground for use in funerary rites of passage. To claim palettes

[157] A monumental bas relief found at Wadi el-Humur in south Sinai is dated during the reign of Den in Dynasty 1 (Resk Ibrahim and Tallet 2009).

Figure 43. Serpent iconography in the southern Levant (1-2; Avner 2002, 69, n.4, fig. 4.139); 3) eryx genus of snake; 4-7) Naqada III palettes with serpent motifs; 8) Naqada II bird woman; 9) Snake charmer from Aswan Keel (1997, 312, fig.417).



was thus to assert dominance over ritual, rebirth, and the perpetuation of the community. Whereas prior to the Naqada III the palettes represented a range of zoomorphic forms, these forms ceased and transformed into richly decorated display objects with various motifs from the Uruk sphere of exchange, as well as the development of local styles. These palettes are attested at numerous sites in the Nile Valley and most recently from a predynastic tomb at Minshat Ezaar in the eastern Delta (Gabr el-Baghdadi 2003, 149). One of the characteristic features of Naqada III palettes is the appearance of a circular, accentuated depression in the center of these palettes where pigments were ground. The appearance of this depression first appears on some zoomorphic palettes and draws striking parallel to the sun disc in later Egyptian iconography. What does the sun have to do with the grinding of greenstone connected with new displays of exclusionary power?

In some non-Western societies, the sun is symbolic of a crucible. A recent proposal by Amzallag demonstrated that ancient metalworking communities of southwest Asia exhibited a cognitive connection between the sun as a molten mass of metal, attested in various epigraphic sources (Amzallag 2015, 86-89 with references). According to this proposal, the changing color from yellow to red associated with the sunrise and sunset provided a similar visual parallel to the copper cooling process in the crucible (Amzallag 2018, 69, n.66). The appearance of these circular discs for grinding greenstone—the stone of regeneration and transformation—may thus have been connected to the increasing importance of the metals industry for the funerary economy at large. Indeed, state building requires relationships and gift giving. It is possible that the appearance of copper model tools during the Early Dynastic (Odler 2016) may reflect the beginning of the system attested during the Old Kingdom wherein the king gifted sets of model copper tools to elite member of his administration to express and reify the power dynamic between patron and craftsperson (Odler 2015).

When we look to the palettes, some of the depressions are the diameters of crucibles, perhaps emphasizing this symbolic connection. While these palettes range in size from 10 to 60 cm, the diameter on the Narmer palette measures 8 cm—the diameter of some of the smaller crucibles from Shiqmim (Pfeiffer 2009, 312). According to Amzallag (2018), the (s)melting of copper in a crucible was thus materially connected with man's ability to capture a piece of the sun, heightening the power of the smith as smelting and casting came to symbolize the act of harnessing both the power of the sun and creation. When we consider the act was achieved via the physical transformation of greenstone—of *wꜣḏ,* tied to an ideology centered on rebirth—this potential connection with the sun reflects the connection between copper and rebirth. The rising and setting of the sun, wherein Re was reborn at dawn, may therefore reflect the increasing centrality of metal to the Egyptian worldview. During the Naqada III, the grinding of malachite within this circle may thus have been a symbolic act of grinding ore in connection with smelting, the act of being reborn into the next life, expressing a continuity with the Late Chalcolithic worldview within its local context.

Of relevance here is the rise of serpent imagery on these palettes, which tended to be carved on the side of the palette with the circular grinding depression (Figure 43:4-7). The image of a serpent or serpent-like creature encircling the disc draws parallel to later depictions of the uraeus encircling the sun disc—that is, the goddess *wꜣḏt* encircling Re—proving a level of support for the disc's proposed identification as reflective of a sun disc and perhaps the material foundations of this later motif. As part of this serpent imagery, we must include the serpopard motif,[158] wherein the necks of two fantastical creatures intertwine to form one serpent-like body with two heads. It is well known that this motif is also attested in Susa and must have been transferred via the Uruk network (Wengrow 2014). The connection between serpents and metalworking communities in

[158] The motif draws parallel to cylinder seals as far east as Susa (Wengrow 2006, figs. 2.1-2.2).

Egypt and southwest Asia is potentially supported by a Northwest Semitic spell written in Pyramid Texts, wherein a two-headed serpent is invoked to watch over the king during his process of regeneration (Steiner 2011).

Semitic Serpent Spells and the King as Chief Snake Charmer and Smith

In the discussion that follows, I argue that a serpent spell from the Pyramid Texts may provide nuance to the appearance of serpents encircling the depressions on some palettes, as well as potentially support a connection for the importance of metal production to the kingly identity and ideology of legitimacy. I argue that the serpent spell from Unas' burial chamber may encode an early, oral smelting spell performed upon the death of a community member by a shaman or ritualist within metalworking circles. I argue that the writing of the spell in Semitic reflects the origin in which it would have been learned. The presence of the spell in the burial chamber of Unas, the last king of Dynasty 5 may therefore reflect the continuity of practice and locate kingship in early metalworking circles. This proposal will be further supported by examining iconography on the Narmer macehead and revisiting the kingly title *nsw.t bjtj* in the next section, and critically analyzing certain symbols in the Nahal Mishmar hoard in the next chapter.

The Semitic serpent spell invokes a two-headed serpent goddess named *Rīr-Rīr* to protect the king to be reborn in the afterlife. The spell is written in the burial chamber of Unas, last king of Dynasty 5 (ca. 2375-2345 BCE).[159] Within his chamber, two sets of funerary incantations have

[159] The chronology adopted here refers to Shaw (2000, 482).

been the source of debate between scholars over the years in light of their indecipherability.[160] These spells face one another, flanking the king's body on the western gable (PT 226-243) and the eastern wall of the antechamber (PT 276-299), and form part of the larger genre of magical spells to protect the king in his rebirth to the afterlife.[161] While the earliest written form of the Pyramid Texts dates to Sahure during Dynasty 5 (Baines 2004, 21), it is generally agreed that these stem from a much older oral or possibly written tradition (Baines 2004, 17-18).[162] Parts of the spells were written in a form of syllabic orthography resembling the Middle Kingdom group writing,[163] reflecting the intent of the scribe to mark the speech as non-Egyptian and raising questions about the motivation to code switch.[164]

[160] A reason contributing to the confusion is that these texts are orthographically distinct from the others spells in the other Pyramid Texts, written in a form of syllabic orthography that comprises predominantly of uniliteral signs, lacks determinatives, and contains a sequence of three alephs–a very non-Egyptian feature (Ritner [2007] in an email, see Steiner 2011:7-8, n.38). Such orthography is known to have been employed when writing non-Egyptian names, places, and words–often of West Semitic origin (Loprieno 1995)–during the Old Kingdom, where it is attested here and in the execration texts. Ritner (1995, 3352-3353) believed the text in PT 281 was not an Egyptian language.

[161] The two sets of texts are different in content but do contain several utterances that overlap, leading some scholars to conclude the transmission of these texts was independent and occurred over a long duration of time (Steiner 2011, 1-4, for most recent review). What this means is that different variations of the spells may have circulated in various spatially and chronologically distinct communities and may date back early—to the fourth millennium. The repeated texts include PT 228 §228a-b with PT 290 §431a; PT 238 242c with PT 282 §243b-c; and PT 240 §244a with PT 299 §444a (Steiner 2011, 3). For a full discussion on the differences, see Steiner 2011, chapter 3 n. 45 and chapter 4.

[162] The dates range from late Dynasty 2 to early Dynasty 3 (Baines 2004, 17-18, Altenmüller 1972-1992, 20).

[163] PT 235, 236, 281, 286, see (Steiner 2011, 77)

[164] In his masterful study of these texts, Steiner (2011) convincingly identified a Northwest Semitic language was encoded in this orthography. In his email to Steiner, R. Ritner indicates that he and his graduate student Harold Hays agree with Steiner's interpretation that the lack of consistency in copying these texts indicates it was probably coding a non-Egyptian language. The texts are thus to be recited in a Northwest Semitic language and are believed by Steiner to have been transmitted to the Egyptians from priests at Byblos as part of the cedar trade. The context of the texts was proposed as a warning to prevent snake bites from those who may have climbed aboard during the maritime transport of wood. That the spell came from the north was argued on the basis of the Late Bronze Age serpent spells attested at Ugarit (Steiner 2011). However, this proposal is revisited below in light of its connection to metallurgical production, serpents and the sun.

With regard to the content of the spells, it is in the innermost chamber of Unas's tomb that the two-headed mother goddess *Rīr-Rīr* is invoked to protect the king from serpent bites in the afterlife. Following Steiner (2011, 24-25), the nature of these texts is summarized as follows: PT 232-38 begins with a serpent that has entered into the burial chamber of the king, wherein the king, acting as the head snake charmer, attempts to make the snake leave. Unsuccessful, *Rīr-Rīr* as the goddess guarding the threshold copulates with the intruder and recites a spell in the native, Northwest Semitic tongue of the snake, convincing the serpent to leave the burial chamber and go to the house of its mother (i.e., into the hole in the ground). Presumably this act allows the king to be re-born successfully into the afterlife given the context of the spell's placement. In PT 281-82, it is the *king* who utters the spell in a Northwest Semitic language, *transforming into Rīr-Rīr* via the spirit of the goddess who has entered his nose. The king performing as the two-headed goddess *Rīr-Rīr* then speaks in a Northwest Semitic tongue, gesturing to (his) her mouth and genitalia to convince the other snakes that the king is legitimately *Rīr-Rīr*. He then states that in attacking the king, the snakes are actually attacking *ẖꜥy-tꜣw* which is translated as "the one who appears in the flame" and interpreted by Steiner as the god of Byblos. The text is followed by PT 286-87, wherein *kbn* snakes (Steiner interpreted *kbn* as "Byblites" and thus foreign snakes) come near the chamber but are rebuked by *Rīr-Rīr*. The spell ends with the king invoking *Rīr-Rīr* as the praised one of the *Red Crowns* (emphasis on plural). Several points are significant to the discussion with the context of the king performing as chief snake charmer, ritualist, and argued here, metalsmith.

One of the more interesting aspects of the text is the fluidity expressed in gender embodiment (the king transforming into a mother goddess figure) and the interchangeability of human and animal (the king as a serpent). If this is an oral spell connected with the regeneration of early cult leaders, then the encoding of performative aspects of the spell in Northwest Semitic language may be connected to the early collaboration between communities around mining and smelting. Early images of snake charming appear in rock art dated to the Predynastic at Aswan (Figure 43:9; Keel 1997, 312, fig.417), where the figure raises both arms over his or her head. Such depictions are very similar the Naqada II bird lady figurine (Figure 43:8)—as well as the ka sign—suggesting a potential connection between this physical gesture of dancing and/or snake charming. Indeed, the painted vessel from Abydos depicting an individual with a mace and zoomorphic costumery contains an individual with their hands raised (Figure 37:1). Similarly, this gesture is found on decorated rough ware vessels of the Naqada IIC-D made from marl clay in the deserts and believed to depict scenes related to funerary rites of passage (Stevenson 2016, 439-440). This gesture appears within these elite circles at Megiddo (Figure 38: 1-3), in rock art in the desert (Lankester 2016), and on a copper saw in pointillé technique from Kfar Monash (Figure 26:4). Within the context of interchangeability of human and zoomorphic creatures, the Naqada bird woman with upraised arms (Figure 43:8) may thus reflect on a time when women played key roles in cult in these early communities, reflecting the interchangeability of the king with the female serpent goddess. We should thus recall the Predynastic burial of women with copper awls, greenstone, and medicinal plants as important figures in the community.

References to copulation with the serpent mother goddess (PT 235) draw parallel to the rituals connected with fertility and mortuary rites at Gilat. Chapter 4 discussed the two figurines––a ram and a mortal female—believed to have played a highly-sexualized role in mortuary-related fertility rites, reflecting the interchangeability of human and animal in the Chalcolithic southern Levant. The king's reference to his genitalia while performing as *Rīr-Rīr* (PT 281-282) finds archaeological evidence rooting this serpent-fertility ideology in the landscape of the southern Levant. In the Uvda Valley in the southern Negev, west of Timna and Wadi Amram, almost three dozen *masseboth* were carved to resemble the female reproductive organ (Avner 2002, 69, n.4, fig. 4.139). The serpent carved onto one of these stones therefore grounds a serpent-fertility ideology in the local landscape by the fifth millennium (Figure 43:1-2; Avner 2002, 69, n. 4, fig. 4:139), recalling the command of *Rīr-Rīr* to observe her genitalia. It should be recalled that this region was long traversed by pastoral groups from the Nile Valley and Delta who crisscrossed to the Gulf of Aqaba and further north as part of the mining and production of copper. Important here are the ethnographic accounts of pre-industrial mining communities around the world that compare smelting with sexual creation (Gošić and Gilead 2015b).

Evidence to root the description of *Rīr-Rīr* in the region of the Levant can be found in the type of snake mentioned. Steiner proposed that the two-headed snake may have been a Palestinian viper (Steiner 2011, 24), however a more likely candidate actually lies in the eryx genus of snake (Figure 43:3), which inhabits the desert regions extending from the Sinai into India. The snake's tail looks like its head, resulting in the appearance of a two-headed serpent. Epigraphic evidence that such snakes were recognized as having two heads is attested during Esarhaddon's campaign from Palestine to Egypt in 671 BCE. While trekking through the *Negev and Sinai* he reports of repeatedly stepping on two-headed snakes (Radner 2008, 307).[165] As a non-venomous snake, this

[165] I extend my gratitude to Andrew Danielson for calling my attention to this reference.

may have been viewed as a protective totem for early groups moving throughout the desert regions, where copper and pastoralism played a major role in connecting communities. The double-headed serpopard motifs—whose necks intertwine to form one snake-like creature with two heads—might thus be viewed in a more nuanced light when we consider the physical world within which a two-headed serpent may have existed. These texts are thus argued to reflect a time when joint-mining expeditions and a shared funerary landscape contributed to the construction of a later elite Egyptian mythos.

When we turn to potential connections between serpents and smelting, Amzallag (2016b, 230, n.67) has cogently discussed the sudden koine of serpent imagery in the Near East by the early fourth millennium[166] and attempted to connect the spread of this imagery to the transmission of furnace technology.[167] His brief (but underdeveloped) proposal maintains that the serpent motif traveled with the spread of specific smelting technologies out of the southern Levant. While the transmission of furnace technology out of the southern Levant has been rejected (Thornton et al. 2010), it is significant that the serpent begins to appear during the Chalcolithic in the southern Levant at a time of intensified production. Indeed, the serpent as a physical symbol of regeneration—shedding its skin as a symbol of regeneration—fits as a totem connected with the mining of greenstone and the smelting and (re)melting of metal.

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[166] Similarly, Elliott (1977, 15) argued that the sun, tree and snake form the most common motifs during the Chalcolithic.

[167] It should be noted that according to this theory, furnaces were independently created in the southern Levant, whose communities then transmitted them north during the fourth millennium (Amzallag 2009, 2010). His reconstruction as it regards the technological development of furnaces has been heavily critiqued by a number of renowned archaeometallurgists (Thornton et al. 2010) and will thus not be engaged here. Of interest here is the potential connection between rebirth, serpents, the tree of life and smelting as a technology.

A connection between serpents, the sun, (s)melting and the circular depressions on these new ceremonial palettes is proposed to find support in the two references to the god *ẖꜥy-tꜣw*. From the Western Gable of Unas burial chamber, PT 238 §424c reads: "The Gold of Jubilation, The One that Appears in Flame–that is your bull, the esteemed one against whom this [=your attack] is done."[168] Similarly, on the eastern wall of the chamber PT 282 §423b-c: "O snake of this foreign land, (like) the mouth of a vulture against me, (you who are) subject to the Gold of Jubilation/ The One that Appears in Flame–that is your bull, the esteemed one against whom this [=your attack] is done."[169] The epithet "Gold of Jubilation" (*nbw ḥiknw*) is generally understood to be the sun god Re (Steiner 2011). The second epithet "the one who appears in the flame" (*ẖꜥy-tꜣw*)[170] is significant when we accept a cognitive association between crucible smelting and the sun. Indeed, the epithet was written by the scribes with the oven sign , emphasizing the cognitive connection between the deity and heat. Such a description of "the one who appears in the flame" recalls the possibility of the green color that appears in the fire when copper minerals were thrown in as part of ritual practice of prospecting efforts (Radivojevic and Rehren 2015). From another Pyramid Text, *ẖꜥy-tꜣw* is said to come from the land of *ngr* believed to be the region of Lebanon. While Byblos is known as the port connected with Egypt, it is also a major center of metalworking that may point to the early collaboration between communities around mining and copper production.

[168] Reading follows Steiner 2011:37-38.

[169] Reading follows Steiner 2011:37-38.

[170] Conversely, Schneider (2000) has proposed reading the epithet as Astarte given his reconstruction of Old Kingdom phonology.

Within the context of smelting and casting rituals tied to elite display and potentially rites of passage, while the crucible charge reflected the ability of the smith to capture a piece of the sun, the serpent mother goddess would have played a role in the rituals ensuring a successful "delivery" of the separation of the copper from its host rock. The retrieval of the prills would have required crushing the slags, giving birth to the metal. The image of *wꜣḏt* encircling *Rꜥ* in later iconographic depictions as well as the two uraei encircling the sun disc[171] is reminiscent of the serpent encircling the grinding circle on a palette. Such a proposal may thus visually tie together a complex fertility ritual surrounding the production of copper from the ore by adding a layer of nuance to certain aspects of early regeneration surrounding the king as chief ritualist.

The last point to discuss is the reference to *Rir-Rir* as the goddess of the Red Crowns, written in the plural. As discussed in Chapter 6, the looped copper pins appear along known trade routes connected with the trade in metals reaching form Iran to the Nile Valley and came to form the ceremonial symbol of the Red Crown. The significance of this tool was known to Beersheba communities who interacted with Nile Valley pastoralists, as the crown appears on a carved ivory at both Bir es-Safadi (Figure 24:1) as well as on the slightly later Naqada I sherd (Figure 24:2). A review of the Pyramid Texts connected to this pin—referred to variously as *ẖꜣbt/šbt/ḥmꜣṯṯ*—demonstrates its relationship to *wꜣḏt*, the serpent goddess and protector of the king. It was proposed that the pin was used as a tool to apply pigment to the body, perhaps as a tattooing needle or applicator, providing the context for the king as head ritualist—head snake charmer—referred to

[171] The earliest depictions of this motif are reported on the columns and architraves of Sahure's valley temple during Dynasty 5 (Shonkwiler 2014, 86).

as "foremost (*tpj*) of the *šbt*-wire of the Green/Fresh one" in PT 570 §1459a (Goebs 2008, 91, n.206). When we consider that Narmer is shown wearing the Red Crown on the side of the palette with the serpopards, we are provided with possible hints at his role as a shaman-smith type figure in Predynastic communities. During the Naqada III, these older symbols of legitimacy connected to mining and metallurgical production were thus drawn on at a time when the industry was expanding, and control needed to be asserted.

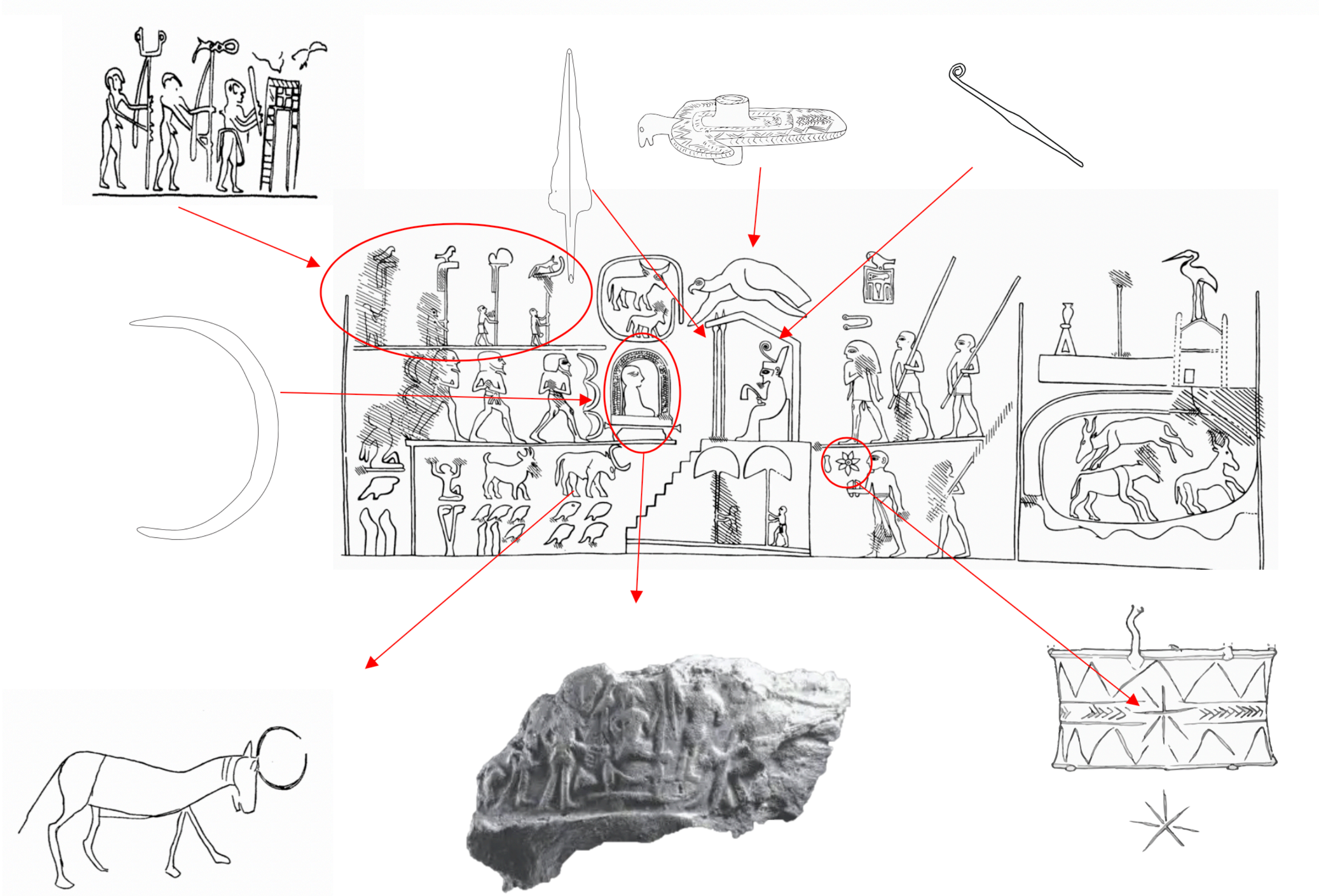
Reinterpreting the Narmer Macehead through a Millennium of Economic Cooperation

When we reexamine the Narmer macehead through the lens of a millennium of economic cooperation with communities in southwest Asia, the social relationships that contributed to the rise of the early state identity come into focus. During the Late Chalcolithic, the contexts in which extractive metallurgy were first learned by Nile Valley groups resulted in the adoption of the Red Crown as the headpiece worn by ritualists in the Beersheba settlements, where Nile Valley pastoralists may have been seasonally integrated. The importance of the southern Levant for maintaining overland networks with southeastern Anatolian communities resulted in the perception that the landscape was part of the early state, attested by the various lines of evidence that express the sharing of knowledge and practices between integrated communities by the EB IB. The shrine under which Narmer sits is held up by monumental, ceremonial-sized spearheads typologically similar to those from the Kfar Monash hoard (Hestrin and Tadmor 1963). Monumental spearheads are iconographically attested on the Hunter's Palette and appear to be typologically connected to Anatolia (Philip 1989). Indeed the depictions of the hunters on the Hunter's palette find parallel to the images drawn on the picture pavement at Megiddo (Sebbane

2003). Such a connection is reflected in the depiction of the bull on the Narmer macehead, which seems to be the developed version of the ritual drawings on the picture pavement (Figure 44, bottom left). Above Narmer, a vulture with outspread wings recalls one of the standards in the Nahal Mishmar hoard, which is discussed further in Chapter 8. Further connections between the southern Levant and Nile Valley elites are potentially attested by the large crescents employed as markers on the Narmer macehead; these potentially find parallel in the large, enigmatic copper crescent from the Kfar Monash hoard (Figure 44, left). The importance of the southern Levant to these early elite Egyptian communities may therefore be connected to its role in maintaining relationships with groups in the Uruk sphere of exchange.

Evidence that metal played a key role in connecting communities via this overland network is supported by spatial distribution of arsenic-nickel rich coppers from eastern Anatolia through the Jordan Valley and into the Delta, described by Hauptmann, Schmitt-Strecker, and Begemann (2011, 75) as distributed across the landscape "like pearls on a string." Such a distribution complements the distribution of textile tools such as the basalt spindle whorls (Savage 2011) and cortex tools and fan scrapers (Klimscha 2012, 195-196) from the Nile Valley to southeastern Anatolia, locating exchange within pastoral groups. Locally, mining communities in the Feinan attest to the cross-craft interaction between bead manufacture, textiles, and copper production. The overland route thus appears to express continuity dating back to the late fifth millennium, when the system of copper production intensified in the southern Levant. These groups were thus highly integrated into local communities, within which women from various communities may have been married into to foster kinship ties and secure safe passage.

Figure 44. Narmer macehead with symbols of economic cooperation with southern Levant and Uruk settlements highlighted (line drawing after Millet 1990, fig. 1). Right, clockwise: Cylinder seal impression from Abu Hatab (Beck 1989, fig. 4c); ceremonial spearhead, Kfar Monash hoard (Hestrin and Tadmor 1963, fig.10.3); Vulture standard, Nahal Mishmar hoard (Beck 1989, fig.8c); Copper pin, Naqada I; Copper "crown" with seven pointed star, Nahal Mishmar hoard; Cylinder seal impression with threshing sledge, Arsalantepe; Bull from Megiddo picture pavement (Loud 1948); Crescent from Kfar Monash hoard (Hestrin and Tadmor 1963, fig. 8.3).



It is here that we can begin to explain the various Mesopotamian styles and motifs on objects of display during the late Predynastic, including the Narmer macehead. Much of the Mesopotamian iconography incorporated into elite Egyptian display objects is now attested on cylinder seals as miniature motifs, however originally may have appeared on wall paintings or perishable items such as textiles. The contexts in which these motifs would have been seen implies intensive interaction in a community of practice centered on exchange. These motifs are thus reflective of the legitimate participation of Nile Valley groups in northern networks. As such, they were monumentalized in the Nile Valley to broadcast maintenance of ties with the outside world. On the Narmer macehead, these motifs include the standard bearers, which are stylistically similar to those from a cylinder seal at Abu Hatab in modern-day Iraq (Figure 44, top left; Beck 1989, fig. 4c) as well as the structure under which the female sites (Figure 44, bottom center), which is almost identical to cylinder seal from Arslantepe depicting a ceremonial threshing sledge (Littauer, Crouwel, and Steinkeller 1990). This motif not only reflects the importance of ceremonial threshing, but also a knowledge of the technology that may have been transferred as part of bread and beer production with bevel-rim bowls and beer brewing technology reflecting the importance of this industry to ritual praxis. The seven-pointed star can also be traced to the Nahal Mishmar hoard, where it appears on crown no. 9, which depicts the face of a grain stalk on the exterior (Bar-Adon 1980, 30-31, no. 9). In Egypt the seven-pointed rosette is the sign associated with Seshat, goddess of writing and wisdom (Magdolen 2005, 48). It is thus noteworthy that the first writing appears during the Naqada III. When we consider interpretations that the Narmer macehead may depict an early ceremony related to kingship (Millet 1990), the incorporation of these symbols reflects the construction of a unique identity and political ideology of legitimation borne out of a millennium of economic cooperation with metalworking communities in southeastern Anatolia and the southern Levant.

New Proposal for *nsw.t bjtj* 𓇓𓏏𓆤𓏏—From Ghassulian Copper to Urukian Exchange

The importance of economic participation in both the southern Levant and Uruk sphere of exchange for the construct of a political Egyptian identity is strengthened when we examine scholarly debate about the kingly titulary *nsw.t bjtj* 𓇓𓏏𓆤𓏏.[172] Traditionally, the title has been interpreted as King of Upper and Lower Egypt, with the *swt* plant representing the heraldic plant of Upper Egypt and the bee as symbolic of Lower Egypt (Leprohon 2013, 17). While this view is still widely circulated in the scholarly literature, an important and ongoing discussion in certain Egyptological circles maintains that there is *no* evidence to support that the title has anything to do with directionality or the myth of the two lands (Peust 2007, 60). Rather, the widely-circulated interpretation of *nsw.t bjtj* as connected with Upper and Lower Egypt can trace its lineage back to Sethe's (1911) original interpretation.[173] Peust (2007, 60) has thus provocatively proposed that *nsw* derived from the Sumerian title ensí, which roughly translates to "priest-king." As such, he

[172] Logographically, the *swt* plant appears as early as the reign of Djet on an ivory tag (Petrie 1900, pl. XIII: 3A) and the earliest occurrences of the sign as part of the *nswt bìtj* title is attested at Abydos in the royal tombs on various ivory tags and stone vessels during the reign of Den (ca. 2945-2904 BCE) (Petrie 1900, pl. XIV: 12, XV: 15, 16, 18). However, it should be noted that the bee also appears on a crystal vase from the Tomb of Merneith, Den's mother, where it is shown with the *nswt bìtì* title (Petrie 1900, pl. IV:7). It is thus unclear if this dates to the time of Djet or Den, given that Merneith served as a co-regent for Den.

[173] For an overview of this historiography of both the assumption and scholarly discussion, see Kahl (2008).

concluded Egyptian state formation was influenced by Mesopotamian models (Peust 2007). In his study of linguistic transfer Schneider (2020) has entertained this proposal given the evidence for language exchange during this period. When set against the backdrop of the evidence presented in this study, such a proposal gains credence given the various technologies and knowledge shared between communities in each region. We should also consider that the power of the ensí tends to be connected to ritual. The connection between an ensi2 as a model for local political identity is further punctuated by a cylinder seal from Level V at Uruk, which depicts a robed man with a cap in front of temple façade holding a crescent axe (Figure 40:4). Such a depiction fits the Mesopotamian canon of depicting the ensí type figures, as reflected on the well-known Uruk vase. The connection between the ensí as an important model for Egyptian kingly identity becomes strengthened as the crescent axe appears on a late Predynastic vase held by a Nile Valley warrior with a dagger in his belt, emphasizing the importance of the northern-style weapons for Nile Valley elites (Figure 40:2). Moreover, a crescent axe is also potentially connected with the Kfar Monash hoard (Figure 40:3), which is dated here to the EB IB and associated with the Nile Valley presence in the region of Megiddo. It is therefore very possible that models of political rule played a critical role in the shaping of kingship in the Nile Valley. The appearance of Mesopotamian-style motifs should therefore *not* to be interpreted as emulation, but rather understood as reflective of the practices in which these groups participated.

Within the context of legitimizing rule over the funerary economy, we must turn to the second title: *bjtj*, “of the bee.” Rejecting the bee as a symbolic association with Lower Egypt, Schneider (1993) employed phonological reconstruction to propose the title *bjtj* derived from the

Semitic *rb*, meaning strong man. However, Kahl (2008, 342-343) has questioned the phonetic problems inherent in Schneider's reconstruction and interpreted *bjtj* as "bee" or "bee-like," related to collecting activities of the bee and the administration. Through a survey of the texts from the Early Dynastic through Ptolemaic period, Kahl (2008) demonstrated that such attestations of the title tend to be confined to activities wherein the king and his entourage/administration collected wealth and goods, providing a parallel to the ways in which bees collect honey. While such a metaphor is apt given the importance of burgeoning bureaucracy, it still does not explain why the bee was so significant to the identity of early Egyptian elites.

I propose, instead, that the bee logogram should be connected to the king as chief ritualist and thus master metalsmith—connected with beeswax for lost-wax casting. It has been argued in this study that the Nile Valley communities learned how to smelt metal from stone via economic cooperation with southern Levantine communities during the late fifth and early fourth millennium. This period was a time in which lost-wax casting played a critical role in manufacturing objects of display that would have reified and legitimized the chief ritualist to the community, who sanctioned certain individuals to assume such a position. Given the role of the primary pastoral economy, mobility and display played a key role in the construct of power for these early groups in the Nile Valley. This exchange manifested in the rise of greenstone as a central component of a new belief system. I argued that the antimicrobial properties of malachite and chrysocolla allowed for the easy conflation of healing, regeneration, and transformation. These associations were connected with copper production given materiality of the production process, where sexual union, parturition, and death (recycling) were argued to render copper as a life cycle metaphor and thus economic foundation of these new belief systems and power structures surrounding them. Within the Chalcolithic system, I demonstrated that various lines of evidence suggest the chief ritualist performed as a bird of prey—connected with the rise of secondary burial rites as a means of fostering community cohesion. It was also argued that such an ideology may have been connected with the reincarnation of the individual into this life with certain zoomorphic features. This specific aspect of the technological system is proposed to have therefore provided the economic foundation on which we see the king as Horus in later mythology—he is thus connected originally with the Late Chalcolithic system of metallurgical production.

After the reorganization of the Chalcolithic system, I demonstrated that many of these practices were carried on in the Nile Valley. These practices include the rise of mortuary central places as organizing economic units, the importance of greenstone, the role of the red crown—connected originally to ritualists in the southern Levant—as well as the interchangeability of man and bird, reflected in certain burial assemblages and the importance of zoomorphic palettes as the means by which greenstone was ground for regeneration. While this system intensified in the Nile Valley, the southern Levant was organized more along kinship lines with a lack of material marker for social differentiation reflecting a different system of social organization.

In Egypt, evidence to support the economic and ideological importance of the bee *for its wax* is supported by various lines of evidence. The title *bỉtj* "he who belongs to the bee" was first suggested by Petrie (1900, 34) to have translated to "beekeeper." This title appears to have been interpreted by Newberry (1908, 30-31) as "Sealer of the Honey Jars," leading Kritsky (2015, 7) to assert that the importance of the bee in ancient Egypt was for its honey. He cited Salt 825 Papyrus–the Tears of Re–dated to the Ptolemaic period, the scribe describes how Re, the Sun god, wept and from his eyes fell honey bees.[174] However, this claim has rightfully been criticized by Niv Allon (2019, 776), who called attention to relying on a claim derived from the Ptolemaic period. Nevertheless, the importance of the bee for the ritual economy in Egypt is well known.

While wax was used for functional purposes like waterproofing boats (Lucas and Harris (1964, 336), it also possessed a steeped symbolic value as an ideologically charged substance tied to magical performance (Kritsky 2015, 106, 108-109). This was demonstrated in a study by Raven (1983, 32), who revealed beeswax was used for destructive, productive, and magic spells, signifying the ritual uses of the substance. During the Old Kingdom, wax figures were sculpted and then melted down and/or burned as part of ritual, placing them within the shabti- and execration-figure genre. Wax scarabs also appear linked to rebirth, as one was found with a priest from Deir el-Bahari while another was coated with resin and inscribed with a spell from the Book of the Dead (Kristsky 2015, 112-113), emphasizing the role of wax in ritual connected with mortality. Kritsky (2015, 98-99) even reports the association of the bee with Min as a male god of fertility, claiming priests who were beekeepers who poured honey on the statue of Min at Edfu and Dendera accompanied by sexual incantations. While late in the Ptolemaic period, such acts recall the ram with cornets on its back and connection with procreation. In terms of ideology, the bee as the progenitor of life fits within the larger narrative for the Chalcolithic, which has relevance for the potential ideology centered around life springing from the abdomen (Kritsky 2015, 104). Raven (1983, 7) has claimed: “Because of its peculiar origin and physical characteristics it was considered to be a primaeval substance of great power, most useful for both ‘black’ and ‘white’ magic.” In

[174] Note that the text describes the bees making wax *first* and then honey.

their discussion on the Chalcolithic cornets, Namdar et al. (2009, 635) indicated that if they *were* used in lost-wax casting, the potential importance of apiculture to local economies would have been significant. However, Kritsky (2015, 104-105) has drawn attention to the fact that we never *see* beeswax harvested in Egypt. Indeed, the first depiction of beekeeping does not date until Dynasty 5 in the Sun temple of Niyserre. Such an observation supports the restricted knowledge surrounding primary production—we must acknowledge that what is shown and what is hidden form part of fluctuating power strategies. We can thus attribute the hidden aspect of the craft to the sacred importance of the wax itself—decorum dictated it should not be shown. Similarly, we never see the mining of metal depicted.

That the bee—along with the Red Crown—became associated with the institution of kingship is therefore argued to be reflective of the broader cultic landscape that connected the Nile Valley, Delta, and southern Levant during the fourth millennium. These claims are supported when we look to the Nahal Mishmar hoard, which is argued in the next chapter to be the product of joint mining expedition and economic cooperation with metalworking communities. When we recontextualize *nsw.t bjtj* with its economic and social context, the importance of the Uruk sphere of exchange and the chief ritualist and master metalsmith allows for a more nuanced understanding of the social processes by which the state not only presented itself in the body of the king, but legitimized its place as the organizing unit of an economy centered on rebirth, regeneration, and transformation.

Chapter 8. Constructing Religious Landscapes: Recasting the Nature of the Nahal Mishmar Hoard through a Millennium of Economic Cooperation

"…it is through ritual that religion 'strengthens the bonds uniting members of a single local group" (Beck 1989, 40, quoting Drennen 1976)

In order to support the proposal that the king performed as chief ritualist and master metalsmith, we must once again look to the southern Levant to demonstrate the importance of lost-wax casting as an economic and ideological source of political power for the early Egyptian kings. We should recall M. Sebbane's (2017) proposal that the Nahal Mishmar formed a cache that had accumulated over the course of a number of years. His rationale was based on the caching of maceheads, which is a practice known from temples dated to fourth and third millennium in southwest Asia. Evidence to support that these objects were in wide circulation include the repair of some objects with lead (Bar And 1980). Many scholars accept a late fifth millennium deposition of the hoard given latest radiocarbon date of the reed mat that was found covered the material (Aardsma 2001). With regard to the community identity who deposited the hoard, the acceptance of a Late Chalcolithic date has rendered a range of proposals (Chapter 4), none of which are accepted here.

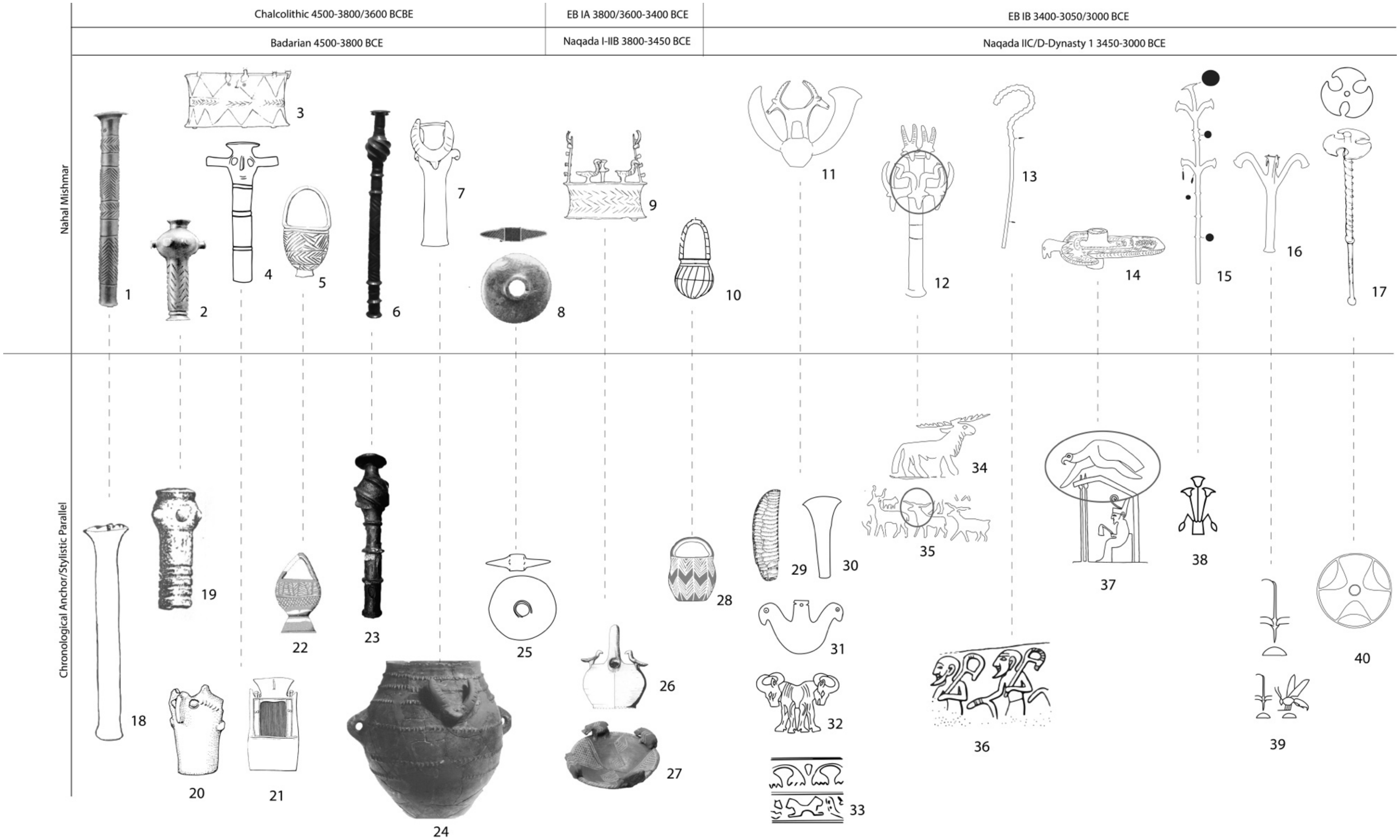
In this chapter, I propose the Nahal Mishmar hoard reflects the physical manifestation of a unique communal identity tied to copper production that evolved over the course of the fifth to late fourth millennium. In its final phase of deposition, I argue that key objects in the hoard can be tied to the formation of an elite Egyptian state identity and I date the final deposition of the hoard to the EB IB/Naqada IIIB/C. To make this argument, I use certain pieces in the hoard as chronological anchors and analyze how they reflect a shared identity tied to certain social practices in the southern Levant and Nile Valley and Delta. It is proposed that the hoard is the physical manifestation of the shared repertoire of symbols (and no doubt knowledge) borne out of continuous cooperation mediated by ritualized behaviors surrounding the production of greenstone and copper. Drawing on previous research, I then situate the hoard within the Judean Desert as a Chalcolithic funerary necropolis and explore the role of the region as a landscape of social significance for early Egyptian elites. The implications of re-dating and re-contextualizing the community to which the hoard belonged are explored against previous arguments about the rise of a kingly identity. Such a proposal nuance previous proposals that the southern Levant appears to have been viewed as part of the Egyptian state during the EB IB (e.g., Andelković 2012). The argument put forth here claims that such a view of the landscape was the product of over a millennium of cooperation between communities, sustained through the ritualized behavior surrounding the production, distribution, and consumption of copper.

Stage 1: Chalcolithic and Badarian (4500-3800/3600 BCE)

The first phase of the Nahal Mishmar hoard can be dated to the Late Chalcolithic and reflects connections with the metalworking communities in the Beersheba settlements. Several scepters from the hoard have excavated parallels in the Beersheba Valley, providing a chronological anchor for these pieces in the late fifth to early fourth millennium. Among others, these include: a standard in the shape of an undecorated tube (Figure 45:1) with parallel at Shiqmim (Figure 45:17; Levy and Alon 1985, fig. 4.6); a decorated scepter (Figure 45:6) with a parallel at Bir es-Safadi (Figure 45:23) and a scepter with protruding knobs from Abu Matar (Figure 45:2, 19; Perrot 1955c, fig.20:24). The excavated parallels for these scepters therefore establish a connection with the Beersheba community during the Late Chalcolithic.

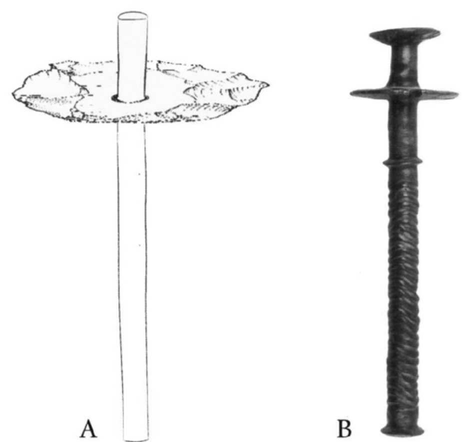
In addition to participation in the Beersheba network, other scepters express elements from the shared repertoire of symbols that accompany a shift in beliefs connected to new, secondary burial rites. A scepter from the hoard is therefore decorated with the same style of horns (Figure

Figure 45. Proposed reconstruction of the Nahal Mishmar hoard. See Table 13 for references. Images adapted by author.



45:7) that appear on a large pithos from Rasm Harbush in the Golan (Figure 45:24). The hoard also reflects many skeuomorphs, which is indicative of the ritualization required for introducing a new technology on a widescale in Late Chalcolithic society (Gošić 2015). We therefore find basket handled vessels on a pedestaled base (Figure 45: 5, 10) with parallels in ceramic at Kissufim Road (Figure 45:22) as well as in the Nile Valley during the Naqada I at Abadiya (Figure 45:28). Within the context of skeuomorphs, disc-shaped maceheads in the Nahal Mishmar hoard provide another chronological anchor in the Late Chalcolithic (Figure 45:8). Conical stone maceheads made from Nile Valley stones are attested in late fifth and early fourth millennium contexts at several sites in the Nile Valley and Sudan, as well as in the southern Levant (Czarnowicz 2014a). In her analysis of many of the motifs in the Nahal Mishmar hoard, Shalem (2015, 224, fig. 4A-B) pointed out that disc-shaped maceheads find their closest parallels to Chalcolithic spindle whorls but argued that it "seems implausible" that such a tool would become a cultic motif. A connection between metal production and textile manufacture was recently proposed by Dafna Langgut and colleagues, who interpret the lead macehead found in the Ashalim Cave as a spindle whorl and proposed five wooden sticks from Qina Cave be identified as spindles, attesting to the importance of the textile industry during the Late Chalcolithic (Langgut et al. 2016, Langgut et al. 2017). This claim was refuted by Ben-Yosef, Shamir, and Levy (2017), who argued that there is no evidence for metal in textile manufacture and that the supposed spindles are macehead hands that may have been robbed. We may nuance this debate by considering the skeuomorphism so reflective of the Nahal Mishmar hoard, wherein the casting of nonmetal forms into metal was a form of sympathetic magic to assert dominance over other industries and perhaps producers (Gošić 2015). During the Late Chalcolithic, it is believed the textile economy was based on linen spun using the drop-spinning technique (Levy and Gilead 2012). The whorl so high up on the spindle is reflective of this technique and as such supports the identification of disc-shaped maceheads as actual skeuomorphs of drop spindles—attached to the textile economy.

Figure 46. Skeuomorphs of whorls and spindles used in drop spinning (Shalem 2015, fig.4A and B).



One of more indicative designs revealing that certain pieces were cast during the Late Chalcolithic is the human-bird/prominent-nose motif. This motif appears on a scepter (Figure 45:4) as well as a copper “crown” (Figure 45:3) from the hoard, providing a chronological anchor between 4500-3800/3600 BCE for the production of these two objects. This motif comprises of two eyes and a prominent nose described as depicting a raptor’s beak (Perrot 1961, 32, Beck 1989, 45). Within the broader southern Levant, the motif is popular on ossuaries from Peqi`in to Azor (Figure 45:21), as well as on items of domestic cult such as the basalt pillar figurines in the Golan (Figure 45:20) and ivory figurines in the Beersheba region, including the figurine at Abu Matar who was argued to wear a predecessor of the Red Crown (Figure 32). A correlation exists between the appearance of this motif and the emergence of secondary ossuary burials, providing an explanation for its significance given that birds of prey are important for the excarnation of the individual in preparation for secondary interment of the body.

The practice of secondary burial during the Late Chalcolithic correlates with the sudden widescale adoption of a shared system of belief that was argued to be correlated with an increased scale in copper production (Chapter 4). Drawing on several lines of convincing evidence, Ilan and Rowan (2019) proposed this new belief system centered on the reincarnation of the individual, who could be reborn into this life with varying degrees of zoomorphic features. The inclusion of the prominent-nose/human-bird motif as well as potential horns protruding from the face on the copper crown (Figure 45:3) establish a connection between the community who cast certain pieces in the Nahal Mishmar hoard and this new belief system.

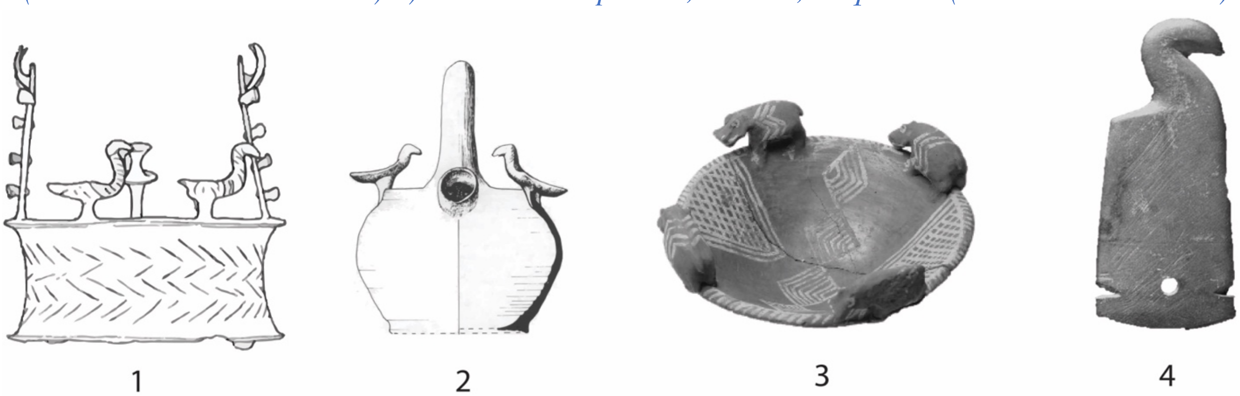
Support for the interplay between human and animal is also attested in depictions of horned human heads attested on the Golan basalt pillar stands (Figure 45:20) and in the frescoes at Teleilat Ghassul, where ritual specialists in charge of mortuary rites of passage wore vulture masks and horns/vulture features (Figure 15; Drabsch and Bourke 2014). This connection between ritualists and birds is connected to their importance in facilitating the process of reincarnation (Fox 1995). Because changes in ideology must be rooted in the functional, I argued that this new system of belief was the ideological justification for the intensification of copper production—the tool used by managerial leaders to coordinate the necessary labor to integrate the southern Levant into wider exchange networks with southeastern Anatolia (Chapter 4). When paired with the magic of smelting, the materiality of copper production was argued to provide a life-cycle metaphor, resulting in the ritualization of practices and the development of economies of scale to accommodate intensified procurement and production strategies. We can therefore establish a connection between mortuary ritualists, metal production, and the prominent-nose/human-bird motif as the facilitator of reincarnation/regeneration.

As part of this process, it was also argued that the participation of Nile Valley communities in this economic system led to fundamental transformations in ideology and economic practices. Participation in the southern Levantine communities was argued to be supported by the sudden rise of greenstone in Badarian burials and the appearance of the bord motif as a central cultic motif, which may have formed the foundation of later Egyptian beliefs about the afterlife (Chapter 5). Indeed, similar horned individuals are on a vase from Tomb U-239 at Abydos during the Naqada I that appear connected with the ritual practitioners at Teleilat Ghassul (Figure 33). Moreover, the similarities in the style of the Nahal Mishmar birds depicted on the copper crown (Figure 23) and those on Badarian/Naqada I ivory spoons and combs (Figure21) speak to a shared iconographic vocabulary rooted in the Late Chalcolithic. We can therefore conclude that the earliest stage in the hoard reflects core symbols that are tied to shared practices and beliefs between corporate groups in the Nile Valley and southern Levant during the late fifth and early fourth millennium.

Stage 2: Early Bronze IA and Naqada I-IIB (3800/3600-3450 BCE)

The next phase in the hoard reflects an EB IA/Naqada I-IIB range. Traditionally, the beginning of the Early Bronze I was understood as a period in which the Chalcolithic mode of production ceased. However, over the years several scholars have acknowledged that the Chalcolithic mode of production continued and the contexts in which lost-wax castings were deposited thus shifted after the abandonment of the Chalcolithic sites (Chapter 6). Indeed, the Chalcolithic did not cease until at least 3600 BCE at Shiqmim (Burton and Levy 2011), which was chronologically contemporary with the Naqada I (Dee et al. 2013). As such, the Late Chalcolithic mode of production appears to continue during the EB IA/Naqada I at Tall Hujayrat al-Ghuzlan and Tall Magass, whose communities mined the Wadi Amram and Timna and exported copper and potentially greenstone to Maadi (Klimscha 2013b). Increased production led to the development of increasing decentralization, wherein sites closer to the coast appear to have specialized in the smelting or refining of copper for export (Golani 2014). The reorganization of this system resulted in the movement of individuals between regions: from the southern Levant to the Nile Valley and vice versa (Chapter 6).

Figure 47. Shared bird motif and practice of figural decoration on perimeter of cult vessel/object in southern Levant and Nile Valley early fourth millennium: 1) Copper crown, EB IA Nahal Mishmar (Bar-Adon 1980, n.9); 2) Cultic vessel with bird models, from southern Levant, EB IA (Amiran 1986); 3) C-ware decorated bowl with hippo models, el-Mahasna Tomb H29, Naqada I (Manchester Museum 5069) 4) Sinuous bird palette, Mesaid, Naqada II (MFA Boston 11.225).



Within the hoard, two pieces indicate potential casting during the EB IA. The first is the crown with a sinuous bird on the perimeter flanked by horned doorways (Figure 47: 1). While the crown was argued earlier to be symbolic of a furnace collar (Chapter 4), the use of these types of furnaces appear to continue in a modified version at Ashkelon-Afridar throughout the EB I (Golani

2014, 124).[175] The technique of applying modeled zoomorphic figures to the perimeter of an cultic object is first attested during the EB IA in both the southern Levant and Nile Valley. In the southern Levant, Amiran (1986) discussed a spouted, basket-handled ceramic vessel similar with bird applique around the perimeter (Figure 47:2).[176] The inclusion of a sieve on this globular vessel may point to its connection with beer production (Amiran 1986, 86). They also appear to be cultic in nature and are similar in style to those excavated from the *eneolithique* cemetery at Byblos, as well as the vessel later depicted on the Narmer palette (Amiran 1986, 85). The sinuous shapes in which the birds were molded on the crown from Nahal Mishmar are almost identical to those on this cultic (beer?) vessel and are also reminiscent of Naqada I-II palettes (Figure 47:4). If these vessels were indeed used for beer production, they would provide a contemporary connection between the Levant and the introduction beer at Hierakonpolis (Chapter 6).

Indeed, it is during the EB IA/Naqada I-IIB that a similar ceramic tradition of applying modeled zoomorphic forms to the perimeter of a cultic vessel is attested at el-Mahasna, wherein hippos are attested along the perimeter (Figure 47:3). While it is possible that the crown with birds was cast during the Late Chalcolithic—and thus the cultic ceramic vessel does not provide a chronological anchor—the similarities in ceramic forms between the Nile Valley and southern Levant attest to shared cultic practices. Similarities in metal and ceramic are also attested by the presence of a basket handled vessel in the Nahal Mishmar hoard (Figure 45:10; Bar-Adon 1980,

[175] Pit furnaces with ceramic collars may also have continued at Elephantine (Pfeiffer 2009, 323-325, n.128), although more analysis is needed.

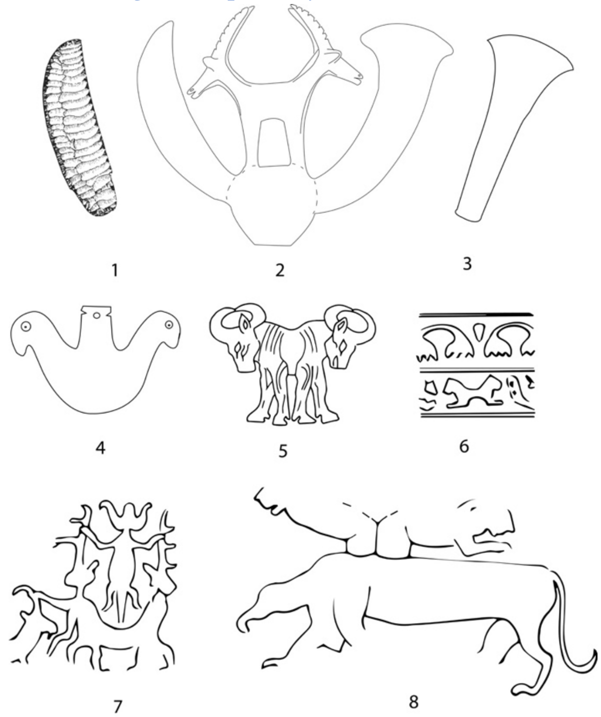
[176] Clay bird models are known to have been applied to an ossuary from Cave 4 at Horvat Qarqar South (Fabian, Scheftelowitz, and Gilead 2015, 12) however the form is more similar to the EB I vessel.

108, nos.159-161) that finds parallel in ceramic vessels in the Nile Valley from Abadiya dated to the Naqada I/EB IA (Figure 35:28). Together, these parallels point to the possibility that certain objects in the hoard were produced during the EB IA by a community who was in economic cooperation with groups in the Levant and Nile Valley, forming an ephemeral middle stage in the hoard's composition.

Stage 3: Egypto-Levantine Identity Display (3450/3300-3100 BCE)

The last phase of the hoard's composition is argued to date to the EB IB/Naqada IIC/D-IIIB/C. Several key pieces are argued to date to the late fourth millennium and to reflect an Egyptian identity. The first is the twin-ibex standard (Figure 48:2; Bar-Adon 1980, no. 153). The twin-ibex standard is comprised of a piriform macehead topped by two ibexes conjoined at the body and flanked on each side by two objects typically identified as tools. The most iconic aspect of the standard is the double ibex in the center of the macehead. Within Egypt, the double animal motif dates back to the Naqada I with the bird motif on palettes (Figure 48: 4). Beck (1989, 42-43) also discussed several parallels for this motif in the mid-to-late fourth millennium, contemporary with the Late Uruk and Naqada II-III. Such parallels include depictions of conjoined animals and beasts on cylinder seals from the Mesopotamian world at Uruk and Susa (Figure 48:7-8; Beck 1989, 43, figs. 8a&b). Interestingly the master-of-animals motif on the Uruk cylinder seal is similar to the double bird motif in the Nile Valley (Figure 48:4 vs. 7), seemingly reflecting the curation of a shared ritual iconography in local contexts. In the Nile Valley, Beck (1989, fig. 7e) also called attention to the double-bull motif on the Naqada IIIA/EB IB Hunter's palette, believed to originate from Abydos (Figure 48:5). Such a motif finds its parallel in the double lion motif on a cylinder seal dating from Saqqara dated to Dynasty 1 (Figure 48:6; Beck 1989, fig. 7.f).[177]

Figure 48. Double ibex standard and parallels: 1) ripple-flaked knife (Hikade 2003); 2) twin-ibex standard (Bar-Adon 1980, no. 127); 3) flanged axe from Kfar Monash (Hestrin and Tadmor 1963); 4) double bird slate palette, Naqada II; 5) double-bull motif on the Hunter's palette (Beck 1989, fig. 7e); 6) cylinder seal from Saqqara, Dynasty 1 (Beck 1989, fig, 7f); 7) Uruk (Beck 1989, fig. 8a); Susa (Beck 1989, fig. 8a). Images adapted by author.



While the double animal motif appears to originate in the early to mid-fourth millennium, a chronological anchor for this scepter is provided by the left tool flanking the ibex (Figure 48:1 vs. 2, left). I propose that this form should be viewed as a skeuomorph of a ripple-flaked knife

[177] Beck's (1989, 42) citation of the double lion mace that appears held by deities on cylinder seals from Mesopotamia dates to the early second millennium and thus should be discarded as a possible parallel, however it attests to the longevity of this symbol in certain elite circles.

(Figure 48:1). Such knives were produced in the Nile Valley during the Naqada IID/IIIA (Midant-Reynes 1987) and are believed to have been the product of a single group who were also responsible for producing the so-called fishtail knives during the Badarian to the Naqada II (Hikade 2003, 148-149). Ripple-flaked knives—like their fishtail knife predecessors—were exchanged by elites to foster relations and mark in-group identity and have been found predominantly in Nile Valley tombs. In the southern Levant, one such knife was found in Tomb 1 at Azor suggesting Egyptian contact (Ben Tor 1975, 24, fig. 13:15, pl.21:4). If the proposal that the tool to the left of the double ibex depicts a ripple-flaked knife is accepted, this would provide a chronological anchor to at least the early EB IB for the hoard as the form would need to exist first prior to its metal skeuomorph.

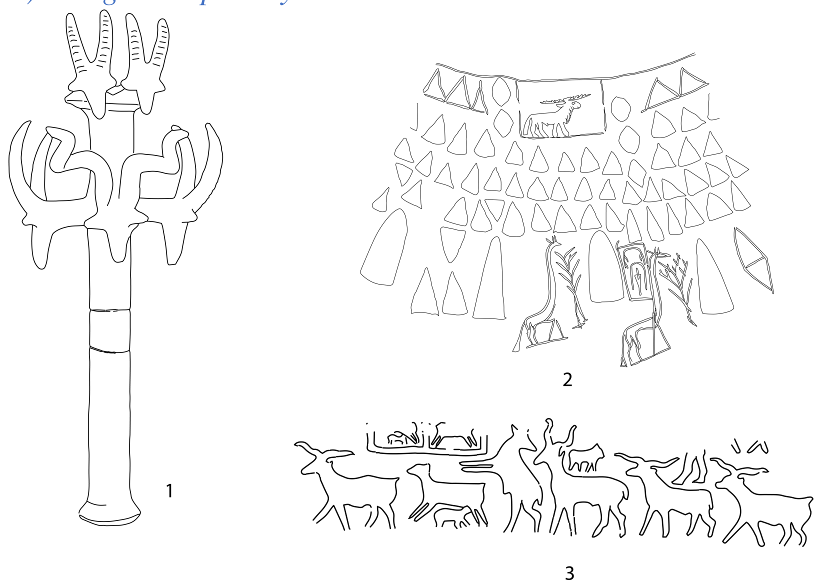
Moreover, typological parallels for the axe are also found in EB IB assemblages. The axe contains a highly flanged cutting edge, which is not attested on axes of the Chalcolithic. Rather, such flanged axes are attested in EB I contexts such as Yiftafel, Beth Shean (Miron 1992, nos.34-36) and in the Kfar Monash hoard (Figure 48:3; Hestrin and Tadmor 1963, 267, fig. 2:3-6).[178] When we consider that the ripple-flaked knife does not appear prior to the Naqada IIC/D, it creates a chronological anchor for this piece in the EB IB. Such a date is further supported by the flanged axe and the double ibex parallel and the creation itself fits more with Nile Valley artistic traditions.

The second piece from the Nahal Mishmar hoard argued to date to the EB IB is the ram and ibex standard (Figure 49:1). The motif of the horizontal-horned ram can be identified as the one of two types of screw-horned sheep that became connected with the wool industry during the

[178] For an EB IB dating of the Kfar Monash hoard, see Chapter 7.

Late Uruk period and is of a different breed than the ram figurine at Gilat. Vila and Helmer (2014) connect the screw-horned sheep to the expansion of a specialized wool industry during the late fourth millennium. The horizontal-horned ram is known to have been utilized alongside coil-horned sheep in Mesopotamia, as depicted alongside one another on a cylinder seal from Uruk (Vila and Helmer 2014, 32, fig. 2.15). Within the context of specialized pastoralism, we know that communities in the eastern Delta and the southern Levant were integrated into the Uruk sphere of exchange in the north via overland networks during the EB IB/Naqada II-III. Evidence in support of this reconstruction the appearance of fan scrapers and cortex tools at Habuba Kabira and Tall Hujayrat al-Ghuzlan (Klimscha 2012, 195-196) as well as the spatial distribution of specialized basalt spindle whorls connecting the region of Maadi through the Jordan Valley and up into the Antioch Plain (Savage 2011). This route is the same one that arsenic-nickel artifacts are found along, establishing the overland metals trade from southeatern Anatolia to northeast Africa (Hauptmann, Schmitt-Strecker, and Begemann 2011, 75). Such a distribution of both metal and textile tools in connection with the spread of new technologies supports the argument that pastoralists appear to have played a prominent role in effecting social change (e.g., Anfinset 2010). The implication is that pastoral groups connected with the textile industry were also connected with the metals trade—a pattern dating back to the sixth millennium, if not prior (Chapter 4). It is during this time that the screw-horned ram is first attested in Egypt on a ceramic pot stand from Abydos dated to the Naqada IIIB (Figure 49:2; Wodzińska 2010b, 113-114). This form is almost identical to depictions of the screw-horned ram from a cylinder seal at Habuba Kabira in use during the Uruk period (Figure 49:3). It is thus significant that this type of ram comes to be depicted by the Egyptians as the god Khnum, whose name is claimed to be of Semitic origin by von Pilgrim (2013). The appearance of the screw-horned ram on the Nahal Mishmar standard thus provides a possible date in the EB IB, connected with the expansion of the textile industry connecting the Delta to Syro-Anatolia through the southern Levant. The appearance of this ram on the Nahal Mishmar scepter therefore supports a possible revised dating to the EB I/Naqada IIC-D/III.

Figure 49. Depictions of the screw-horned ram during the late fourth millennium. 1) Nahal Mishmar hoard (after Beck 1989, fig. 5b), 2) Naqada IIIB pot stand with spiral-horn ram motif (Wodzińska 2010b, 113-114); C) Cylinder seal impression from Habuba Kabira, Uruk (after Vila and Helmer 2014). Images adapted by author.

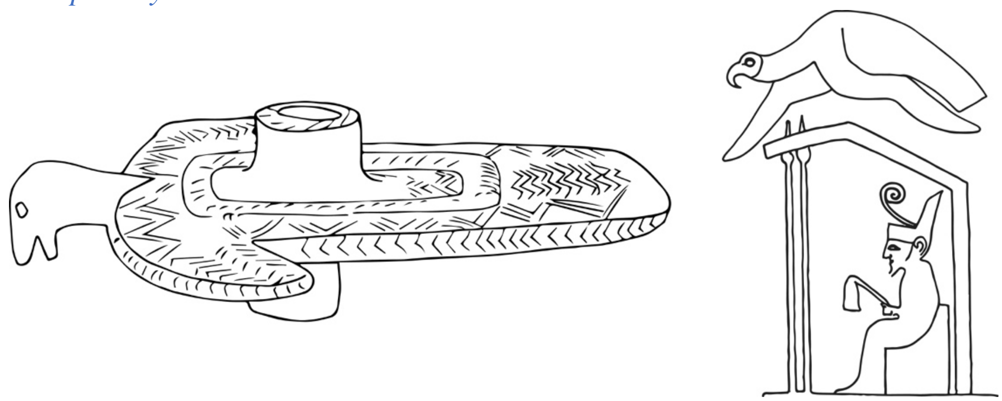


Another motif that appears to reflect an EB I socioeconomic context is the vulture standard with out-spread wings (Figure 50:1, Bar-Adon 1980, no. 154). The importance of the bird appears to extend back to the Chalcolithic period in the southern Levant with the introduction of the beak-like nose on basalt pillars, ceramic ossuaries, ivory figurines, and even on a standard in the Nahal Mishmar hoard (Figure 23). It was discussed previously in this study that this interplay between man and bird may have formed piece of a larger belief system wherein individuals could be reincarnated as zoomorphic beings or features, which appears unique to the southern Levant and disappears with the transition to the EB I (Ilan and Rowan 2019). Outside of the human-bird/prominent-nose motif, depictions of birds are rare within the Chalcolithic iconographic repertoire, rendering the vulture standard as somewhat of an outlier if we view the Nahal Mishmar hoard as the homogenous product of Chalcolithic communities (Shalem 2015, 232).[179] Gates (1992, 136) proposed that this bird fell within the Egyptian idiom but did not expand on how nor its significance. In an attempt to interpret the vulture standard through a Chalcolithic lens, Goren (2008, 393) proposed casting was performed in the Wadi Arabah and central Israel, between the Shephelah and the Judean Desert. He advocated that the ibex[180] and the vulture—two animals native to the Judean Desert—may have been viewed as "the protectors of this highly skilled metallurgy, and their representation on the objects was probably related to the rituals that accompanied this secret activity" (Goren 2008, 393). Within this context, the standard of the vulture needs to be examined more thoroughly.

[179] From Mesillat-Tsiyon a fully developed bird-like image is attested on a ceramic ossuary (Beck 1989, n. 36 with references). Likewise, avian-like wing or beak extends from the top of a ceramic ossuary recently excavated from Cave 8 at Horvat Qarqar South, radiocarbon dated to the Late Chalcolithic ca. 4250-3900 BCE (Fabian, Scheftelowitz, and Gilead 2015, 9, fig. 9b).

[180] Note that Gates (1992, 136) identified the ibex with Egypt's pushmipulyu oryx nome, located in Middle Egypt and attested textually by the time of Djoser during Dynasty 4.

Figure 50. Vulture standard (Beck 1989, fig.8c) and Narmer macehead (Millet 1990, fig. 1). Images adapted by author.



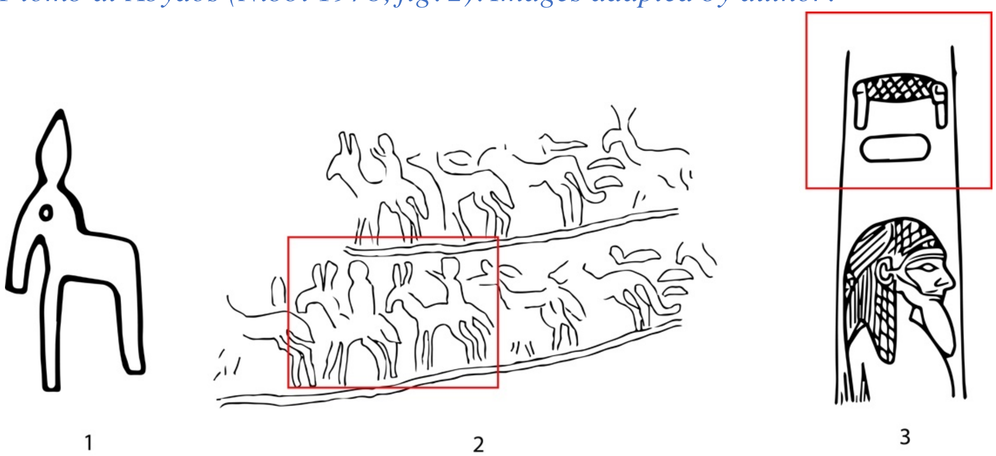
When we take Goren's statement into consideration—specifically, that these zoomorphic figures may have served as protectors of the metalsmiths who produced the hoard—the spreading out of the wings is argued to be significant. When mounted, this means that the standard bearer would have walked directly under an effigy of a vulture whose out-spread wings formed the physical manifestation of protection (Figure 50, left). The first image of a bird of prey in such a position is attested on the Narmer macehead dated to Dynasty 0 (Figure 50, right). Here, the bird spreads its wings over Narmer as he wears the *Red Crown* during a ceremonial procession (Millet 1990). It should be recalled that the Red Crown is argued to have been important paraphernalia worn by ritualists during the Chalcolithic in the southern Levant, attested by an ivory figurine at Bir es-Safadi and few centuries later in the Nile Valley at Naqada (Chapter 4-6). In later elite Egyptian cosmology, Nekhbet is the protector of the divine king who himself is a manifestation of Horus, the falcon. Rather than using this piece as a chronological anchor, it seemingly establishes a performative connection to the king as master smelter and chief ritualist.

Of relevance to the vulture standard is Ann Macy Roth's study on the Old Kingdom organization of the phyle system, which provides an interesting lens through which we can examine the intersection of cooperation, cultic symbols, and community identity. During the Old Kingdom, labor within the administration was categorized by groups of people who worked part-time in various facets of the state administration, referred to as phyles (*z/sꜣ*) in the various epigraphic sources, and each was named after an animal or arachnoid (Roth 1991, 2). While many scholars have understood the organization of the phyle system as an administrative invention tied to a system of labor during the third millennium, Roth (1991, 206) argued that the system represents a much deeper, more natural association of people with their respective social groups. Specifically, Roth proposed the Old Kingdom system of labor organization was born out of earlier totemic clans, wherein the zoomorphic iconography depicted on standards represented the protective deity of each group—later becoming the name of the phyle in the system of labor (Roth 1991, 198-205). These totemic clans included: *wr* (falcon=Horus), *sṯ* (seth animal=Seth), *nḏs* (scorpion=unclear), *jmj-nfrt* (baboon=Thoth), with *wꜣḏt*(*jw*) (serpent=Wadjet) as the earliest attested of the group (Roth 1991, 208). By Dynasty 1 under the reign of Den, the *wꜣḏt*(*jw*) and *wr* or *nḏs* phyles were connected to the divine cult (Roth 1991, 208).[181] Support for this proposal derives from the iconographic depictions of various animals on predynastic standards on the Hunters palette and Naqada III jars, connected with hunting and rituals (Roth 1991, 208). According to this proposal, membership within each clan would have been hereditary and these zoomorphic emblems would have been connected with ceremonies and initiation rites (Roth 1991,

[181] Note that at least two phyles are attested during Dynasty 1, reflecting the fluctuating power relations between early coalitions during the formation of the early state (Roth 1991, 209).

205).[182] Each phyle would have been selected from clans in the Nile Valley who were potentially allied during the process of state formation, thus maintaining their power in the Old Kingdom administration (Roth 1991, 206-207). Given the nature of collaboration between groups in the southern Levant, Nile Valley and Delta, which resulted in a shared repertoire of symbols attached to community identity ideology—the Nahal Mishmar bird standard may reflect an early connection to the *wr* phyle, whose origins may date back to the Chalcolithic.

Figure 51. Depictions of Seth animal. 1): Seth(?) ivory from Tomb H29 at el Mahasna (after Te Velde 1967, fig.); 2) Mud sealing from Helwan, Dynasty 1, Seth animal depicted ridden like a donkey (after (Mitchell 2018, fig. 3.10); 3) Ivory wand depicting bound Asiatic with sṯ.t sign from Dynasty 1 tomb at Abydos (Nibbi 1978, fig. 2). Images adapted by author.



With regard to the power dynamics between these early clans, Roth (1991, 204-205) proposed the phyle name *sṯ* reflected its early associations with Seth, who had close connections with kingship and potentially mining.[183] The nature of the Seth animal has been debated, however

[182] Within the context of initiation rites, circumcision served as membership of service devoted to the king (Roth 1991, 207).

[183] Te Velde (1967, 116, n. 5 for references) originally discussed the possibility that Seth was god of miners. He proposed that Naqada and Coptos were important access point to the Wadi Hammamat where the Min colossi are located. Indeed, PT Utterance 222, Seth's traditional birthplace at Ombos/Nubt "city of gold," reinforcing the importance of this strategic location at the access point to the Wadi Hammamat, which contained greywacke, copper

a mud sealing from Dynasty 1 at Helwan depicts the Seth animal being ridden like a donkey (Figure 51:2). If such an identification is correct, it hints at the importance of overland trade to the southern Levant—and the potential role of the Seth group in change of transportation via donkeys. In later Egyptian epigraphic documents, the name *sṯ.t* is traditionally associated with southwest Asia and written with the "shoulder knot" glyph 𓋭 (S22). However, Nibbi (1978) convincingly argued that it depicted a donkey saddle. While she argued that it should be translated as "imported" vs. "Asiatic" (Nibbi 1978, 62), it is possible its original association was multivalent—a word phonetically similar to Seth as a donkey and whose iconicity was connected to the donkey pack for importing goods from the southern Levant. Indeed, the earliest depiction of the name appears on a decorated ivory wand from a royal Dynasty 1 tomb at Abydos and depicts a bound Asiatic identified with the *sṯ.t* sign (Figure 51:3; Petrie 1900, 43, pl. 17:30)—a time after which the state has exerting coercive control over industry.

Given later myths about Horus and Seth battling for kingship, these myths might function as cultural memories, reflecting back on a time when tensions arose between these earlier clans as a result of claims over industry. Indeed, Morris (2019, 68) proposed that the spatial distribution of certain zoomorphic figures and icons—namely the falcon and the Seth animal—reflected competition between competing elite groups. From Tomb 23 at Hierakonpolis, traditionally associated with Horus, she cites the earliest complete depiction of a falcon found alongside fragments from another falcon. In nearby Tomb 16, dated to the Naqada IC-IIA (ca. 3600 BCE),

and gold. Indeed, it is during the Naqada III that there is the first evidence of mining in the Eastern Desert as well as non-disputed evidence for smelting at Elephantine (Kaiser et al. 1997).

similar fragments of two falcons were also found. Morris juxtaposes this with the absence of falcons at cemetery T at Naqada, Cemetery U at Abydos and two other cemeteries nearby and attributes this absence to “local aggrandizers” (Morris 2019, 68, with references). Moreover, she points out Seth animals are depicted in the entourage of Horus from rock inscriptions at Gebel Tjauty, west of Naqada (Morris 2019, 70-72, with reference to Darnell 2002. 19). The accompaniment of Seth animals in the entourage of Horus is similarly attested on the Scorpion macehead. Such iconography reflects the cooperation between groups. Morris proposed that the competition between the elites at Naqada and Hierakonpolis allowed for the polity at Abydos to rise, “who would appropriate the divine personage of the falcon and incorporate the god into their own royal titulary” (Morris 2019, 70). Set against the backdrop of Naqada I and II, and the proposal that some of the communities from the Beersheba Valley may have integrated into the local Nile Valley, it appears these phyles were part of a diverse landscape of corporate groups dating back to the late fifth/early fourth millennium, who are argued to have migrated seasonally from the Nile Valley to participate in mining expeditions to Sinai and the southern Levant.

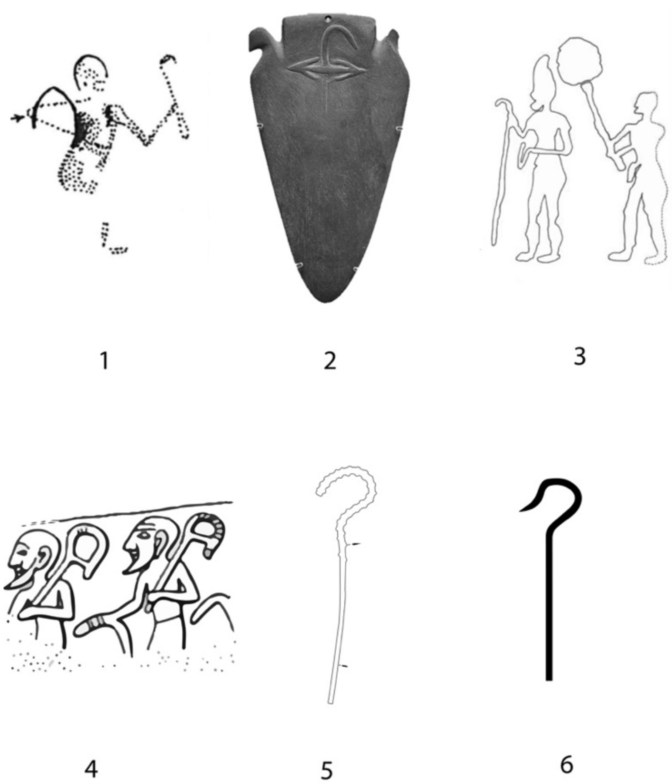
When we return to the Nahal Mishmar hoard, a third scepter—the shepherd’s crook—speaks to an EB IB date and reflect the role of pastoralism in connection with an early Egyptian identity (Bar-Adon 1980, no. 125*)*. The shepherd’s crook is a visual symbol that has long been connected to deities and elites in the southwest Asia and Egypt (Ambos and Krauskopf 2010). In the southern Levant, a crook appears to be held by one of the ritualists in the fresco at Teleilat Ghassul during the Chalcolithic (Drabsch and Bourke 2014, fig. 5). Shalem (2015, 228) proposed that a Chalcolithic ossuary from Peqi`in depicted a bearded man who was flanked by two crook-like objects creating a connection to the crook in the Nahal Mishmar hoard. However, these symbols are very angular and do not resemble the candy-cane like curvature of the lost-wax-cast crook from the Nahal Mishmar hoard.[184] The closest parallel to the crook in the hoard is on an ivory dagger handle in the Metropolitan Museum of Arts, dated to the Naqada III on the basis of stylistic typology (Williams, Logan, and Murnane 1987). This knife is relatively contemporary with the double-bull motif on the Hunter's palette as well as the Narmer macehead.

Stylistically the Nahal Mishmar crook is almost identical to the Egyptian logogram for *ḥḳꜣ*, indicative of the title *ruler*. Gates (1992, 134-135) pointed out that the scepter is an Egyptian symbol used in the *sed*-festival to regenerate kingship and was later assimilated as a symbol of Osiris (with reference to Helck and Otto 1975-86 [III], 821-823). Of potential relevance is that *ḥḳꜣ* also means magic in Egyptian and is a word also used to refer to rulers or leaders of the mines *ḥḳꜣ ẖꜣwt* (Aufrère 1991, 67-68). Images of individuals holding the crook are attested in the Eastern Desert during the Naqada II in Hierakonpolis Tomb 100 (Figure 52:1; Case and Crowfoot Payne 1962, fig. 5:11), as well as and on the so-called Min palette from el-Amrah (Figure 52:2). By the Naqada III, a ruler wearing the white crown on a rock face from Gharb Aswan holds the crook, dated to the Pre- to Early dynastic period (Figure 52:3; Hendrickx and Gatto 2009, fig. 2). When viewed together, the scepter appears to mark membership in a community of practice centered on mining greenstone and stone. While this staff traces its origins back to the ritualists of Teleilat Ghassul, it later becomes indicative of kingship. On stylistic grounds, the crook from the Nahal

[184] While Shalem (2015, 228) also proposed one of the plant standards (no. 124) from the Nahal Mishmar hoard was a crook, it is argued to depict a poppy.

Mishmar hoard (Figure 52:5) appears to date to the Naqada III, contemporary with a knife handle in the Metropolitan Museum of Art (Figure 52:4). Indeed, it is most like the hieroglyph S38 of the shepherd's crook (Figure 52:6), a logogram for *ḥḳꜣ*. Within the context of ritualized rites of passage, the Nahal Mishmar scepter appears to date to the Naqada III and may have functioned logographically—visually signaling who the ruler was within the context of mortuary and community rites of passage.

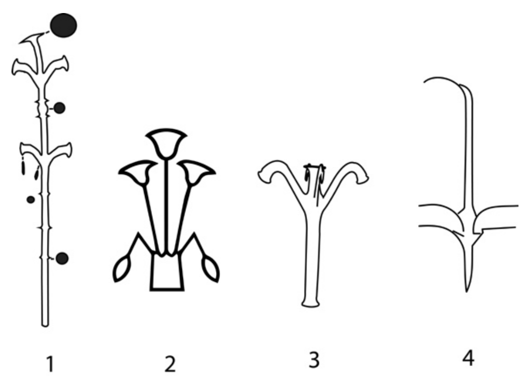
Figure 52. Evolution of the ḥḳꜣ scepter. 1: Tomb 100, Hierakonpolis Naqada IIC (Case and Crowfoot Payne 1962, fig. 5:11); 2)Min palette; 3) Gharb Aswan, individual with white crown (Hendrickx et al. 2009, fig. 2); 4) Decorated ivory knife handle from the Metropolitan Museum of Art, Naqada IID/IIIA; 5) Nahal Mishmar shepherd's crook (Bar-Adon 1980); 6) Egyptian hieroglyph S38, logogram for ruler. Images adapted by author.



With regard to how these objects would have functioned within ceremonial performances, of interest here is Amzallag's (2018) recent proposal that the Nahal Mishmar hoard formed a visual code shared among metalsmiths to pass on their craft knowledge—the earliest form of proto-writing. Amzallag accepts a Chalcolithic date for the Nahal Mishmar hoard's deposition and argues that certain symbols in the hoard functioned logographically. His interpretations operate on the assumption that the community was Semitic speaking, an argument for which there is no evidence and has opened up this proposal to criticism (e.g., Wilson-Wright 2020). Rather, it is proposed here that certain scepters in the hoard functioned as a form of writing used in ritual performance during Naqada III—Egyptian glyphs cast into metal. Such a proposal closes the gap between the Chalcolithic and the EB IB and locates certain objects in the hoard to the late fourth millennium, when a system of writing was developing in Egypt. The *ḥḳꜣ* scepter would have indeed functioned logographically, marking an individual in ritual procession as the ruler. Not only did the *ḥḳꜣ* scepter function logographically, however, but so too did at least two other scepters.

Within the context of elite display and the ritual performance of logograms, two scepters depicting leafy plants provide additional support for a Naqada III elite Egyptian political identity. The first is comprised of one long stem with a bulb and two sets of stems flanking the long stem, with space in between the two sets (Figure 53:1; Bar-Adon 1980, no. 126). Gates (1992,) originally identified this standard as the heraldic *swt* plant of Upper Egypt, however it is proposed here to be the papyrus stalk glyph M15, which is typically associated with Lower Egypt and writing. Depictions of papyrus stalks appear as early as the Scorpion macehead (Kantor 1945), placing the motif within the Naqada IIII, when the writing was crystalizing. The second standard is comprised of four leafy-looking projections, potentially designed to incorporate flanged axes as leaves (Figure 53:2, Bar-Adon 1980, no.127). These wavy plants first appear during the Naqada II on the prows of ships (Gates 1992, 135, with references). When mounted, the long wooden pole that would have extended up past the leaf projections to resemble the logogram for the *swt* plant (Figure 53:3 vs .4). If we accept the proposal that the *swt* plant was a logogram for ensí (Peust 2007, 60), then its presence can be connected to the display of power alongside the *ḥḳꜣ* scepter. That these scepters and standards were cast using the lost-wax method—the sign of the bee—reinforces the Egyptian king's legitimacy as chief ritualist and master metalsmith. This proposal gains more support when we connect it to the importance of the human-bird motif, which formed a central component to the ritual mode of copper production during the Chalcolithic and is argued to have carried on in the Nile Valley in connection with the greenstone production.

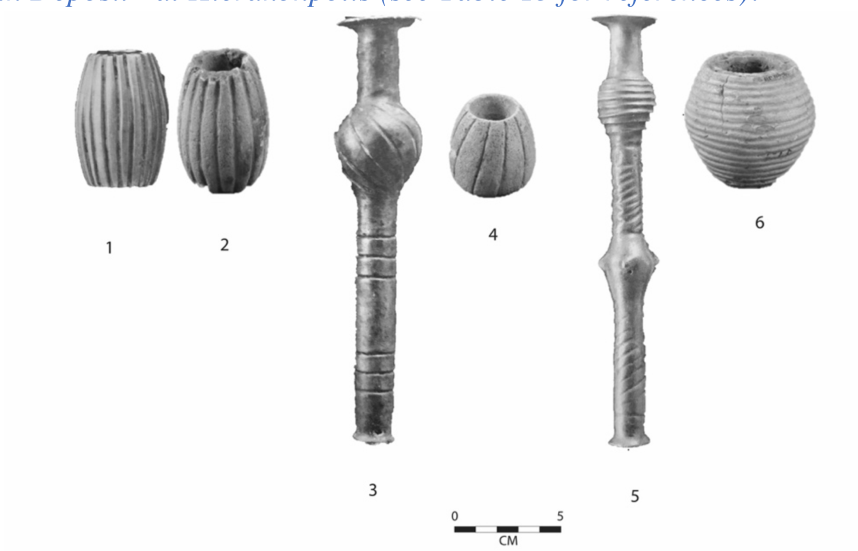
Figure 53. Logographic symbols of papyrus and swt plant. 1) Papyrus scepter (Bar-Adon 1980); 2) Hieroglyph M15; 3) swt scepter (Bar-Adon 1980); 4) Hieroglyph M23. Line drawings traced by author.



Another scepter that advocates for a late fourth millennium deposition of the hoard is one of the more intriguing pieces in the cache—an exquisitely detailed scepter decorated with a spiral up the handle leading to a tripartite disc (Figure 45:17). The disc standard was discussed by Beck

(1989, 41-42) within the context of its physical appearance and aesthetic value but no parallels were cited. However, we can find a potential parallel in the Nile Valley at Saqqara during the Early Dynastic. Within the tomb of the high official Sabu, a tri-lobed greywacke object was discovered (Figure 46:40:). Sabu is known from his sealings at Abydos (Petrie 1900, 44,pl. XXVII: 64-66) and a sealing from Tomb 3111 at Saqqara, where he is identified as a high official contemporary with Den and Adjib during Dynasty 1, ca. 3000-2930 BCE (Emery 1949, 95). Emery translates his title as administrator of a town called "Star of the family of Horus." Inscribed stone vessels and jar sealings contained the names of both Den and Sabu, dating the mastaba to the reign of Den (Emery 1949, 98). The so-called "Sabu-disc" has been without parallel. It is proposed here that connection is to be found in the disc-standard in the Nahal Mishmar hoard (Figure 45:17).

Figure 54. Copper maceheads from Nahal Mishmar and faience imitations of lost-wax maceheads from the "Main Deposit" at Hierakonpolis (see Table 15 for references).



Further support for an elite Egyptian connection to the Nahal Mishmar hoard is attested at Hierakonpolis in the so-called "Main Deposit" (foundation deposit). Objects in the cache extend back into the Naqada III/Dynasty 0, if not further, with some of them seemingly deposited during that time (Baines 2014, 15, with reference to, McNamara 2008). It is in this deposit that three rather enigmatic faience objects were excavated (Figure 54:2,4,6; Quibell 1900, pl. XXII.5,9, Adams 1974, 32, 42-43, nos.152, 154, 217, pls. 24, 32, 37). However, when compared to scepter nos. 39, 78, 182 in the Nahal Mishmar hoard (Bar-Adon 1980, 61, 73, 119), they are identical in size, shape and form (Figure 54:1,3,5). Given that faience is often made to mimic other forms, it is proposed that this trio of faience objects should be interpreted as reflecting lost-wax cast maceheads, supporting the proposal that these forms would have been known to—indeed, possibly produced by—Nile Valley groups. Their presence in the Hierakonpolis foundation deposit thus expresses continuity with the tradition of the Beersheba practice of burying lost-wax cast objects under domestic structures as a pre-cursor to later temple foundation deposits—bringing Sebbane's (2017) original proposal full circle by locating the Nahal Mishmar's deposition a millennium later and connecting it to elites later ruling at Hierakonpolis. Within the context of the Egyptian presence during the Naqada III/EB IB in the southern Levan, this begs the question: what is this ritual paraphernalia doing in the Judean Desert?

Forging the Egyptian State through the Crucible of Ritual Praxis

Assigning an EB IB date to the final deposition of the Nahal Mishmar hoard has significant implications for our understanding of the nature of the relationship between the early Egyptian state and communities in the southern Levant. More questions are raised than can be answered: How do we explain the dating of the Nahal Mishmar *mat* to the late fifth millennium? How did elite Nile Valley/Delta communities come to procure the hoard? Why was it deposited during the

EB IB and why in the Judean funerary landscape? Given the social significance of the Judean Desert during the Chalcolithic, did the landscape have a similar significance during the time of its deposition? In what follows we review the occupation of the Judean Desert, where the hoard was deposited in order to establish the nature of presence in the region.

Evolution of Economic Cooperation

We should recall that Ilan and Rowan (2015) convincingly proposed the Judean Desert formed a funerary landscape during the Late Chalcolithic. According to their model, the region comprised a mortuary temple at En Gedi and a necropolis of primary burials in caves that were concentrated on the west side of the Dead Sea. The spatial layout of a mortuary shrine and necropolis on the west side of the Jordan River draws parallel to the mortuary landscape of the west bank of the Nile Valley during dynastic period (Ilan and Rowan 2015, 184). Within this landscape, the Nahal Mishmar Cave appears to be one of three caves within which a total of 21 primary burials were interred (Bar-Adon 1980). It is generally agreed that these burials date to the Chalcolithic,[185] attesting to the use of the space as a burial ground (Ilan and Rowan 2015, 176).[186] The hoard was deposited in Cave 1, which contained five of the primary burials and a domestic assemblage dated to the Chalcolithic attesting to habitation in the cave at some point (Bar-Adon 1980). The

[185] For a rejection of this proposal, see Gilead and Gošić 2014.

[186] The act of cutting off one's hand is attested in contemporary Chalcolithic contexts in Bulgaria (Zäuner et al. 2011), which is contemporary with the Varna culture—known for its rich burials. In Egypt, the act appears by the Middle Kingdom at Tell el-Dab`a (Bietak et al. 2012/2013, 31-32, figs, 14A-C).

community who deposited the hoard dug a crevice capped with a large stone slab and covered with a reed mat (Bar-Adon 1980, 7).

While it has long been acknowledged that the deposition of the hoard and the burials/habitation could have happened at different times, the radiocarbon dating of the mat used to cover the hoard has been used to date the hoard's deposition. The most recent radiocarbon date of the mat renders a range between 4300-4000 BCE (Aardsma 2001). This date has since been accepted by several scholars as reflective of the period in which the hoard was deposited. In light of the argument presented here, the equation of the mat with the hoard's deposition must be re-evaluated and also explained. Ilan and Rowan (2015, 177) have brought up the possibility that the mat was scavenged during the Late Chalcolithic/EB I. I agree, however it probably was not scavenged from very far as the practice of wrapping individuals in reed mats is an act attested during the Late Chalcolithic. In the southern Levant, it is known that some of the Chalcolithic ossuaries were lined with reed mats as supported by the impression of a reed mat in an ossuary at Sha`ar Efrayim (van den Brink 2011, 26). At Abu Matar, the pit furnaces also appear to have been lined with simple reed basketry (Golden 2010, 120). Indeed, not far from the Nahal Mishmar Cave, one of the individuals in Cave 2 was wrapped in a mat (Bar-Adon 1980, 6). It is therefore possible that one of the individuals buried in the Nahal Mishmar Cave may have similarly been on a mat—the very mat that was taken and used to cover the hoard. Such an explanation seemingly clarifies why the mat was of a late fifth millennium date yet the hoard contains objects that can be dated to the EB IB on stylistic grounds and that seemingly appear connected to a burgeoning Egyptian state identity. How do we explain the wide gap between the late fifth millennium burials in the cave and the late fourth millennium deposition of the hoard?

Davidovich (2012, 2013) has criticized the tendency to assign a Chalcolithic date to all phases of occupation in the Judean Desert. Through a re-analysis of the ceramic data, he demonstrated that numerous caves in the region concentrated between En Gedi and Masada were occupied during at least two distinct periods: the Late Chalcolithic and the EB IB1, identified by the presence of Erani C sherds within the caves (Davidovich 2012, 12-14; 2013). Erani C sherds are a diagnostic ware typically assigned to the "pre-Egyptian" colony phase in the southern Levant, contemporary with the Naqada IID-IIIA2 phase in the Nile Valley and Delta. Czarnowicz (2014b) mapped out the spatial distribution of Erani C pottery and reconstructed potential routes that would have been utilized to lead directly into the Delta. Caravans would have thus led from the Wadi Lachish west, passing by Tel Erani and then down the coastal route, west across the Way of Horus and into the eastern Delta, leading directly to the major trade center of Tel el-Farkha (Czarnowicz 2014b). Erani C sherds are also reported in the Nile Valley at Tomb U-j, indicating such a route would have continued south down the Nile Valley. We can thus assume that this type of vessel played a key role in the exchange between the southern Levant and Nile Valley groups. What Czarnowicz did not point out, however, is that Erani C sherds are also found in cave sites in the Judean Desert during the EB IB, creating a connection even further east. It is thus significant that EB IB sherds were *also* present in the Nahal Mishmar Cave (Davidovich 2012, 129, emphasis added), supporting an EB IB1 presence. In his conclusions, Davidovich points out that many of these caves were inaccessible, which stand in stark contrast to what is expected from habitation caves of pastoralists which tend to be easily reached. As such, he proposed the EB IB1 habitation of these caves be attributed to refugees of southern Canaan seeking shelter during the Egyptian "colonization" of the region shortly after the Erani C horizon, contemporary with the reign of

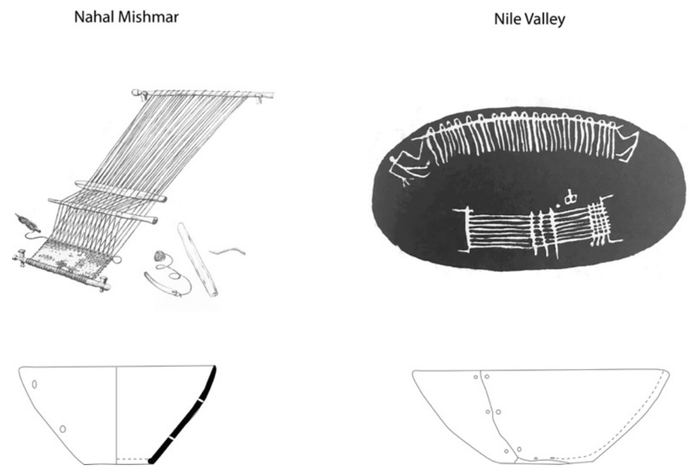
Scorpion at tomb U-j (Davidovich 2012, 16). However, the conquest/refugee narrative is outdated in light of the evidence attesting to peaceful cooperation between communities (e.g., Kansa, Kansa and Levy 2006; Anđelković 2012, Allentuck 2015), paired with a weak institutional presence (Kansa 2001). Rather, we would be better suited to return to a previous proposal that the community that interred the hoard did so because of the knowledge of the burials (Ilan and Rowan 2015). How do we explain a gap of almost one thousand years between the burials and the date of the hoard's deposition?

Cultural memory of landscapes can play a central role in the identity formation of a community. This study has explored the nature of cooperation between corporate groups from the fifth through the late fourth millennium and argued for long-term, sustained interaction between groups whose *primary* goal was copper production. We must remember that technologies are part of larger sociotechnical systems and thus the transfer of technological knowledge can often be accompanied by the web of social praxis within which that technology is embedded. If we accept that the community that buried the hoard was of an elite echelon during the EB IB/Naqada III, we must assume that the hoard circulated in the community—in use—for over a millennium. Here we can nuance Sebbane's (2017) proposal that the hoard was the accumulation of material over a millennium. Instead of dating the hoard to the fifth millennium, it should be viewed it as the product of a unique identity borne out of cooperation between communities in the Nile Valley and southern Levant over the course of the late fifth to late fourth millennium. These symbols would have played a role in mortuary rites of passage, reifying community identity and solidifying the position of certain individuals in the community. If we assume that the group that interred the assemblage did so because they knew where the cave was used for burials, it is quite likely that they had a real—or fictive—kinship ties to the individuals originally buried in the cave. We must thus ask whether certain practices associated with the domestic assemblage in the cave can be traced to the late fifth to early fourth millennium Nile Valley.

Several lines of evidence connect certain aspects of the domestic assemblage in the Nahal Mishmar hoard to the Nile Valley, supporting a potential attachment to the Judean Desert as part of real or imagined ancestral ties. It should be recalled that during the Badarian, we see a shift to greenstone as a central component of many burial assemblage, the rise of a specialized industry of ivory spoons and combs with motifs that can be found in the southern Levant, and new pyro-technological practices for bead manufacture that suggests these communities had already procured a working knowledge of extractive metallurgy (Chapter 5). The nature of Nile Valley imports to the southern Levant—maceheads, shells, and potentially ivory—reflect material practices associated with sites connected to copper production. I argued that the nature of transfers between groups during the fifth and early fourth millennium was the product of intensified economic interaction around mining and copper production—connected with a shift in the system of belief. The nature of sustained cooperation requires the advent of a set of shared practices around which a community can formulate an identity and achieve their collective goals. When studying the nature of economic cooperation in small scale societies, exogamy is a key feature of complex stateless societies and within agricultural communities patrilocality plays a key strategy for fostering ties without compromising inheritance. During the fifth to early fourth millennium, several lines of evidence suggest Late Chalcolithic practices attested in the Nahal Mishmar hoard were sustained in the Nile Valley.

The first regards the textile manufacture from flax. During the Chalcolithic, Levy and Gilead (2012) argue that communities in the southern Levant were predominantly spinning linen—not wool—and employed the drop spin technique. In the Nahal Mishmar hoard, this connection was argued to be reflected in the disc-shaped maceheads as skeuomorphs of spindles and whorls for drop-spinning. This technique would come to characterize the textile industry in Egypt, paired with the importance of linen manufacture. Evidence for shared textile knowledge procured from participation with the southern Levant is supported by the introduction of the ground loom into the Nile Valley. As part of the domestic assemblage in the Nahal Mishmar hoard, a horizontal ground loom was detected in the cave (Figure 55, left). From Tomb 3802 at Badari, most likely dated to the Naqada I-II, a bowl was painted depicting a horizontal loom reflecting knowledge of this technique (Figure 55, right; Brunton and Caton-Thompson 1928, 54, pl. xlviii:6). The tomb belonged to a woman and child who appear to have been of higher rank in the community based on her assemblage: the decorated sherd, carnelian ring beads, a bracelet on the child of *blue-glazed steatite*, a fishtail knife, known to have been one of the most prestigious knives (Brunton and Caton-Thompson 1928, 54). Glazed enstatite beads were also found in the Nahal Mishmar Cave (Bar-Yosef Mayer, Porat, and Davidovich 2014, 269), which were argued to have belonged to metalworking communities of the Late Chalcolithic.

Figure 55. Shared practices during the Chalcolithic and Badarian. Left: Nahal Mishmar hoard—horizontal ground loom and pierced bowl (Bar-Adon 1980); Right: Nile Valley—painted image of ground loom in predynastic bowl at Badari (Bar-Adon 1980, 179, fig. III.52) and pierced bowl. Images adapted by author.



In addition to textile manufacture, the mending of ceramic vessels appears as a shared practice. This technique includes drilling holes vertically into the side of a bowl, resulting in an image of a seam to be threaded. Such a technique is attested in several of the ceramic bowls in Cave 1 at Nahal Mishmar (Figure 55, left; Bar-Adon 1980, 140-141, nos. 2, 4, 6). Bar-Adon (1980, 140, with references) cites parallels for such a technique at "Jericho VIII, Ghassul, Beersheba, Lachish, Hadera, Tel el-Far'ah (N), Megiddo, the caves in Nahal David, Nahal Se'elim, Nahal Hever, and En-Gedi." While its appearance in the cave reflects the perpetuation of a long trajectory of practice in the region, of significance here are the presence of these bowls at Badari in the Nile Valley (Figure 55, right; Brunton and Caton-Thompson 1928, pls. XV:41E, XVIII:31E, XIX:44M). Given the shared landscape of knowledge and practice during this period, such technologies seemingly attest to the role of women in connecting communities and passing on craft traditions. When we consider the importance of greenstone, awls, and palettes in connection with women, paired with the nature of shared technologies—weaving and ceramics—it is possible that they played a key role in fostering connections and passing on craft to the next generation.

With regard to the parallels between the Judean Desert as a funerary necropolis and the Nile Valley, let us return to the question posed by Ilan and Rowan (2015, 184): Who influenced whom? I propose that the centuries of economic cooperation between Nile Valley pastoralists and local communities in the southern Levant led to the construct and of a unique, shared identity, set of practices, and worldview around the mining of greenstone and the production of copper. The result was the region formed a place of social significance for the elite communities of the later Egyptian state, who would have connected aspects of their economic foundations, system of legitimacy, and community identity to the land.

Chapter 9. Conclusion: Mobility, Metal, and the Rise of Kingship

"Given this broad array of evidence for the production, distribution, and consumption of copper, tin, lead, silver, and gold throughout the Mediterranean, what can we say about the role of metals, and the impact of metallurgical production and trade, on its prehistoric societies?" (Kassianidou and Knapp 2005, 230)

The introduction of extractive metallurgy into the southern Levant, Nile Valley, and Delta during the fifth and fourth millennium played a fundamental role in the construction of elite identities, practices, and power dynamics that would lead to important transformations in local communities. In order to understand the contexts and implications of various corporate groups introducing and subsequently integrating a new technology or technique into the region. The process of technology transfer requires cooperation at the level of both the individual and community and involves messy sets of practices that do not appear in the traditional analytical practices applied to archaeological assemblages. Technology transfer involves the curation of a new set of practices to mediate economic cooperation between communities, and a system of belief that legitimizes the perceived necessity of the production system. Through the process of learning a new technique, identities can transform and as the social elements of production morph the newcomer becomes a full member of the sociotechnical system. When we invoke words like "trade" to classify exchange, we mask over the complex, nuanced practices that are required to facilitate economic cooperation. The term "trade" to classify exchange also tends to be viewed through a highly Western economic lens. When dealing with complex stateless societies, however, we must accept that economic behavior is inherently different in the absence of institutionalized coercion. Informal coercive practices such as magic and taboo formed important mechanisms employed by community-sanctioned leaders to persuade and coordinate labor and resources as a means to gain power and status (Stanish 2017). For the study of metallurgical knowledge transfer, we must thus ask what new identities formed as a result of technology transfer, how were communities reconstituted, and what systems of belief legitimized the integration of extractive metallurgy.

To examine the nature of interaction between communities in the southern Levant and Egypt, I applied Wengrow's (2003, 2006) *primary pastoral community* framework to situate the origins of power in the early Egyptian state in its Nile Valley context. This framework maintains that the subsistence strategies of these highly mobile groups resulted in the centralization of power in the body vs. the household. Mobility and participation in external networks therefore formed a key source of power that was played out in the funerary landscape, wherein the body formed the object of display and thus the conduit through which power was exercised. By adopting this approach, I built on previous scholarship that maintained pastoralists *mediated* contact between settled communities in the southern Levant and Nile Valley and Delta by beginning with the assumption that corporate groups from the Nile Valley may have been in *direct* contact with metalworking communities in the southern Levant. As such, this study explored the nature and evolution of economic cooperation around the system of copper production in the southern Levant, Sinai, and Eastern Desert by combining anthropological game theory and cross-craft interaction with a communities of practice framework. Such an approach allowed me to move away from exploring interaction through the lens of culturally homogenous entities (i.e., Egypt vs. the southern Levant) and toward the investigation into how participation in the same technological system resulted in the construction of a shared set of practices and system of belief about greenstone—and thus copper. The main thesis put forward in this study is that Nile Valley communities came to embody their knowledge of copper production via economic cooperation with southern Levantine communities during the fifth millennium. In its local Nile Valley context, the transformation of this system contributed to the rise of the early state and the king who was legitimized given his role as chief ritualist, which is argued to have been tied to copper production. To support this argument, I analyzed the evolution of copper production through the lens of four key phases, the findings of which are summarized below.

Stage 1: Greenstone Production and the Stone of Regeneration

To understand the social significance of copper, in Chapter 3 I argued that we must reach back into the Neolithic to explore the economic and ideological impact of greenstone production in its local southern Levantine context to establish the pre-existing system into which copper production would have been integrated. Previous research has demonstrated that the exploitation of greenstone in the southern Levant dates back to the Late Natufian and correlates with the increasing sedentarization of communities and connected the significance of green-colored stone as linked to the symbolism of plants and thus the regeneration of the community as a coping mechanism to deal with new population pressures (e.g., Bar-Yosef and Porat 2008). The period also coincides with the local appearance of obsidian, attesting to participation in exchange networks with Anatolia. While such an explanation may elucidate the initial manipulation of greenstone, I argued that a shift took place during the PPNB where efforts intensified to exploit the copper-bearing minerals from Feinan, Timna, and Sinai.

In order to explain this shift, I proposed that the pharmacological properties of copper-bearing greenstones became known during the PPNB resulted in a cognitive shift wherein the greenstones once *symbolically* associated with community healing were now *functionally* tied to group regeneration. This claim was supported by demonstrating differential use in copper minerals vs. non-copper-bearing greenstones. Whereas both copper and non-copper-bearing greenstones were carved into beads and pendants to be worn *on* the body, only copper-bearing greenstones appear to have been ground into pigments and applied *to* the body. As populations multiplied, greenstone production in the Feinan increased in scale by the later part of the PPNB, as supported by specialized bead production at Tel Tifdan (Levy 2007). Analysis of many greenstone artifacts in the Neolithic southern Levant also identified Feinan as the source of origin (Hauptmann 2007), demonstrating that both the region and its greenstone were becoming increasingly viewed as a socially significant material by many communities in the region.

Within the broader landscape, the shift in procurement strategies in the southern Levant appear connected to a similar exploitation of secondary copper minerals alongside native copper in the greater Syro-Anatolia region, hinting at the exchange of knowledge within pre-existing networks. During the PPNB, native copper and greenstone appear to have been exchanged within the same routes as obsidian and the same routes by which extractive metallurgy may have later diffused across the landscape. When knowledge of copper metallurgy was first introduced into the southern Levant, it is therefore argued to have been integrated into a pre-existing system of labor and ideology that conceptualized greenstone from certain places in Feinan and perhaps Timna as the stone of regeneration. This pre-existing association would have far-reaching implications for local conceptions of copper production.

Stage 2: Mortuary Centers, Rank, and the Stone of Transformation

In Chapter 4, I revisited the timeline and context in which extractive metallurgy was first introduced to the southern Levant and argued for a late sixth to early fifth millennium date, when communities in the Balkans, Anatolia and Iran exhibit the first evidence for copper smelting. Given the presence of an awl from Tel Tsaf dated to this period, I reviewed the evidence that communities were participants in these northern networks and sought to answer the question as to why the southern Levant was not a recipient of this knowledge given its local system of greenstone production. I then examined the Beersheba system of copper production, which appears suddenly, fully developed, and run by metalworking experts with ties to Anatolia several hundred years after the first evidence of metal in the region. Given that evidence does not support a widescale migration but rather a local origin for this community, I also asked how this group came to procure their knowledge.

In order to explain the organization of the Beersheba system, I synthesized the current research on the contemporary development of public sanctuaries at Teleilat Ghassul, En Gedi, and Gilat, explored the correlation between the rise of these centers and a new region-wide belief system shared by members of certain communities across the landscape, and revisited the claim that cornets—which appear at all three cult centers—were not used in metal working. One of the prominent images that appeared connected to this new system of belief was the human-bird/prominent-nose motif, which has been connected to the importance of birds of prey for the excarnation of the body in secondary burial (e.g., Fox 1995). By drawing on previous research, I explored the possibility that the ritual practitioners who were in charge of the public centers were actually capable of working metal by examining several lines of evidence about the function and appearance of these centers as well as the potential connection of the human-bird motif with these ritualists.

To explain the intensification of copper production, I argued that the rise of mortuary centers *were* intimately connected with copper production, as they formed the economic coordinating units for copper production in the region. Building from recent research on ritual praxis and Late Chalcolithic beliefs, I proposed the materiality of copper production—from mining to recycling—resulted in the alteration of greenstone as the stone of regeneration to the stone of physical and metaphoric transformation. As such, copper came to form a life cycle metaphor centered on the of the reincarnation of the individual. Those who possessed the knowledge of how to smelt metal from its ore were thus shaman-like figures in the community, performing public magic while drawing on taboo to protect their position in a new landscape of display where social power was being forged. As part of this process, lost-wax castings no doubt played a prominent role in the public ceremony, especially around the funerary grounds which have been linked to fostering community cohesion. The transformation of greenstone—long associated with fertility and regeneration dating back to the PPNB—thus resulted in a new source of power for individuals who could smelt metal from the stone, the ritualists who expressed control over the process of life and death. The intensification of the system was thus linked to the persuasion of ritualists at a time when the region was experiencing population densities and needed a way to cope. The rise of this new belief system tied to the potential shift in conceptions of copper as a life cycle metaphor was proposed to have been an economic strategy that ritualized community behavior, allowing for the increased scale of production that we associate with the Beersheba system of production. Securing these northern networks would come to play a critical role in the intensification of overland trade with Anatolia during the fourth millennium. By reviewing various lines of research, I argued that metalsmiths were integrated into these exchange networks, which created a community of practice that was connected via knowledge and participation, spread out over a non-contiguous landscape.

When we look to Egypt, economic cooperation with metalworking communities in the southern Levant typically explores contact though the lens of the *Delta*. In chapter 5, however, I argued that the intensification of copper production during the late fifth millennium resulted in increased economic cooperation with certain corporate groups in the *Nile Valley*. Such collaboration was made possible via the primary pastoral community, wherein the diverse subsistence strategies of Nile Valley groups led to the construct of social power via the mobility of the individual and his or her participation in external social networks (Wengrow 2003, 2006). Such knowledge of—and participation in—external communities abroad was conveyed through the decoration of the body and its interment funerary landscape, forming a political arena of display between corporate groups (Wengrow 2006, 69-71). While Nile Valley communities had participated in a network of greenstone (amazonite) exchange prior to the fifth millennium, during the late fifth millennium Badarian communities began including copper-bearing greenstone alongside the earliest appearance of copper in burial assemblages alongside various expertly carved stone and ivory tools for application to the body. Previous research accepts that the social significance of greenstone for dynastic-era funerary rites draws its origins to the Predynastic, however the reasons that led to the adoption of greenstone specifically during the late fifth millennium are not fully explored.

I therefore argued that the newfound importance of greenstone in the Nile Valley can be correlated with the intensification of copper production in the southern Levant, reflecting the active participation of certain communities in the technological system of copper production. I further maintained that such cooperation provided a context for these communities to procure knowledge of extractive metallurgy. In order to support this hypothesis, I applied a cross-craft interaction framework to bead manufacture and argued both faience and the glazing of carved steatite beads reflect a novel use of applying pyro-technology to the use of copper minerals as a glazing agent. The glazing technology is known in the southern Levant and connected with metal-working communities in the north, who introduced extractive metallurgy to individuals in the region during the late sixth/early fifth millennium (Chapter 4). While efflorescence was practiced in the southern Levant and cementation was the technology employed in the Nile Valley, I maintain that the application of fire to green color minerals for the manufacture of beads reflects knowledge of the same system albeit manifested in its local context.

The inclusion of greenstone in Nile Valley burial assemblages resulted in fundamental changes for local labor practices, many of which support integration into the southern Levantine mode of production. These changes included the development of a specialized community of ivory carvers who shared iconographic motifs with the Beersheba region. The ivory spoons in these assemblages were thus decorated with zoomorphic motifs that find parallel in the southern Levant and are connected to metal-working communities—one of the more important motifs to appear is the bird. Moreover, the palettes on which greenstone was ground were similar to those from the important pilgrimage center at Gilat (Rowan et al. 2006), where vessels made from Nile Valley clays were found. Evidence that these groups sustained engagement with one another is supported by the shared set of practices that are born out of these metal-working communities and included the macehead and cultic headdress potentially connected with the later Red Crown that is so central to Egyptian kingship. I therefore argued that the economic cooperation between corporate groups in the southern Levant and Nile Valley led to the rise of a community of practice whose joint endeavor centered around the mining and transformation of greenstone. Participation in this sociotechnical system thus resulted in a shared set of practices and beliefs that would play a central role in the evolution of cooperation over the next millennium.

Stage 3: Chalcolithic Continuity in Nile Valley and Greenstone in Funerary Economy

The Chalcolithic system of copper production in the southern Levant underwent major transformation around 3800 BCE, resulting in the reorganization of the Chalcolithic settlement system. While it is often maintained that this economic reorganization led to the transformation in the social significance of metal, in Chapter 6 I discussed the research that supports that many practices continue along the coast in the Besor region and in the Red Sea communities, as well as in the Delta *and Nile Valley* during the Naqada I-IIB and EB IA. What we see are the local manifestations of a trans-regional identity connected by the production of copper that were maintained and indeed intensified during the first half of the fourth millennium. During the Naqada I, the rise of central places around mortuary centers appears to have facilitated the construct of communal identity. I connected the introduction of beer and bread baking technology most likely from the north to the continued participation of metal-working groups in these regions by arguing that the shared practices between bread molds as crucibles was attested in Syro-Anatolia as in the Nile Valley. Moreover, I discussed the preserved linguistic evidence for Egyptian crucibles, which attest to a connection between the use of certain vessels seemingly for metal, bread and beer production. In order to explain this, I discussed evidence supporting that individuals involved in mining and metalworking were also integrated into northern exchange networks and argued they may have been transmitters of this new technology to the Nile Valley. Vessels related to beer production are attested in the Levant, which continued to form an important region for cooperation as it formed the landscape through which the overland routes connected Syro-Anatolia to the Nile Valley as well as the ports along the coast. The production of beer and bread in connection with the rise of a local funerary economy in the Nile Valley was important as it allowed ritualists a major source of power to maintain control of over the community. Such a system was argued to be similar to what we saw during the Chalcolithic in the southern Levant and indeed many of the motifs and practices associated with that system appear to continue in the Nile Valley. Such parallels include the construction of mortuary centers and a necropolis on the west bank of the Nile, which was a paralleled practice in the Judean Desert during the Chalcolithic (ILan and Rowan 2015).

When we look to the Sinai, the importance of elite pastoral communities connected with Nile Valley practices are attested by the presence of *nawamis*. I connected these funerary structures with Nile Valley pastoral groups and discussed the evidence for their contact with the metalworking communities in the Gulf of Aqaba. As such, I also discussed the importance of cooperation between Nile Valley corporate groups and groups in the Delta around the procurement of copper and greenstone. The knowledge of metallurgy and participation in these exchange networks connected with copper production is argued to have played a major role in the curation of an emergent political identity and elite system of belief that later contributed to the foundation of the early Egyptian state, where mining and metallurgical production came to form an integral power source in the Nile Valley.

Stage 4: Uruk Exchange Networks, the Advent of Egyptian Kingship, and Nahal Mishmar

The last stage of interaction that I argue played an important role is the mid-to-late fourth millennium, where the intensification of production led to processes that contributed to state formation given the high levels of integration in these networks. The investment in new settlements in the Delta and southern Levant played an important role in the state formation for the Egyptian community—not via conquest but rather through coalition building (Stevenson 2016). The development of shared practices includes conceptions of kingship, stabilization of core symbols of identity, and the development of writing. We also see the importance of a martial identity in the various weapons of northern origin. In the southern Levant, the nature of cooperation is supported by the evidence that reflects a generally peaceful integration among its communities. The region transformed into a burgeoning system of copper production, with ties to the north and west.

The construct of an emerging political identity tied to the early Egyptian state is reflected in selected objects that can be connected with the community of copper production: the macehead, palette, ripple flaked knife and Red Crown. Building on previous arguments, I was able to situate these symbols within their original contexts that I argue date back to the fifth millennium in the southern Levant. The monumentalization of the palette was argued to have been connected with claims over the mines, greenstone production, and thus copper. The Red Crown was similarly tied to the smelting and funerary procession dating back to the Chalcolithic and Naqada I. The macehead transformed into the symbol of institutionalized coercion of the state but again dates back to this early period and appears connected to participation in this system of production, as supported by the 250 or so lost-wax cast maceheads in the Nahal Mishmar hoard. Through a close reading of the Narmer macehead, I demonstrated that many of the motifs could be connected to material reflections of cooperation with communities in the southern Levant and Syro-Anatolia.

As part of changing conceptions of political authority in the early Egyptian state, I proposed a new understanding of the title *nsw.t bjtj*. Drawing on previous scholarship that the title has no relation to conceptions of Upper and Lower Egypt, I accepted a recent proposal by Peust (2007) that the title *nsw* should be equated with the Sumerian ensí—a proposal that ultimately advocates for the role of Mesopotamian state formation as an influence on the rise of the early Egyptian state. Nuancing this, I proposed that the *bjtj* should be connected with the king as chief ritualist and master metalsmith, creating a connection between the Red Crown as costumery worn by the chief ritualist as well as the bee as a logogram for lost-wax casting, which played a critical role in creating landscapes of display and rank.

While there are very few lost-wax-cast objects in the Nile Valley or Delta during the fourth millennium, I argued that we must look to the southern Levant to support this proposal. In Chapter 8, I therefore proposed recontextualizing the Nahal Mishmar hoard—long assumed to date to the

Chalcolithic. Building on previous proposals that the Nahal Mishmar hoard was the accumulation of material over a millennium (Sebbane 2017), I have redated the hoard to the EB IB (ca. 3300): the time in which key symbols of Egyptian kingship were becoming stabilized. By drawing on archaeologically and stylistically contextualized parallels as chronological anchors, I argued that key pieces in the hoard reflect the evolution of shared practices between communities in the Nile Valley, Delta southern Levant and no doubt further abroad in Syro-Anatolia. Many of the pieces in the hoard have not been understood by scholars given the assumed Chalcolithic date. I discussed how such standards reflect elite symbols tied to a burgeoning Egyptian state identity during the late fourth millennium. These included the papyrus plant, the *ḥḳꜣ* scepter, the ripple-flaked knife and the *swt* plant—all argued to be tied to kingship. The presence of these forms in the hoard in the southern Levant, in a landscape associated with Chalcolithic burial practice—adds nuance to the previous hypothesis made by Ilan and Rowan (2015) that one group may have influenced the other. The proposed dating and recontextualization of the Nahal Mishmar hoard are argued to reveal that a major component of the Egyptian political identity was rooted in the Chalcolithic mode of production, which was born out of cooperation between communities around the mining and production of copper.

Concluding Thoughts on the Social Implications of Metallurgical Knowledge Transfer

Symbols of power and legitimacy hide in plain sight every day, their meaning divorced or transformed from their original context. The centrality of copper production for fostering economic cooperation between communities across southwest Asia and into the Delta and Nile Valley is no exception. In a recent review of the Bronze and Iron Age epigraphic evidence reflecting a connection between metal and various gods, Nissim Amzallag (2019) drew attention to the significance of metal for many early cosmologies in the eastern Mediterranean, across southwest Asia, and into the Nile Valley. While it has long been maintained that the intensification of copper production resulted in a shift in the ideological importance of metal in society, he hypothesized that the embeddedness of metal in these myths reflects the importance of metal for early community cohesion but over time this knowledge became hidden, confined to the realm of the esoteric and retained in small communities (Amzallag 2019, 9-10). This study has attempted to nuance such an observation by exploring the evolution of economic cooperation between communities in the southern Levant and Egypt through an archaeological lens. In Egypt, we see the early importance of metal production live on in key symbols of authority and legitimacy that center the power of the state in the king's body. The importance of displaying the Red Crown and the mace, argued to be tied to the legitimacy of his role as chief ritualist and thus master metalsmith. The monumental images of the Egyptian king smiting foreigners in the mining regions: reflections of the monopolization of the greenstone—and thus funerary—industry. The esoteric knowledge of regeneration rituals in the Semitic serpent spells, preserving the language in which the ritual was originally recited and thus the collaboration with communities in the Levant. The list goes on if we look closely. We must remember that the integration of a new technological system will result in fundamental transformations to society. The adoption of extractive metallurgy requires social mechanisms to facilitate learning, the collaboration of individuals, and the reconstitution of communities.

I want to end by returning to Michal Mann's conception of society. Mann maintains that societies are not bounded, unitary totalities or systems glued together by some ultimate form of primacy. Rather, societies comprise messy overlapping and intersectional sociospatial networks of power *made up of individuals interacting around coinciding objectives* (Mann 1986, 1-2, emphasis added). For communities across the Nile Valley, Delta, and southwest Asia during the fifth and fourth millennium, one of the primary objectives fostering economic cooperation was the procurement, production, and exchange of copper. These communities cooperated, negotiated, collaborated, fractured, dissolved—and in some cases, rose to form the first state-level societies. When we look at the archaeological record, we thus need to remember that the artifacts we study are the physical manifestations of the participation between individuals embedded in communities of practice. Our investigations must therefore focus on the human agents through which technological knowledge was transferred, identities transformed, and power structures reorganized. We need to move away from studying production systems as representative of entire regions and focus on the people-centered approaches to economic cooperation, *exploring the social implications of those interactions*. It is only then that we can look at the way identities, communities, and societies were forged.

Appendix A: Tables

Table 4. References for Chalcolithic copper production in southwest Asia (ca. 4500-3800 BCE, see Figure 5 for spatial distribution of sites).

Site	Period	Publication
Arslantepe	Late Chalcolithic, VIII	Yener 2000
Mersin (XVII-XIV)	Middle Chalcolithic	Sagona and Zimansky 2009, 205
Hacinebi	Late Chalcolithic- EB I	Özbal, Adriaens, and Earl 1999; Stein 2001
Peq'i'n	Late Chalcolithic	Gal and Shalem 1997; Shalem et al. 2013; Segal and Gilead Unpublished
Nahal Qanah	Late Chalcolithic	Gopher and Tsuk 1991, 1996
Givat Ha'Oranim	Late Chalcolithic	Namdar, Segel and Shalev 2004
Teleilat Ghassul	Late Chalcolithic	Golden 2010, 77; Drabsch and Bourke 2014, fig. 10
Beth Shemesh	Late Chalcolithic	Ben-Yosef et al. 2016
Abu Matar	Late Chalcolithic	Perrott 1955, 1957; Golden 1998, 2010; Shugar 2001, 2003, 2018; Pfeiffer 2009, Table 1
Nahal Tillah 79	Late Chalcolithic	Golden 1998; Anfinset 2010, 121
Shiqmim	Late Chalcolithic	Levy 1987; Shalev and Levy 1987; Golden et al. 2001; Pfeiffer 2009, Table 1
Horvat Beter	Late Chalcolithic	Dothan 1959, 4; Pfeiffer 2009, 320, Table 1
Grar 100	Late Chalcolithic	Gilead 1995, 39, Pfeiffer 2009, 320, Table 1
Neve Noy/Bir es Safadi	Late Chalcolithic	Eldar and Baumgarten 1985, 135, 137; Shugar 2000; Pfeiffer 2009, 320, Table 1
Arad	Late Chalcolithic	Amiran 1978, 9; Pfeiffer 2009, 320, Table 1
Maadi	Late Chalcolithic-EB I	Rizkana and Seeher 1989, 80–85
Nahal Mishmar	Late Chalcolithic-EB I	Bar-Adon 1980
Ashalim Cave	Late Chalcolithic	Yahalom-Mack et al. 2015
Feinan	Early(?)-Late Chalcolithic	Baker and Mattingly 2008; Grattan et al. 2016
Timna, Site 212, Mine T	Early(?) Chalcolithic	Rothenberg 1999, 78-79; Shaw et al. 2018
Timna, Site 39	Early Chalcolithic	Rothenberg, Tylecote, and Boydell 1978, Rothenberg 1978, 4; 1985, 124; 1999, 79-82; Ben-Yosef et al. 2008

Table 5. References for crucibles and tuyeres from SE Anatolia, Levant and Egypt (ca. 4500-3100 BCE; see Figure 9 for images)

No	Region	Date	Site	Description	Reference
1	Levant, southern	Late Chalc	Abu Matar (reconstructed)	Hemispherical crucible	Golden 2010, fig. 7.6a
2	Levant, southern	Late Chalc	Abu Matar (reconstructed)	Hemispherical crucible	Golden 2010, fig. 7.6b

3	Levant, southern	Late Chalc	Abu Matar	V-shaped vessel reused as crucible	Golden 2010, 118, fig. 7.7c
4	Anatolia, SE	Late Chalc	Hacinebi (Phase B)	Bevel rim bowl	Stein 2001, fig. 8.6:c
5	Levant, southern	Late Chalc	Arad (Level V)	Hemispherical crucible	Amiran et al. 1978, pl. 67.129
6	Levant, southern	EB IA	Meser	Socketed crucible	Pfeiffer 2009, 319, fig. 13, after Dothan 1967, 28
7	Levant, northern	EBI/II	Amuq Plain survey (Amuq G)	Spouted crucible	Braidwood & Braidwood 1960, 269, fig. 207:12
8	Iran	Late Chalc/ EB I	Tepe Ghabristan (Period II)	Socketed crucible	Amiet 1986, 238, fig, 7
9	Sinai	EB IB/II	Southern Sinai	Crucible, hemispheric with straight sides	Beit-Arieh 2003, 6.4:3
10	Egypt	Dyn. 2	Elkab	Spouted crucible	Claes, Davey, and Hendrickx 2020, fig. 2
11	Sinai	EB I/II	Site 1039	Tuyère	Beit Arieh 2003, 301. n.5
12	Sinai	EB I/II	Site 1041	Tuyère	Beit Arieh 2003, 302. n.1
13	Levant, southern	Late Chal	Abu Matar	Tuyère	Shugar 2001, fig. 504

Table 6. References for Chalcolithic copper objects in the southern Levant (ca. 4500-3800 BCE; see Figure 10 for images)

No	Site	Description	Reference
1	Nahal Mishmar	Macehead	Bar-Adon 1980, 120 (no. 185)
2	Cave of the Sandal	Disc-shaped macehead, unalloyed copper	Segal, Kamenski, and Merkel 2002, fig. 1.3
3	Shiqmim	Disc-shaped copper macehead	Golden, Levy, and Hauptmann 2001, fig. 11
4	Ashalim Cave	Lead macehead	Yahalom-Mack et al. 2015, fig. 5
5	Givat Ha-Oranim	Copper standard	Namdar et al. 2004, fig. 5.2
6	Nahal Shalva	Copper standard	Isreal, Aladjem, and Milevski 2014, fig. 3
7	Peqi`in	Solid copper standard	Shalem, Gal, and Smithline 2013, fig. 9.3
8	Shiqmim	Copper standard	Levy and Alon 1985, fig. 4.6
9	Nahal Mishmar	Scepter, prominent-nose motif	Bar-Adon 1980 (no.21); Beck 1989, fig. 6d
10	Nahal Mishmar	Horn-shaped copper object	Bar-Adon 1980, 105 (no. 15); Beck 1989, fig. 6b
12	Neve Noy	Piriform copper standard	Eldar and Baumgarten 1985, 135, fig. C

13	Givat Ha-Oranim	Copper standard	Namdar et al. 2004, fig.5.2:1
14	Bir Safadi	Awl	Ilan and Sebbane, fig. 4.1, IDAM no. 63-479
15	Nahal Mishmar	Shaft-hole axe	Bar-Adon 1980, 112 (no. 170)
16	Teleilat Ghassul	Fishing hook	Rosenberg and Rivka 2020, fig. 2.7
17	Abu Matar	Oval ingot (Cu-As-Ni-Sb)	Golden 2010, fig. 7.21
18	Shiqmim	Oval ingot ("pure" copper)	Golden 2001, fig. 9
19	Nahal Qanah	Gold Ingot	Gopher 1996
20	Stollhof Hoard	Double spiral wire	Angeli 1967, Tafel 1
21	Neve Noy	Double spiral wire	Eldar and Baumgarten 1985, 134
22	Nahal Mishmar	Mining hammer, skeuomorph?	Bar-Adon 1980, 115 (no. 163)
23	Nahal Mishmar	Shaft-hole axe	Bar-Adon 1980, 98 (no.148)
24	Nahal Mishmar	Crown, bird motif	Moorey 1988, fig.3a
25	Nahal Mishmar	Crown, prominent-nose motif	Moorey 1988, fig.3b
26	Nahal Mishmar	Horn-shaped object	Bar-Adon 1980, 105 (no. 157)

Table 7. References for ingot development in southwestern Asia (ca. 4500-2500 BCE; see Figure 12)

No	Region	Date	Site	Description	Reference
1	Anatolia, SE	Pre-Uruk: Phase A	Hacinebi	One-sided ceramic oval ingot mold	Stein 2001, 278, fig.8.5
2	Levant, southern	Late Chalc.	Abu Matar	Oval ingot (Cu-As-Ni-Sb)	Golden 2010, fig. 7.21
3	Levant, southern	Late Chalc	Shiqmim	Oval ingot ("pure" copper)	Golden 2001, fig. 9
4	Levant, southern	Late Chalc.	Nahal Qanah	Gold Ingot	Gopher 1996
5	Levant, southern	EB IB	Tel esh-Shuna North	One-sided, ceramic bar ingot mold (ceramic)	Rehren et al. 1997, fig. 2
6	Levant, southern	EB IA	Tall Hujayrat al-Ghuzlan	One-sided, oval ceramic copper ingot mold	Klimscha 2012, fig.22
7	Levant, southern	EB IA	Tall Hujayrat al-Ghuzlan	One-sided, rectangular ceramic copper ingot mold	Klimscha 2012, fig.22

8	Delta, Egypt	Naqada I-II (EB IA)	Maadi	Oval copper ingot	Pfeiffer 2009, 323, fig. 17
9	Delta, Egypt	Naqada I-II (EBIA)	Maadi	Rectangular copper ingot	Pfeiffer 2009, 323, fig. 17

Table 8. References for shared cultic iconography of prominent nose and eyes motif (see Figure 13 for images).

No	Site	Description	Reference
1	Nahal Mishmar	Crown, lost-wax cast	Bar Adon 1980; Moorey 1988, fig.3b
2	Golan	Basalt pillar stand	Bar Adon 1980; Beck 1989, fig. 9e
3	Nahal Mishmar	Scepter, lost-wax cast	Bar Adon 1980; Beck 1989, fig. 6d
4	Peqi`in	Ossuary	Shalem 2015, fig. 2F
5	Azor	Ossuary	Shalem 2015, fig.6B
6	Toptepe	Vessel	Shalem 2015, fig.6C

Table 9. References similarities between Nile Valley and southern Levant (see Figure 20 for images)

No	Site	Description	Reference
1	Badari	Rectangular palette	Brunton and Caton-Thompson 1928
2	Badari	Ivory figurine	British Museum, EA59648
3	Badari	Ivory spoon, ibex motif	Brunton and Caton-Thompson 1928, pl. XXXII:3
4	Badari	Palette, double bird motif	Brunton and Caton-Thompson 1928, LII:22
5	Mesaid	Greywacke palette	MFA Boston 11.225
6	Badari	Vessel with pierced holes	Brunton and Caton-Thompson 1928, pl. XLIV
7	Gilat	Rectangular palette	Rowan et al. 2006, fig. 12.29:2
8	Bir es-Safadi	Ivory figurine on sprue	Perrot, 11, fig. 1
9	Nahal Mishmar	Ram and ibex standard	Bar Adon 1980, no. 17; Beck 1989, fig.5b
10	Nahal Mishmar	Standard, double-ibex motif	Beck 1989, fig.7c
11	Nahal Mishmar	Crown, bird motif	Bar Adon 1980, no. 21
12	Nahal Mishmar	Vessel with pierced holes	Bar Adon 1980

Table 10 References similarities between prominent-nose/human-bird motif in Nile Valley and southern Levant (see Figure 23 for images)

No	Site	Description	Reference
1	Nahal Mishmar	Crown. Bird motif	Bar Adon 1980
2	Abbu Matar	Ivory bird figurine	Perrot 1979, ,pl. 57
3	Nahal Mishmar	Scepter, lost-wax cast	Bar Adon 1980; Beck 1989, fig. 6d
4	Golan	Basalt pillar figurines	Brunton and Caton-Thompson 1928, LII:22

5	Peqi`in	Ossuary	Shalem 2015, fig. 2F
6	Azor	Ossuary	Shalem 2015, fig.6B
7	Mesaid	Greywacke palette	MFA Boston 11.225
8	Badari	Ivory spoon with double bird motif	Brunton and Caton-Thompson 1928, XXII:7
9	Nile Valley	Figurine of bird-woman with arms raised	

Table 11. Material similarities between Nile Valley and Late Chalcolithic/Early Bronze I Southern Levant (see Figure 28 for images).

No	Site	Context	Description	Period	Citation
9	Nahal Mishmar	Cave 1, hoard	Double ibex standard	Late Chalc/EB IA	Bar-Adon 1980, 102-103, fno.154
10	Egypt	Unknown	Nebwy palette	Naqada IIC-IIIB	Meyer 1991, 20
11	Fidan 4	Settlement	Stone pick	EB IA	Adams and Genz 1995, fig. 8.1
12	Nile Valley	Burial	Double-pointed "macehead"	Naqada II	Cialowicz 1898, 265, fig. 1.6
13	Nahal Mishmar	Cave 1, hoard	Pear-shaped macehead	Late Chalc/EB IA	Bar-Adon 1980, 119, no. 400
14	Nile Delta and Valley	Various tombs	Pear-shaped macehead	Merimde, Naqada IIA and on	Cialowicz 1898, 264, fig. 1.5
15	Nahal Mishmar	Cave 1, hoard	Copper "crown" (birthing stool/furnace collar) with ostrich and horns arranged around rim	Late Chalc/ EB I	Bar-Adon 1980, 24, no.7
16	Hierakonpolis	Tomb 100	Plaster fresco depicting animals around a circular enclosure	Naqada IIC	Case and Crowfoot 1962
17	el-Badari	T1629	Bag-shaped stone vessel with lug handles resembling Chalcolithic churn	Badarian	Brunton and Caton-Thompson 1928, pl. LI:14
18	Gilat	Room A, St. IIC	Lady of Gilat on birthing stool/furnace collar(?) with ceramic churn	Late Chalcolithic	Amzallag 2016
19	Unknown		Basket-handle ceramic vessel with bird figurines	EB IA	Amrian 1986
20	el Mahasna	Tomb H29	C-ware bowl with four clay hippopotami on the rim	Naqada I	Manchester Museum 5069

Table 12. Naqada I-II palettes (see Figure 30 for images)

No	Palette Name	Period	Excavation Location	Measurements	Reference[187]
1	Elephant palette	Naqada I	Hu, Tomb B102	Unknown	(Petrie 1901a, pl. XII, n.43 and pl. V, B102 mid row, right)
2	Double Bird "Pleta" Palette	NaqadanIIA/B	Naga ed-Deir	3 x 4 7/8	P.A. Hearst Museum of Anthropology, Berkeley, California
3	Two ibexes palette	Naqada IC-IIB	Unknown	Unknown	(Capart 1904, 90, fig. 59 (center))
4	"Hathor" palette	Naqada IIC/D1	Gerzeh, Tomb 59	Unknown	(Petrie, Wainwright, and Mackay 1912, pl. VI:7)
5	Double bird palette	Naqada II	Unknown	Unknown	(Spencer 1993, 42 fig. 24; British Mus. EA 32503)
6	Nebwy palette	Naqada IIIC/IIIB	Unknown	Unknown	Laure Meyer, "Métamorphoses de l'Art antique" in Archeologia 267 (Dijon, France, April 1991), pp. 18-25 (fig. p. 20)

Table 13. Badarian and Predynastic copper objects from Nile Valley and Delta (see Figure 35 for images).

No	Site	Context	Description	Reference
1	Nagada	Grave 836	Dagger (copper)	Petrie and Quibell 1896, 22-23, 48, pl. LXV, 3, LXXXIII; Petschel 2011, cat. No. 237
2	El-Amrah	Grave b 250	Dagger (silver with ivory handle)	Randall-Maciver and Mace 1902, 23, 40, pl. VI; Hartung 2001, 308; Petchsel 2001, 350. no. 1 Petschel 2011, 498, cat. No. 240
3	El-Amrah	Grave a 131	Dagger (copper)	Petschel 2011, 498, cat. No. 240, with reference to Randall-Maciver and Mace 1902, 20, 40, Taf. X.5
4	Hamra Dum	-	Dagger (copper)	Petschel 2011, 498, cat no. 242, with reference to DeMorgan 1896, 201, n. 546
5	el-Badari	Tomb EN 216	Fish tail flint knife	Brunton 1948, pl. LXXX n. 72
6	Hierakonpolis	Main deposit	Copper dagger	Quibell 1898, 8, pl. XXIV:2
7	Naqada	Tomb 807	Chisel	Petrie and Quibell 1896, 27, pl. LXV, 11

[187] References from Raffaele, Francesco. 2019. "Corpus of Egyptian Late Predynastic Palettes." http://xoomer.virgilio.it/francescoraf/hesyra/palettes.htm. Access date: August 19, 2019.

8	Faras	A-group cemetery	Copper axe (1.3% As)	Davies 1987, 27, pl. 1.2
9	Naqada	T400; 702, 1298, Q603	Adze	Petrie and Quibell 1896, 22, pl. LXV, 5
10	Naqada	Tomb 39	Adze/chisel	Petrie and Quibell 1896, 20, pl. LXV, 6
11	Naqada	Tomb 9	Harpoon	Petrie and Quibell 1896, pl. LXV, 7
12	Matmar	Tomb 3131	Copper axe (1.28% Ni)	Brunton 1948, 16, 21, 23, pl. XVI, 47
13	Naqada	Tomb Q172	Gold pendant	Petrie and Quibell 1896, pl. LXV, 16
14	Naqada	Tomb 3	Needle/pin	Petrie and Quibell 1896, 24, pl. LXV, 21
15	Naqada	Tomb 162	Cosmetic spoon	Petrie and Quibell 1896, pl. LXV, 13
16	Naqada	Tomb 1257	Silver bead	Petrie and Quibell 1896, pl. LXV, 1
17	Naqada	Tomb 1257	silver lid for porphyry jar	Petrie and Quibell 1896, pl. LXV, 2
18	Naqada	Tomb 218	Copper pin with loop	Petrie and Quibell 1896, 21, pl. LXV, 15
19	Naqada	Tomb 3	Copper pin	Petrie and Quibell 1896, 24, pl. LXV, 22
20	Naqada	Tomb 63	Copper blade?	Petrie and Quibell 1896, pl. LXV, 23
21	Naqada	Tomb 1480	Pierced copper sheet	Petrie and Quibell 1896, 48, pl. LXIV, 100-101
23	Naqada	Tomb Q103	Hook	Petrie and Quibell 1896, pl. LXV, 17
24	Naqada	Tomb 807	Razor	Petrie and Quibell 1896, 27, pl. LXV, 4
25	Qusutl	Grave L24	Copper sheeting, shaped like papyrus stalk	Wengrow 2006, 168-169, fig. 8.5, after Williams 1986, 359, pl.64:a-b, 65:a-b
26	Khirbet Hamra Dawood	Grave 371	Copper alloy spearhead	Rowland 2014, 284, fig. 11
27	Qustul	Grave L24	Copper spearhead	Wengrow 2006, 168-169, fig. 8.5, after Williams 1986, 359, pl.64:a-b, 65:a-b
28	El Mahasna	Grave H85	Copper ritual tool? (not to scale)	(Ayrton and Loat 1911, 19, pl. XIX, 5)
29	El Mahasna	Grave H85	Copper ritual tool? (not to scale)	(Ayrton and Loat 1911, 19, pl. XIX, 5)
30	El Mahasna	Grave H85	Copper ritual tool? (not to scale)	(Ayrton and Loat 1911, 19, pl. XIX, 5)
31	Matmar	Tomb 2649	Copper hook (harpoon?)	Brunton 1948, 13, pl. XVI:39
32	Qena	Purchased	Stone vase fragment depicting individual with three tang crescent axe and dagger	Krauss 1995, 154

33	Tel el-Farkha	Kom C, settlement Lower Egyptian residency, Square 63B	Copper knife	Czarnowicz 2012, fig. 1.2
34	Tel el-Farkha	Kom E, settlement, Square 75D	Copper butcher knife (mimicking flint)	Czarnowicz 2012, fig. 1.3
35	Tarkhan	Grave 1023	Model saw	Petrie et al. 1913, 9, pl. V, 16
35	Tel el-Farkha	Kom, administrative cult center	Model knife, sheet copper	Czarnowicz 2012, fig. 3.11
36	Tel el-Farkha	Grave 55	Copper harpoon	Czarnowicz 2012, fig. 3.9
37	Tarkhan	Grave 1023	Model chisel	Petrie et al. 1913, 9, pl. V, 18
37	Abydos, Osiris Temple	Chamber M69	Figurine, lost-wax cast (copper)	Petrie 1903, pl. V, no.34
38	Abydos-Umm el Qab	Chamber M69	Figurine, lost-wax cast (copper)	Petrie 1903, pl. V, no.35
39	Naqada	Tomb 721	Seth-animal(?) made of wood, coated in lead and fastened with copper pins	Petrie and Quibell 1896, pl. LX, 14
40	el-Badari	Tomb	Ivory figurine of woman, parallel in Ubaid	Brunton and Caton-Thompson 1928, 28-29, pl. XXIV:2, XXV:3-4
41	Mostagedda	Tombs 2229 and 596	Copper beads, 3 square-section rolled into circle (T2229), fourth bead copper thin metal ribbon wound spirally to form ring twisted (596)	Brunton 1937, 51-52;
42	Tel el-Farkha	Kom C, settlement, sq. 53A	Copper pin with loop	Czarnowicz 2012, fig. 4.5
43	Tel el-Farkha		Copper bracelet	Czarnowicz 2012, fig. 3.4

Table 14 Proposed Nahal Mishmar Chronology (see Figure 45 for images).

No	Site	Date	Description	Reference
1	Nahal Mishmar	Late Chalcolithic	Copper standard	Bar-Adon 1980
2	Nahal Mishmar	Late Chalcolithic	Copper standard, four protruding knobs	Bar-Adon 1980
3	Nahal Mishmar	Late Chalcolithic	Copper crown, prominent-nose motif	Bar-Adon 1980

4	Nahal Mishmar	Late Chalcolithic	Copper standard, prominent-nose motif	Bar-Adon 1980
5	Nahal Mishmar	Late Chalcolithic	Copper vessel with pedestal foot	Bar-Adon 1980
6	Nahal Mishmar	Late Chalcolithic	Copper standard, decorated	Bar-Adon 1980
7	Nahal Mishmar	Late Chalcolithic	Copper standard, horns	Bar-Adon 1980
8	Nahal Mishmar	Late Chalcolithic	Mace-head, disc-shaped	Bar-Adon 1980
9	Nahal Mishmar	Late Chalcolithic	Copper crown, bird applique	Bar-Adon 1980
10	Nahal Mishmar	Late Chalcolithic	Copper vessel with basket handle	Bar-Adon 1980
11	Nahal Mishmar	EB IA or IB	Double ibex macehead	Bar-Adon 1980
12	Nahal Mishmar	EB IA or IB	Screw-horned ram scepter	Bar-Adon 1980
13	Nahal Mishmar	EB IA or IB	Copper standard, shepherd's crook	Bar-Adon 1980
14	Nahal Mishmar	EB IA or IB	Copper standard, bird in flight	Bar-Adon 1980
15	Nahal Mishmar	EB IB or II	Copper standard, plant	Bar-Adon 1980
16	Nahal Mishmar	EB IB or II	Copper standard, plant	Bar-Adon 1980
17	Nahal Mishmar	EB IB or II	Copper standard, tri-lobed disc	Bar-Adon 1980
18	Shiqmim	Late Chalcolithic	Copper standard	Levy and Alon 1985, fig. 4.6
19	Abu Matar	Late Chalcolithic	Copper standard, protruding knobs	Perrot 1955c, fig.20:24
20	Golan	Late Chalcolithic	Basalt pillar stand, prominent nose	Beck 1989
21	Azor	Late Chalcolithic	Ossuary with prominent nose	Shalem 2015, 226, fig. 6.B
22	Kissufim Road	Late Chalcolithic	Pedestalled goblet	Rowan and Golden 2009, 34, fig. 7.F ; Goren and Fabian 2002, fig. 4.2
23	Bir Safadi (Neve Noy)	Late Chalcolithic	Copper standard	Goren 2008, 388, fig. 8
24	Rasm Harbush	Late Chalcolithic	Horned pithos	Epstein 1985, fig. 8
25	Cave of the Sandal	Late Chalcolithic	Disc-shaped copper macehead	Segal et al. 2002, fig. 1.3

26	Unknown	EB IA	Ceramic basket-handled vessel with bird applique on rim	Amiran 1986, fig.1B
27	el-Mahasna (TH29)	Naqada I	C-ware bowl with hippo applique on rim	Manchester Museum 5069
28	Abadiya	Naqada I	Ceramic vessel with basket-handle	Wodzińska 2010a, 109, Naqada I12
29	Abydos, T503	Naqada IId	Ripple-flaked knife	Hikade 2003, fig. 3:4
30	Kfar Monash	EB IB	Flanged axe	Hestrin and Tadmor 1963, fig. 2.3
31	Naga el-Deir	Naqada I-IIB	Double bird "Pelta" Palette	Traced by author from Hearst Museum
32	Abydos(?)	Naqada III	Double bull motif on Hunter's Palette	Beck 1989, 51, fig. 7.e
33	Saqqara	Dynasty 1	Double lion motif, cylinder seal	Beck 1989, 51, fig. 7.f
34	Abydos	Naqada III/Dyn 0	Impression of ram on tall ceramic stand	Wodzińska 2010b, 114, Archaic 81
35	Habuba Kabira	Mid-Uruk	Cylinder seal impression with spiral-horned ram	Vila and Helmer 2014, fig. 2.8
36	Unknown	Naqada IIC/D-IIIA	Men holding crooks from MMA knife handle	Williams, Logan, and Murnane 1987, 273, fig. 2
37	Hierakonpolis	Dynasty 0	Schematic from Narmer macehead	Millet 1990, fig. 1
38	Hierakonpolis	Dynasty 0	Papyrus hieroglyph, heraldic plant of Delta	Gardiner 1957, M15
39	Umm el-Qa`ab	Dynasty 1 (Den)	*swt*-hieroglyph used in titulary of king (*nswt bjtj*)	Gardiner 1957, M23
40	Saqqara	Dynasty 1 (Den)	Tri-lobed disc of Sabu (Greywacke)	Emery 1949, 101, fig. 58

Table 15. Copper maceheads from Nahal Mishmar and Faience Imitations of Lost-wax maceheads from the "Main Deposit" at Hierakonpolis (see Figure 53 for images).

No	Description	Site	Context	Date	Reference
1	Lost-wax cast copper macehead	Nahal Mishmar	Cave 1	Late Chalc/EB IA	Bar-Adon 1980, 118, n.182
2	Faience object	Hierakonpolis	Main deposit	Late Predynastic/Early Dynastic	Adams 1974, 42-43, no.217, pl.32, 37
3	Lost-wax cast copper macehead	Nahal Mishmar	Cave 1	Late Chalc/EB IA	Bar-Adon 1980, 73, n.78
4	Faience object	Hierakonpolis	Main deposit	Late Predynastic/Early Dynastic	Quibell 1900, pl. XXII.9; Adams 1974, 32, no.154, pl. 24
5	Lost-wax cast copper macehead	Nahal Mishmar	Cave 1	Late Chalc/EB IA	Bar-Adon 1980, 61, n.39
6	Faience object	Hierakonpolis	Main deposit	Late Predynastic/Early Dynastic	Quibell 1900, pl. XXII.5; Adams 1974, 32, no.152, pl. 24

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