Copper in Early Egypt

Marcin Czarnowicz

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Institute of Archaeology, Jagiellonian University in Kraków
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Translation and proofreading
Piotr Godlewski and Eliot Braun

Photographs
Marcin Czarnowicz, Agnieszka Ochał-Czarnowicz, Barbara Witkowska

Drawings
Marcin Czarnowicz

layout and setting
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Institute of Archaeology,
Jagiellonian University in Kraków
ul. Gołębia 11, 31-007 Kraków Poland
tel. +48 12 663 12 79
archeo.sekretariat@uj.edu.pl

Profil-Archeo Publishing House
ul. Jurajska 23
32-087 Pękowice n. Kraków, Poland
tel. +48 12 665 10 11
wydawnictwo@profil-archeo.pl
www.profil-archeo.pl

Contents

Dear reader, the book presented to you here is the fruit of several years of research on the spread of copper in Egypt and the Near East in the 5th and 4th millennia BC. My work was made possible by a grant awarded by the National Science Centre under decision DEC-2014/15/N/HS3/01144, and the full title of my project is: *The comparative analyses of Early Bronze Age Egyptian and Southern Levantine copper tools including the influences from the Arabian Peninsula and Mesopotamia region*. The aim of the research was to investigate the relationships between Egypt and the Near East, the Levant in particular, and their influence on the development of copper metallurgy during the Late Chalcolithic and Early Bronze Age. An important part of the study was to identify possible influences from other directions, linked to centres in Mesopotamia and the Arabian Peninsula, which may have also played a role in shaping the situation in Egypt. However, it soon became clear that it was the links with the Levant, established over many generations, which had a key influence on the emergence and use of copper by communities living along the Nile. The immediate reason behind taking up the subject lay in the difficulties I encountered in analysing the material recovered from the Tell el-Farkha site in Egypt by the research of the Polish Archaeological Mission to the Eastern Nile Delta. It turned out that despite the passage of 100 years since the publication of W.M.F. Petri's *Tools and Weapons*, no one had undertaken the task of expanding the typology of copper tools, to detail their chronology, or even to correct the obvious typological errors appearing in the work of the renowned English scholar. The only person making efforts to change this has been Martin Odler, the Czech scholar who presented the results of his research in Kraków, among other places, during the Copper and Trade conference which I co-organised, where he presented the typology of adze from the first copper specimens to the end of the Old Kingdom.

In recent years, the application of laboratory methods has popularized studies on the origins of raw materials used to make tools discovered in the Near East. Unfortunately, the law in force in Egypt makes it virtually impossible to carry out such research. This blocks the progress of knowledge and limits the analyses to artefacts stored in foreign museums, which often come from uncertain sources or unknown contexts. Despite the advances in both field and laboratory research, archaeologists are still struggling with

interpretation and chronological difficulties, and even with attribution of tool finds to proper categories. I therefore decided that to move forward with the research it was necessary for a publication summarising my studies on copper objects, one taking a more typology-oriented approach, showing the origins, development and stylistic changes of in the most common types of tools and weapons. Limiting the scope of the study to utilitarian objects was necessary. After the decline of the Chalcolithic societies, who produced beautiful copper sceptres, crowns, and other social status markers, Levantine metallurgy was reborn in a completely new form, with production limited solely to utilitarian objects. Another important aspect addressed is the relationship with the Near East, as seen largely through the prism of the circulation of copper and its products.

The chronological scope of the book is limited to the times of particularly intense contacts between Egypt and the Near East. The symbolic beginning of that period is the appearance of the first copper objects on the Nile, which was still in the times of the Badari culture. The end is marked by the end of Narmer's reign and the collapse of the network of Egyptian trade factories in the southern Levant.

The sources used in this project are mainly published copper tools found in Egypt and the Near East in contexts dating to the late 5th and early 4th millennia BC. The catalogue was expanded to include finds from excavations at several sites, such as Tell el-Farkha and Tell el-Murra in Egypt and Tel Erani in Israel. I also had access to data from a survey conducted in southern Jordan by Piotr Kołodziejczyk, PhD. In addition, my research made use of materials found in museum catalogues, which in several cases allowed for providing more detailed information on the finds from Petri's excavations in Upper Egypt. It should be stressed in this context that the vast majority of copper objects were found in the rich graves of the Naqada culture in Upper Egypt at the turn of the 20th century. Their publication is very often not up to current standards. As is quite common in publications of the works of Petri, information on the context of the objects found or the chronology of the assemblages they were part of is often missing. Information on the size of artefacts is also very rarely provided. In my research I made every effort to discover as much information as I could, although this sometimes proved impossible. Therefore, in most cases I chose not to compare the objects by size, since this data was relatively the least available in old publications and I was not able to obtain all of it from museum collections or other sources.

The project would not have been possible without the support of many people. First of all, I would like to thank my wonderful wife and son, who bravely endured all my trips connected with the project, as well as my parents and brother. My mentor, Professor Krzysztof Ciałowicz, was a source of great support. Special thanks are due to Piotr Kołodziejczyk PhD and Jacek Karmowski PhD, my companions during my travels in the Near East and Egypt. Discussions with colleagues conducting research on various issues related to the development of Near Eastern societies in the 4th and 5th millenium

BC contributed greatly to this study. I would like to mention Eliot Braun, Ianir Milevski, Martin Odler, Yuval Yekutieli, Matt Adams, Marcelo Campagno, and others. Geoffrey Tassie deserves a special place in this group. Geoffrey and I had several ideas related to my project, but his untimely and unfortunate death prevented them from coming to fruition. This work would not likely have come into being if not for the opportunity to conduct studies at such institutions as the IAA, EBAF, AIAR, CAŚ, and IFAO, and to have access to finds from sites such as Tell el-Farkha, Tell el-Murra, Tel Erani and others. To the leaders of these expeditions I offer my sincere thanks.

I would like to dedicate this book to my grandparents, who instilled in me an interest in the Near East and whose stories about the magnificent monuments of Iraq and Jordan led me to become an archaeologist.

The cultural landscape of Egypt and Southern Levant in the 4th millennium BC

Egypt

Egypt is understood here as the area stretching from the 1st cataract to the coast of the Mediterranean Sea, confined to the east and west by deserts.

Egypt lies in a sub-tropical zone characterised by very dry or dry climate, with only the northernmost part belonging to the Mediterranean zone. Egypt can be divided into two distinct geographic zones, namely the Nile Valley and the Nile Delta, which correspond with the historical lands of Upper and Lower Egypt. Some researchers also distinguish another region – Central Egypt – which stretches from Memphis to Asyut (Ciałowicz 1999: 19). The term Upper Egypt is taken here to mean the entire area of the Nile Valley as far as Fayum.

When describing the range of the Lower Egyptian culture, two terms are often interchangeably used: 'Delta' and 'Lower Egypt'. This, however, is only a mental shortcut as the range of the culture in question extended beyond the geographical boundaries of the Nile Delta. In this study, Lower Egypt is understood as the area north of the Fayum oasis.

Upper Egypt means the Nile Valley, ranging in breadth from 2–3 km in the south to 15–20 km near Cairo. Human settlement was clustered along the river, excluding the floodplain, which was used as farmlands. Cemeteries were founded further away from the river, at the margins of the fertile land. Both edges of the Nile Valley are marked by limestone hills, often crossed by numerous wadis. The river served for communication with Lower Egypt, while wadis facilitated contact with the Red Sea coast. To the west of the Nile Valley stretches the Libyan (Western) Desert, with a few oases. From the perspective applied in this study the most important of them is the Fayum Oasis, where one of the earliest Neolithic cultures in Egypt developed.

East of the Valley is the Eastern Desert, also known as the Arabian Desert, with the Sinai Peninsula as its extension. The peninsula is mainly highlands with high mountains in the central part and gentle slopes along the Mediterranean coast. Sinai abounds in mineral resources, in particular copper and turquoise, which were exploited from prehistoric times.

The north of Egypt is completely different. The Nile Delta is a lowland area. In the period discussed in this study it was an accumulation area, where the Nile floods

regularly deposited large amounts of sediments carried by the river. Today, the appearance and nature of the Delta differs much from the landscape of the 4th millennium BC. Lower Egypt is now densely populated and crisscrossed by numerous irrigation canals. The two main Nile branches – Rosetta (western) and Damietta (eastern) – remain active today. In the period discussed here the Delta was a much more humid environment, with most part of the region covered with floodplains and wetlands, with many oxbow lakes. The vegetation was lush, and the floodplains soon started to be exploited as farmlands (Czarnowicz 2018). Settlement was only possible in selected places. In the north, these were so-called turtlebacks – vast islands created in the Pleistocene from sediments accumulating along the then banks of the Nile. They can be encountered to the south of the tectonic fault running along the Mit Gamr – Minouf line (Issawi 1976: 21; Pawlikowski and Wasilewski 2012: 375). Further to the north and in the Holocene period gezirahs formed, and the mechanisms behind their formation resembled that responsible for the development of turtlebacks. Sandy islands were the only elevated locations in the Delta and by this virtue the only places where humans could survive the Nile floods. This made gezirahs and turtlebacks the perfect places for settlement. The further to the north the more wetlands and swamps there were, and closer to the sea coastal lakes developed, supplied by waters from the many branches of the Nile. In ancient times the Nile had seven main distributaries. The above-mentioned Rosetta and Damietta of today were the Phatnitic and Bolbitine branches, and there were also the now completely silted branches known as Canopic, Sebennetic, Tanitic, Pelusiac, and Mendesian. Though settlements were typically established close to the Nile channels, not all of them were navigable. Many branches in the coastal zone emptied into coastal lakes or ended in marshlands. It needs to be stressed that the landscape of the Delta was very changeable. Stronger floods could change the course of channel beds, sometimes over considerable distances, which resulted in the settlement shifting towards or away from the channels. This may explain why archaeological research in the Delta revealed relatively large settlements, larger than those known from Upper Egypt. As the chronological differences within short time periods are difficult to identify, the picture of settlement in Predynastic Egypt, and in particular the differences between the Delta and the rest of the country, may be deceptive.

Southern Levant

Southern Levant is separated from Egypt only by a narrow strip of northern Sinai. As understood in this study, the region covers the south-eastern coasts of the Mediterranean Sea, in Polish literature often referred to as Palestine. Aside from the seacoast to the west, the borders are not precisely defined. The eastern margin is the Syrian Desert, and the southern boundary runs approximately along the southern margins of the Negev

and Edom (Bieliński 1985: 15–16; Śliwa 1997: 9–11). The northern boundary is most difficult to determine. It starts between Tyr and Akko at the height of Rosh Haniqra promontory, and follows east via Nahal Betzet towards Mount Hermon, leaving sites like Hazor and Dan, important for the history of the region, on the Palestinian side (Suriano 2014: 13ff.). Southern Levant historically divides into two regions: Cisjordan in the west and Transjordan in the east. The border between the two is the Jordan fault (Bieliński 1985: 17; Śliwa 1997: 11), which contains the largest permanent water reservoirs in the region: the lakes of Hula and Tiberias and the Dead Sea. The northern part of the fault is occupied by the Jordan Valley. The Jordan is the only permanent river in the region. It has four major springs, including on the slopes of Mount Hermon, and it empties into the Dead Sea. South of the Dead Sea, the Jordan fault continues as a valley up to 30 km wide as far as Akaba. The described area is the lowest dry land on Earth.

In terms of landscape, Southern Levant differs completely from Egypt. The region is comprised of scores of small areas, valleys and plateaus, separated by mountain ranges or valleys. This created completely different conditions for the development of human communities. In Egypt, the absence of natural barriers allowed for easy contact, which favoured exchange of ideas and development. In the Levant, these processes operated on a much smaller scale, resulting in the development of local enclaves like the Jezreel valley, Shfela, or Negev. As early as the Early Bronze Age I (EB I), some centres like Megiddo and Tel Erani clearly gained a dominant position within the region. This great geographic and climatic diversity translated into considerable differences in material culture among Southern Levantine communities, which is evident in pottery decoration, to give just one example (cf. Braun 2012). These factors most likely affected social development as well. The western part of the region offered good opportunities for settlement and farming, which allowed for the rise of large central settlements and, ultimately, the first cities. The eastern areas, predominantly highlands marked by dry climate, became home to nomadic communities who based their economy on goat and sheep herding.

Periodisation

Egypt

The 4th millennium BC covers the Pre- and Protodynastic periods in Egypt. This is a time of great importance for the history of the Pharaonic state, as it was then that the foundations of the Egyptian civilisation were laid. Many aspects of social and political life known from the Dynastic period have their roots in Predynastic Egypt. The foundations of a periodisation for the 4th millennium BC were created by W.M.F. Petrie (1901). He applied the seriation method to the data he collected based on ceramic vessels recovered

from graves during his excavations of the Naqada, Ballas, and Diospolis Parva cemeteries. Petrie concluded that the Predynastic period can be divided into three separate cultural units: Amratian, Gerzean, and Semainian. He distinguished 50 sequence dates (SD), assigning them numbers from 30 to 80, with the range of 1–30 left deliberately unused in case some new cultures were discovered in future. In the original scheme, the cultures of Predynastic Egypt covered the following ranges: Amratian (Naqada I) – SD 30–37, Gerzean (Naqada II) – SD 38–60, and Semainian (Naqada III) – SD 60–80 (Petrie 1901: 4–12). Petrie's division was re-assessed by W. Kaiser (1957), who chose the cemetery at Armant, well researched and published for pre-WWII standards (Mond and Myers 1937), as the basis for his study. He supplemented Petrie's method with spatial analysis, identifying groups of graves not only from the perspective of chronological distribution of vessels, but also within the horizontal stratigraphy of the site. This allowed Kaiser to propose the division of Upper Egypt's development during the 4th millennium BC into three main phases, within which he distinguished 11 stadia (*Stufen*) – chronological units identified based on the analysis of grave inventories and their attribution to spatial groups. Kaiser's division was criticised by S. Hendrickx (1989, 2006, 2011a) as relying on the materials from just one site. Hendrickx resolved to extend Kaiser's study by introducing as many cemeteries as possible into the database, while maintaining the basics of Kaiser's methodology in their analysis. The inclusion of this larger dataset allowed for refining the earlier model and more precise definition of boundaries between cultural phases (cf. Table 1). This applied in particular to Naqada III period, poorly represented in the Armant cemetery. In Kaiser's system particular stadia were designated with lower-case letters (e.g. Naqada Ia), while Hendrickx's system uses capital letters (Naqada IA). The division of the Naqada culture became the basis for the periodisation of the 4th millennium BC in Upper Egypt, and came to be applied to the Delta as well. The relative chronology of Egypt in the Predynastic period has been a subject of study by other researchers as well (Hassan 1988; Köhler 2010), but the findings by Kaiser and Hendrickx remain the most relevant and it is their systems that are commonly used as reference points in discussions on chronology. The table below illustrates correlations between the periodisation systems – Table 1.

In recent years, the introduction of subjective probability modelling has shed some new light on the absolute chronology of Predynastic Egypt. The results of these analyses are presented in Table 3 along with data concerning the periodisation of the Lower Egyptian culture.

The Lower Egyptian culture does not have such a developed chronological sequence as the Naqada culture. Its periodisation is based on materials from cemeteries and settlements alike and, along with stratigraphic data, an important role is played by Upper Egyptian imports, which allow for correlations with the Naqada culture. At present, the development of the Delta communities can be divided into three stadia spanning from Naqada I to the beginnings of Naqada IIIA1 (Mączyńska 2013: 19–21). Until recently,

Currently used division	Petrie's stadia		Kaiser (1957)	Hendrickx (1996, 1999)		Hassan (1988)	Köhler (2010)
Badari			Badari		Badari	Early Predynastic	Late Neolithic
Naqada I	**Amratian**	SD 30–38	Ia–c	I–IIB	I–IIB	Middle Predynastic	Chalcolithic
Naqada II	**Gerzean**	SD 38–62	IIa IIb IIc IId1 IId2	IIC IID1 IID2	IIC–D	Late Predynastic	Late Chalcolithic
Naqada III	**Semainian**	SD 63–80	IIIa1 IIIa2 IIIb1 IIIb2 IIIc1 IIIc2 IIIc3	(IID2) IIIA1 IIIA2 IIIB ... IIIB IIIC1 IIIC2	IIIA–D	Protodynastic	Early Bronze Age

Table 1. Correlation of systems of relative chronology after: Petrie 1899, 1901, 1920; Kaiser 1957; Hassan 1988; Hendrickx 1989, 1996, 1999, 2006, 2011a; Köhler 2010; Stevenson 2016

only two phases were distinguished, which referred to the stratigraphic situation recorded in Maadi. However, the research in Tell el-Farkha and other Delta settlements proved it necessary to distinguish another, transitional phase, during which the Lower Egyptian culture was replaced by that of Naqada (Table 2).

Radiocarbon dates indicate that the Naqada and Lower Egyptian cultures appeared in the first centuries of the 4th millennium BC. Initially, the Naqada culture coexisted in the Nile Valley with the Badari culture, but the latter soon disappeared. The cultural unification of Egypt took place in the beginnings of Naqada IIIA1. The table below presents developmental phases of cultures of Lower and Upper Egypt based on the most recent radiocarbon dates (Table 3).

Southern Levant

The chronology of Southern Levant was determined based on criteria completely different than in Egypt. Data seriation could not be applied in Palestine due to the prevalence of collective burials (cf. Stiebing 1970; Schaub and Rast eds. 1989). Another difficulty stemmed from the high local diversity in terms of material culture. All these factors cause the chronology of Southern Levant to be not as detailed as that available for Egypt.

Phases of the Lower Egyptian culture	Corresponding stratigraphic phases in Lower Egyptian sites	Correlation with the Naqada culture
Early	Maadi Wadi Digla I-II Heliopolis Buto Ia-II Tell el-Farcha 1 Kom el-Chilgan 1	Naqada I – IIB
Middle	Buto IIb Tell el-Farcha 1-2 Tell el-Iswid Tell Ibrahim Awad 7 Kom el-Chilgan Minshat Abu Omar I Beni Amir	Naqada IIC – IID1
Late	Buto IIIa Mendes B3 Tell Ibrahim Awad 7 Minshat Abu Omar I Beni Amir	Naqada IID2 – early IIIA1

Table 2. Chronology of the Lower Egyptian culture, after Mączyńska 2013: Tab. 3

Upper Egypt	Lower Egypt	Absolute dates
Badari	Final Merimde/Early Lower Egyptian (?)	(440–3800)
Naqada IA–IIB	Early Lower Egyptian	3900/3850–3500 BC
Naqada IIC–IID1	Middle Lower Egyptian	3500–3400 BC
Naqada IID2–IIIA1	Late Lower Egyptian/ cultural unification	3400–3300 BC
Naqada IIIA2–IIIB		3300–3085 BC
Naqada IIIC1		3085–3000/2950 BC

Table 3. Absolute chronologies of cultures of Upper and Lower Egypt, after: Dee *et al.* 2013; Hartung 2013; Mączyńska 2013: 1–21; Stevenson 2016

The prehistory of Southern Levant is described using the classic system by C. Thomsen, with particular epochs named after raw materials used for manufacture of tools. The 4th millennium BC was a period when the Chalcolithic civilisation collapsed and the communities of the Early Bronze Age I started to develop. It is worth noting that the archaeology of Southern Levant uses the term Chalcolithic rather than Eneolithic. At present, the term Chalcolithic corresponds to a period spanning from phase Jericho

VIII to the upper layers of Teleilat Ghassul and Beersheba (Garfinkel 1999: 104). The Chalcolithic divides into three sub-periods, known as the Early, Middle, and Late Chalcolithic.

As for the Early Bronze Age, the terminology proposed by K. Kenyon did not catch on, and today the system developed by G. Wright is used, which divides the Early Bronze Age into three phases. The 4th millennium BC is nearly entirely covered by phase EB I, divided into sub-periods EB Ia and EB Ib, each of which can be further subdivided into lower-range units designated with Arabic numbers (Yekutieli 2000: 129).

The Chalcolithic is believed to have come to an end around 3900 BC, as indicated by the dating of the abandonment of Teleilat Ghassul (Bourke *et al.* 2004). The end of EB Ib2 falls around 3000/2950. The detailed divisions are presented in the table below:

Phase	Absolute dates
Late Chalcolithic	–3900 BC
Transitional period (?)	3950–3750
EB IA1	3800/3750–3400
EB IA2	
EB IB1	3400–3000/2950
EB IB2	

Table 4. Absolute chronology of Southern Levant, after Bourke *et al.* 2004; Regev *et al.* 2012a, 2012b; de Miroschedji 2014; Sharon 2014

In light of the most recent research, the dating of the beginning of EB I seems to pose the biggest problem. The nature of the problem is described further in the text, but either the researchers must accept that the Bronze Age actually started earlier, or a transitional period of a few decades needs to be introduced to account for the time of collapse after the disintegration of the Chalcolithic culture, when the EB I culture was only taking shape. The end of EB I is not fully clear, either. Until recently it was believed that the rise of fortified cities marks the beginning of EB II. Today, however, it is known that the first such cities emerged still during EB Ib (Sharon 2014: 51). In such circumstances, the division needs to be based on the appearance of new ceramic forms, like vessels of the Abydos type. However, given their limited distribution, the transition from EB I to EB II is not always clearly legible in the stratigraphy of archaeological sites.

Cultural landscape

Egypt

The development of the Naqada culture led to the rise of the first territorial state in the world, with centralised power and the apparatus of administration at its disposal. This was possible due to processes of centralisation and rivalry among political and economic centres over the course of several centuries. In a way, a social organisation with a ruler as the leading force lies at the foundations of the Naqada culture. The responsibility of the ruler was to maintain order, and the role of the elites was to redistribute goods, in particular those most valuable (Anđelković 2011: 26–28). The social sphere was dominated by the ideology of sacralised force, which concentrated around it not only the political will but also the whole of economic and military operations, and held the fate of the entire community in its hands. The picture of a ruler as a protector of order started to take shape as early as Naqada I (Wilkinson 2003: 194). This is evidenced by symbolic representations, like vessels from tomb U-239 in Abydos (Dreyer 1998: 114, Fig. 13), where the ruler is depicted crushing his opponents. The question about the reasons behind such intensive social development is not an easy one. An interesting concept recently emerged, linking the evolution of the Egyptian political system with the landscape. T. Wilkinson (2003) notes that the Nile Valley is narrow, especially in the south of Upper Egypt where the Naqada culture formed, which set considerable limits on the area of land available for settlement and farming. This necessitated contacts with neighbours. Communities could either cooperate by sharing the farmland, exchanging goods, and helping to deal with the damage caused by floods, or they could compete (Lankester 2014: 6–7). Attempts at getting the upper hand over another village often included alliances against a common enemy. The first symptoms of social hierarchy in Upper Egypt appear as early as during Naqada I. They include, among other things, large, richly furnished burials in the cemeteries of Abadiya, Naqada, Abydos, and Hierakonpolis (Castillos 1982, 1998). The culture of Naqada I marks the beginning of the process that led to the emergence of centres of power and ultimately to the rise of the First Dynasty ruling over the whole of Egypt (Hassan 1988; Kemp 1989, 1995). At its early stages, the Naqadian community inhabited independent villages, the number of permanent settlements greatly increased, and the economy turned into a predominantly agricultural one. The share of meat provided by hunting dropped from around 10% in the Badari culture to merely 1% in Naqada I (Linseele and van Neer 2009). Particular villages maintained contacts with their neighbours, which triggered the processes described above and resulted in them merging in groups (Anđelković 2011: 27). According to some researchers the effect of this process were proto-nomes, and the existence of such structures is allegedly indicated

by symbols in early Egyptian art interpreted as representations of banners (Anđelković 2008: 1045; Graff 2009: 173). This gave rise to the first, small political organisms based on the power of an individual and control over a territory. Once in motion, the processes of forging alliances and rivalries could not be stopped. This can be described as a variation of the Verdun syndrome – maintaining advantage required continuous increases in political, economic, and military strength. This process had important implications for social transformations. The result was the growing importance of the ruler, but also the emergence of social elites. What followed was clientelism and increased demand, for luxury goods in particular. At the turn of Naqada I and Naqada II the process continued further, and the increasing centralisation reduced the number of centres to just a few, above all Abydos, Abadiya, Naqada, Gebelein, and Hierakonpolis (Wilkinson 2000: 378–379). B. Anđelković (2011: 28–29) believes that by Naqada IIC there were only three centres left: Abydos, Naqada, and Hierakonpolis, one of which established the first state in Upper Egypt during the next phase. This is allegedly evidenced, among other things, by the expansion to the north. However, this argument may be used in favour of a completely different interpretation: the growing pressure among the centres, with only three centres left, might have simply necessitated expansion to new areas. Another reason may have been the desire to protect the trade route along which luxury goods were imported from the Near East, and these were necessary for maintaining both prestige and alliances. Importantly, the arrival of the Naqadians to Lower Egypt, for example to Tell el-Farkha, does not correlate with traces of destruction. What we see in the archaeological record is rather a peaceful coexistence of the newcomers from the south with the local Lower Egyptian community. The layer of destruction recorded in Tell el-Farkha, interpreted as traces of a possible invasion, may indicate that the rivalry among political centres continued as long as Naqada IIIA1, and perhaps even up to the middle of Naqada IIIB (Ciałowicz 2018: 13). It needs to be emphasised that the rivalry among the centres need not have been limited to the military sphere. The economic sphere was equally important, and it additionally fuelled the rivalry among Abydos, Hierakonpolis, and Naqada over access to and control of resources and transfer of goods, including those inflowing from the Near East. The cultural unification of the entire area of Upper and Lower Egypt most likely preceded the political one.

At the same time when the foundations of state were being laid in Upper Egypt, the Lower Egyptian culture developed in the Delta. According to some views, the emergence of this cultural unit was indirectly influenced by groups of Levantine populations migrating to the Delta at the turn of the 5th/4th millennia BC (Watrin 2007). Even though its genesis may remain unclear, the Lower Egyptian culture was clearly the first settled farming community in the Nile Delta. The environment was very different from that in Upper Egypt and the social pressure was not that intense, which translated into slower socio-political development, or rather into development following a different path. For

many years the Lower Egyptian culture was considered as a uniform society with no social stratification. This view, however, has been challenged by the results of research in Tell el-Farkha. The archaeological evidence shows that the village was divided into distinct areas separated initially by wooden fences and later by mudbrick walls. On the plan of the site, a large building having a very sophisticated layout clearly stands out, whose area far exceeds that of a typical household (Chłodnicki and Geming 2012). Inside, many artefacts imported from Upper Egypt and Levant were found. This possibly indicates that the socio-political organisation of communities inhabiting the Delta was much more advanced than previously thought, perhaps even on par with that known from the South (Ciałowicz 2018: 10). Delta communities were led by elites, perhaps even chieftains, who exerted control over specialist workshops like breweries and others. They were also responsible for the organisation of and oversight over trade with both Levant and Upper Egypt. The most pronounced difference between the inhabitants of the Delta and Upper Egypt was in the sphere of funeral rites. If in the South the progressing social development was accompanied by raising ever larger and richer tombs, the North seems not to have attached much attention to this aspect. Burials are less richly furnished there, typically with a few ceramic vessels or ornaments, although some increase in the number of grave goods is evident over time (Mączyńska 2013: 107–108).

The mechanisms behind the cultural unification of Egypt still remain the subject of scholarly debate. Some researchers assign the key role in this process to people who came from Upper Egypt and settled in the Delta (Kaiser 1956, 1985: 70, 1990: 287–288, Stevenson 2006; Ciałowicz 2018: 14–16), while others see the unification as a result of social transformations with no significant role of Upper Egyptian settlers (Köhler 1995, 1996). Determining this issue far exceeds the scope of this study. Whichever was the case, the result was the cultural unification of the Delta and the Nile Valley, a process which concluded by the early Naqada IIIA1 (Mączyńska 2013: 19–21). At that time, local political organisms in the South evolved into the first proto-states (Campagno 2002: 52–60), and the first separate royal necropolises were founded (Kemp 1989; Wilkinson 2000). The rivalry among major centres in the South continued, leaving only Abydos and Hierakonpolis in the Protodynastic period (Hassan *et al.* 2006: 694). Both sites provide evidence for great social differentiation. Specialisation in manufacture had already been long evident by that time. Trade routes were maintained, and the range and scope of long-distance exchange increased. The major centres had a vital interest in maintaining the supply of luxury goods for the constantly growing group of consumers. They also needed new materials, like copper, for making better tools. One can assume that the period of Naqada IIIA – early Naqada IIIB1 was a time when, even if there was no open military conflict between the main centres, the economic competition among them was intense, with both Abydos and Hierakonpolis trying to gain the upper hand. Such a relationship between the centres of power is described by C. Renfrew and J. Cherry

(1986) as peer polity interactions. According to some opinions, the rulers of Hierakonpolis managed to maintain control over the south of the Nile Valley, while Abydos controlled the northern part (Wilkinson 2000: 392). Whether the control of Abydos extended to the Delta, or the Delta centres of that time remained independent, remains unclear (Hassan *et al*. 2006: 695). In Naqada IIIB names of rulers started to appear on vessels, most of them believed to be names of local chieftains. Ultimately, Abydos came out as victor in the rivalry. Contrary to what was thought previously, the first ruler to unite the whole of Egypt was not Narmer but rather one of his predecessors – Iry-Hor (Ciałowicz 2018: 16), whose name was found not only on ceramic vessels in the Delta but also engraved in rock in Sinai (Tallet and Laisney 2012: 385–387). The process of formation of the state concluded, which opened, as early as in Naqada IIIB, new opportunities for further expansion.

The development of Southern Levant followed a completely different trajectory. The early 4th millennium BC saw the decline of the Chalcolithic culture. In its final stages it was a highly complex organism, with developed social organisation, highly advanced and specialised crafts, and a rich spiritual sphere, evidenced by temple complexes known primarily from the southern parts of the region. The research in Nahal Mishmar brought about the discovery of a hoard of copper objects hidden in a cave. Among other objects in the hoard were mace heads and sceptres, often richly decorated. These were most likely objects used by elites during religious ceremonies performed in the nearby sanctuary of En Gedi (Bar-Adon 1980). Metallographic analyses have demonstrated that the artefacts were cast using the lost wax technique, evidence of considerable skills of the craftsmen. Intriguingly, despite such advanced social development the Chalcolithic communities of Levant mainly inhabited large villages.

At the final stages of its development, the centres of the Chalcolithic culture were situated on the Dead Sea, with the sites of Teleilat Gassul (Mallon *et al.* 1934; Koeppel 1940, Bourke *et al*. 2004) and En Gedi, and near Nahal Beersheva in the Negev, with such settlements as Bir es Safadi, Bir Tzfad, or Abu Matar, known for their subterranean tunnels carved out in loess. The tunnel system included living quarters and workshops, where ivory and copper objects were produced. Shiqmim should also be added to this list, although in this site the stone architecture prevailed (Levy 1987; Commenge-Pellerin 1990). Other regions were inhabited as well, including the coastal plains and the Golan Heights (Garfinkel 1999). The far-reaching regionalisation resulted in differences in material culture of particular regions (Garfinkel 1999: 200–297). For reasons which remain as yet unknown, this well-organised society relying on herding economy and operating high-quality workshops started to disintegrate at the turn of the 5th and 4th millennia BC. One of the hypotheses cites climate changes, which may have triggered migrations, in particular from the Negev northwards (Golani *et al.* 2013; Vradi and Gilead 2013). A very characteristic symptom of the change was rejection of the previous

political and religious systems. Among others, temple complexes disappeared. Although copper tools continued to be produced, luxury objects like those from Nahal Mishmar are no longer known. What follows is a period described by some researchers as the "lost horizon" (Braun 2011), which lasts approx. from 3900 to 3700 BC, after which the settlement in Levant emerges in a completely new shape.

This new phase is known as the Early Bronze Age. Small villages up to 5 ha in area were the predominant form of settlement. With time, the settlement network became more dense, and the advancing evolution led these new communities to the rise of the first urban civilisation in the Levant. The economy in EB Ia relied on farming rather than animal husbandry. Olive trees continued to be cultivated, and viticulture started to play a role. These are the basic foundations of what we might call Mediterranean agriculture. After the period of crisis, both local and long-distance trade started to flourish. Manufacturing often focused on specialised products, like copper artefacts or Canaanean blades. In Southern Levant, the impact of the landscape was different than in Egypt. Land was in no short supply, and the natural barriers resulted in uninterrupted development, as people tended to cluster in their microregions. This gave rise to regional centres, which were the focus of political and social life in a given area. Among others, they controlled specialised manufacture and trade, and provided security. This led to the emergence of the first urban settlement in the middle of EB I. The most recent discoveries in Tel Erani allow the defensive wall surrounding the site to be dated to EB Ib. In Southern Levant, defensive walls came to be regarded as symbols of urbanisation. Naturally, having a defensive wall does not make in itself any settlement a city, but in Tel Erani there is also other evidence available to regard the site as an urban centre.

Tel Erani is not unique, even if the most recent research places it among the earliest urban centres in the Levant. There were more centres of this type in EB Ib. In the north it was surely Megiddo controlling the Jezreel valley, and there was also Tel Dalit surrounded by stone walls near Tel Lod (Gophna 1996), among others. Until recently it was thought that urbanisation did not take place before EB II, but today we know it started earlier (Sharon 2014: 51). Therefore, the Levantine neighbours of Egypt can be described as small but resilient centres led by local rulers. Each such centre consisted of a central settlement exerting control over its *chora* with a number of subordinate settlements. Were they perceived by Egypt as a threat, as opportunity for development, or a potential area for expansion? Scholars have been pondering this question for decades.

Copper and Copper Deposits

Copper deposits can be found on all the inhabited continents of the Earth. Copper occurs in two forms: in a pure form as native copper or, much more commonly, in an oxidised state, mixed with other elements, for example as malachite. It was precisely these latter deposits that were exploited in the 4th millennium BC. The extraction of copper involved following copper oxide veins embedded in limestone rocks. The extracted material was crushed, and the crushed ore was smelted to obtain metal, from which artefacts or ingots could be produced.

Owing to its relatively high accessibility and unsophisticated processing, copper became the first metal to be widely used by humans. The name copper derives from a Latin expression meaning "metal of Cyprus" (*cyprum aes*), an island renowned throughout the Mediterranean for its famous copper mines. Egyptians acquired huge amounts of copper from Cyprus as well, but in the 4th millennium BC their attention shifted to deposits in other regions of the Near East. Four basic regions are known where copper compounds possibly used in the 4th millennium BC occurred. These are Wadi Feinan/Timna, Sinai, Eastern Desert, and Nubia (cf. Sowada 2009: 185–187). Copper first spread in the southern Levant, where it became used on a larger scale towards the end of the Chalcolithic, around 4200 BC (Golden 2010; Thornton *et al*. 2010; Bourke 2015), above all due to deposits from the Wadi Araba region, specifically Timna and Feinan. Copper deposits in these two valleys, situated approximately 100 km from each other and on the opposite sides of Wadi Araba, formed in the same period, and subsequent tectonic movements resulting in the formation of a giant trough now occupied by the Dead Sea split the bed in two. The earliest artefacts were created from copper originating from Wadi Feinan (Hauptmann and Weisenberger 1987; Levy *et al.* 2000). This has been confirmed by excavations in the copper-bearing areas and by analyses of copper samples from Levantine sites (Segal *et al.* 2004: 324–325; Bourke 2015). The early exploitation of these deposits is also indicated by results of excavations in Wadi Feinan itself, which revealed a settlement complex dated to EB I. Occupation from that period has not as yet been confirmed from Timna. New research carried out in that region by E. Ben Yosef's team suggests that these deposits may have been exploited in the period when contacts with Egypt intensified. The copper from Wadi Araba was transported to the banks of the Nile

by merchants heading for Ma'adi. Situated at the southern margins of the Delta, this site yielded many copper artefacts and ingots (Hauptmann 1989; Rizkana and Seeher 1989). A German mission working near Aqaba in Jordan uncovered a settlement from the turn of the Chalcolithic and the Early Bronze Age, where ingots of the same shape and size as those known from Ma'adi were cast (Hauptmann 2009). Along with analyses confirming the metal to have originated from the Wadi Feinan deposits, this allows for reconstructing the course of the trade route via which copper was imported to Egypt.

Within the area where the Naqada culture developed, copper deposits could be found in the Eastern Desert, with outcrops known, for example, from Wadi Hamama and Gebel Dara. Their exploitation in the Predynastic era has been confirmed by analyses of artefacts kept in the Royal Museum of Art and History in Brussels (Rademakers *et al.* 2018). These results have been corroborated by analyses carried out by M. Odler's team using a different set of samples. Relics of installations associated with extraction and production of copper in the Old Kingdom were discovered, among other places, near Gebel Zeit (Tawab *et al.* 1990: 361) and 'Ayn Sukhna (Abd el-Raziq *et al.* 2004: 12–14). The smelting of copper ore originating from Nubian deposits situated in Buhen has also been confirmed (el-Gayar and Jones 1989: 31–40). At the current state of research, exploitation of these deposits in the 4th millennium BC cannot be ruled out. During the formative period, when political centres competed among themselves, they probably made attempts to diversify the sources of this precious raw material to guarantee uninterrupted supply. Thus, one cannot rule out that the deposits from the Eastern Desert and Nubia may have been exploited to some degree.

The last copper-bearing region in the Near East to be exploited during the 4th millennium BC was Sinai. According to B. Rothenberg (1995), the first attempts at exploitation of Sinai deposits undertaken by the Egyptians failed, as the material obtained after initial processing contained too much calcium and was not suitable for making tools. As a result, the Egyptians gave up the extraction and smelting of this raw material, instead focusing on acquisition of processed copper from the Levant (Rothenberg 1995). Whether in the later period Egyptians extended their sovereignty over Sinai remains an open issue. In light of the present state of knowledge one can assume that during the Third Dynasty the pharaohs controlled the extraction of copper from the outcrops in Wadi Maghara and nearby (Ogden 2000: 149–150; Mumford 2006; Sowada 2009: 185). A recently published grafitto with the name of Iry-Hor (Tallet and Laisney 2012) seems to suggest that as early as in Naqada IIIB/C1 the young Egyptian state tried to exert control over the extraction of copper in Sinai. The deposits used in the 4th millennium BC were most likely those situated in the south of the peninsula. Analysis performed by F. Rademakers's team confirmed that among copper artefacts discovered in Egypt were those made from metal originating from Wadi Tar, Wadi Samra, Sheikh Muhsen, and other deposits. The exploitation of Sinai deposits is also suggested by analyses of artefacts found in Tell el-Farkha

(Rehren and Pernicka 2014). Along with numerous Naqadian imports known from settlements in the vicinity of the mentioned wadis, the above data indicate that Sinai was among the primary sources of copper supplies to Egypt. Whether it was delivered directly or via intermediary of south Levantine populations remains an open issue.

Copper in the Levant

The beginnings of metallurgy in the southern Levant can be traced back to the last centuries of the 5th millennium BC. Easy access to the raw material and the occurrence of outcrops in the vicinity of large Chalcolithic centres like Teleilat Ghassul and Nahal Beer Sheva resulted in a rapid development of copper metallurgy in the region. The north of the Levant adopted this innovation with a considerable delay, and artefacts made of copper are less common there than in the Dead Sea basin or the Negev region (Braun 2014). Copper metallurgy is currently believed to have emerged in the late phase of the Ghassulian culture, i.e. around 4200 BC (Gosić and Gilead 2014: 26; Golden 2010; Thornton *et al.* 2010). The first steps towards the processing of the new raw material were undertaken by people from the Negev. They made simple tools, like pins, awls, and axes (Levy and Shalev 1989), using the hammering and annealing technique (Golden 2001: 225). With the passage of time larger and more specialised production centres emerged, and pure copper was replaced with arsenic copper and copper with antimony (Golden 2001: 256). The development of metallurgy is supposedly linked with the social evolution that took place in southern Levantine communities during the 4th millennium BC. The increasing social stratification generated increased demand not only for utilitarian products but for luxury goods as well (Gosić and Gilead 2014). At least four workshops involved in the production of copper artefacts were identified in the region. They are all situated in the Negev, close to Wadi Beer Sheva: Abu Matar (Gilead *et al.* 1992; Perrot 1955), Bir es-Safadi (Eldar and Baumgarten 1985), Shiqmim (Shalev and Northover 1987), and Nevatim (Gilead and Fabian 2001). Laboratory analyses allowed the entire chain of production to be reconstructed. The bulk of copper used in these workshops originated from Feinan (Hauptmann 1989; Shugar 1998: 114). Copper was transported to the workshops in the form of crushed ore. The discoveries of crucible fragments, slag fragments, and remains of copper ore in Abu Matar (Gilead *et al.* 1992; Perrot 1955: 25, 29, 33–34, 79) and Shiqmim (Shalev and Northover 1987: 366) suggest that the smelting process took place at the sites where the workshops were located rather than in mining areas. Thus, the smelting of the raw material and the casting of tools were performed in the same place. With the advances in metallurgy came more and more sophisticated techniques. Ghassulian coppersmiths were capable not only of using open moulds but, as demonstrated by the research at Abu Matar (Shugar 2000: 204) and the

finds from the Cave of the Treasure at Nahal Mishmar (Shalev and Northover 1993), they mastered the lost wax technique as well.

The range of copper objects manufactured was very broad, from tools like axes, adzes, pins, and awls to luxury objects. Utilitarian objects are well evidenced from settlement contexts, e.g. in Ein Assawir (Shalev 2006) and Giv'at Ha-Oranim (Namdar *et al.* 2004: 70–71), and cemeteries alike (Segal 2002; Gal *et al.* 1997: 145). Adzes commonly have a strongly curved cutting edge and arching, convex sides. They seem relatively massive (cf. Shalev 2004: Fig. 8:1). Axes have a very similar appearance, with the main morphological trait shared by both tool types being the curved cutting edge extending beyond the width of the artefact. Other copper objects commonplace in Chalcolithic sites, like awls and pins, have highly uniformized shapes determined by their function. Among luxury objects one should mention above all pear-shaped mace heads. A hoard containing such objects was found by Israeli archaeologists in a cave at Nahal Mishmar (Bar Adon 1980). Apart from the mace heads, among the more than 400 items in the hoard were many objects known as standards, adorned with ibex figures, axes, or knobs soldered to the shaft, which were actually batons of a kind (cf. Bar Adon 1980).

The turn of the 5th and 4th millennia BC was a time of crisis, which also affected the sphere of manufacture of copper artefacts, even though it soon revived in another place. As early as EB I a new production centre emerged, this time near the present-day city of Ashkelon on the Mediterranean coast rather than in the Negev (Golani 2014). The centre started to develop at the very beginning of EB I. The lowermost layers in which installations for making copper tools were found date to around 3800–3700 BC, and the production continued for most of the period in question (Golani 2014: 125). This was not the only centre, as traces of similar activity were recorded, for example, in Tel Halif and Tell es-Shuna (N) (Golden 2001), although Ashkelon is the oldest and best-researched one. Certain changes with respect to the organisation of production are evident when compared with the Chalcolithic. First, it was no longer ore but smelted copper being imported to the Mediterranean coast. The data produced by excavations in Wadi Araba indicate that the ore was extracted and smelted either there or at sites like Tell Hujayrat al-Ghuzlan or Tell al-Magass near present-day Aqaba (Hauptmann *et al*. 2009). The smelted copper was then transported to tool-making workshops. The production itself changed as well. Luxury objects disappeared completely, and the lost wax technique ceased to be used. Only tools were produced, with observable continuity from Chalcolithic forms. This is evidenced by the products of workshops operating in the Ashkelon region (Golani 2014: 126).

Both in EB and during the Ghassulian phase of the Chalcolithic, specialisation in manufacture of copper objects is evident. Towards the close of the 5th millennium BC this was dictated by control exerted by the already existing centres of power, which developed due to considerable social stratification. Golden (2001) describes this system as

attached craft specialization. It is evidenced by the appearance of luxury objects, mace heads and standards in particular, which were markers of social status and even symbols of power. Shalev (2003: 233) and Golani (2014: 125) believe the system must have looked much the same during EB I. In their opinion the network of workshops was certainly centrally controlled. The archaeological data, however, do not support these claims. No single centre can be shown that could exert control over the area where the workshops were situated. Instead, EB Ia is rather characterised by small settlements of a rural nature. Political centres like Erani, and only in a limited number, do not appear before early EB Ib, which means some 400 years after the first Ashkelon workshops. It is also worth noting among the copper artefacts the absence of luxury objects, so characteristic of the final Chalcolithic. It is thus reasonable to assume that workshops focused their production on trade rather than on meeting the demand from higher social classes. In this case, the model known as independent craft specialisation seems to better reflect the reality (Golden 2001). Golden (2001) argues that further development of production and its gradual industrialisation are evident. This can be seen, among others, in the specialisation of individual workshops. In his opinion, even before the end of the Chalcolithic highly specialised centres emerged, tasked with performing one particular stage in the manufacture of copper tools: mining, smelting, melting, or finishing. This transformation concludes ultimately during EB I. Moreover, an evolution towards mass production oriented towards manufacturing large quantities of utilitarian objects can be demonstrated. However, there was another new aspect in metallurgy which emerged during the 4th millennium BC: the recycling of copper. Research at sites like Camel Site (Rosen) produced sufficient data for concluding that nomadic populations were not only involved in transport of black copper, but they also acquired damaged copper items in order to re-cast them. The nomads of the Negev and Sinai played a highly important role in the circulation of copper in the Levant, as was suggested some time ago by Animfest (2014). Nomadic tribes whose economy relied on goat/sheep herding required regular supplementation with agricultural products to survive. Nomads thus became responsible for supplying raw material to the workshops in exchange for food surpluses. Their contacts with various areas within the southern Levant and Sinai may explain the appearance of copper originating from new, previously unrecorded sources.

Copper in Egypt
Typology of the most important types of objects

Adzes

The adze was a very popular tool in ancient times, and its commonness and importance in Egypt is well evidenced by the fact that at least three hieroglyphs resemble it in shape. According to Gardiner's typology these are signs U19, U20, and U21. The last, *stp*, was a determinative of belonging, hence it can very often be found in cartouches with royal names (Collier and Manley 1998: 142). The first copper adzes appeared in the Naqada IID1 period (Anfinset 2014: 146, Odler 2015: 97). The oldest known artefact was found in the Naqada cemetery and it is currently kept in the Ahhmolean Museum (Inv. 1895.969). Baumgartel (1947: 42–43) claimed that copper adzes did not have any predecessors made from other raw materials, so they were most likely imported. In her opinion they were used as weapons. Moreover, she believed that famous Egyptian battle axes derived precisely from adzes. However, Shubert and Bard (1999: 458) demonstrated that copper adzes repeat the shape of stone adzes, eventually replacing them. Tools of this type were probably known in Egypt and Sudan as early as the Mesolithic. Some of the tools known from that period and interpreted as axes were probably used as adzes (Kobusiewicz 2011: 285–289, Fig. 10–12).

Proper definition of this group of tools causes many problems. There is much chaos in the literature, with researchers often mixing notions and describing axes, chisels, or even hoes (cf. Baumgartel 1960: 15) as adzes. This terminological problem has not been resolved to this day. So, what defines an adze? These tools were used in processing materials like wood or stone. They were fixed to wooden handles, most often at an acute angle (cf. Odler 2015: Fig. 5C). When working, the processed material was hit with the front edge only. The cutting edge was fixed perpendicularly to the axis of the handle. Naturally, an adze could be used as a chisel, with the force applied to the back side, but this was not the primary role of these tools. A very common use-wear mark in adzes was that the tool is bent at approximately 1/3 of its length, measured from the cutting edge. This happened because this was how far the handle into which the tool was set reached. What distinguishes an adze from an axe or a chisel? First, the adze was a long and narrow tool. Based

on the morphology, the tool was cast in a shallow, one-sided mould and then hammered to make it sufficiently hard, as suggested by the triangular section. It is also possible that adzes were hammered into shape from copper ingots (Odler 2015: 94). One of the edges was sharpened and used in work, and the other was left blunt and unused. It was narrow and not reinforced in any way. This distinguishes adzes from chisels, as the latter were typically used by striking their backs with other objects in order to transmit energy to the cutting edge. Therefore, many chisels have the back side additionally reinforced or adjusted for setting in an organic haft. What makes adzes different from axes is their length and width, with axes being much shorter and wider than adzes. We can assume that every tool whose side is at least three times as long as the cutting edge can be identified an adze.

Adzes were rectangular or trapezoidal in section. The lateral edges often slightly narrowed in the middle, just to flare out near the blade. A detailed typology of this group of tools was recently presented by M. Odler (2015: Fig. 7). It is based on the most recent finds and follows stylistic changes until the end of the Old Kingdom. Odler distinguishes four main types of adzes, the first two of which occur in the 4th millennium BC. The first type is designated with the letter A and comprises adzes with straight or slightly rounded ends, with the cutting edge situated on the wider side. Variants within this category differ in terms of lateral edges, which can be straight or flare towards the cutting edge. The B type is distinguished by the end, which is rounded rather than straight. As type A, type B can be sub-divided based on differences in the lateral edges. The difference between the two main types is not only morphological, but it also extends to the chronology of their occurrence. This was observed early by Needler (1984: 282), who regarded adzes of the 'B' type as later.

Abusir el-Meleq

Four adzes were found in the burial ground examined by a German archaeological mission in the beginnings of the 20th century. The first comes from grave 1037 (Scharff 1926: 46, Abb. 258, Taf. 61.2), which can be dated to the Naqada IIIB period based on the pottery found among grave offerings. The artefact can be classed as Odler's type A2. Another adze was found in grave A, and it allegedly has the end sharpened by a hammer strike. It belongs to the B2 type, since it has a rounded end (Scharff 1926: 46, Abb. 259). Scharff (1926: 46) mentions another find of this type, which could not be retrieved from the grave due to strong corrosion. The deceased from grave 14g9 was buried with an adze in the left hand. All these three objects are known to be approximately 20 cm long, with their width exceeding 3 cm. Another adze was found in grave 1037, and it was interpreted as a hoe. It differed considerably from the three finds mentioned above in terms of dimensions: its length is 35 cm, and the width of the cutting edge exceeds 10 cm (Scharff 1926: 45). It is a classic example of an adze of Odler's type A3. A bend, characteristic for this type of tool, is evident in the drawing (cf. Scharff 1925: Abb. 257, Taf. 61.1).

Adaima

An adze originating from Adaima is one of the few objects of this type found in a settlement context. The artefact was found in a vessel of the R81 type alongside an axe (Needler 1984: 280, 282). It is dated to the Naqada II period and represents type A2.

Ballas

Quibell mentions that two adzes were found in this site, one of them broken. However, no further information about the finds is available (Petrie and Quibell 1896: 114).

Hierakonpolis

Two adzes were found during the research performed at the turn of the 20th century. One of them, found in the main deposit, belongs to the A2 type (Quibell 1900: Pl. XXIV:4). The other adze comes from the cemetery, and the researchers only noted its occurrence (Quibell and Green 1902: 26).

Homra Doum

The site is situated near Naqada. It was allegedly a small cemetery, from which several interesting copper artefacts were recovered. Among them are two well-preserved adzes of the A1 type. It has to be mentioned here that the artefacts were incorrectly identified as axes (Baumgartel 1960: Pl. I: 6–7). Not much is known about the context of their discovery.

Minshat Abu Omar

One adze is known from the site. The artefact was found in grave 126. The pottery found in the grave – a vine jar with crescents and cylinder vessels with decoration below the rim – suggests that the assemblage should be dated to the Naqada IIB–C1 period (cf. Kroeper and Wildung 2000: 118–119). The adze has a straight cutting edge and back, and slightly flaring lateral edges (Kroeper and Wildung 2000: Fig. 127/17). It is a typical example of a tool belonging to the A1 type. The grave also contained two other copper objects: a harpoon, and what are probably the remains of a dagger (Kroeper and Wildung 2000: Fig. 126/18, 21).

Naqada

In context of this site it is difficult to determine exactly how many adzes were found as a result of Petrie's research. Anfinset (2014: 148–149) and Baumgartel (1960: 12–13) claim that the site yielded more adzes than anywhere else in Egypt, which could suggest that a production center was situated in this area. According to some sources there are as many as 20 adzes dated to Naqada II in Egypt, and 22 blade tools in Naqada alone (Anfinset 2014: Fig. 6.29, 30). However, such data do not find confirmation in the available publications. Baumgartel (1960: 12–13), who evaluated the finds from Petrie's

excavations, mentions five artefacts, of which four belonged to Odler's type A2. They were recovered during the exploration of graves tt. 702, 1298, Q 600, and ["smaller"] 400. The last object belongs to another type. It differs by having slightly concave lateral edges and a slightly rounded cutting edge. It can be classified as Odler's type A1. Precise chronology of the graves is difficult to determine.

Tell el-Farkha

The artefact from Tell el-Farkha was found in grave 91, dated back to Naqada III B/C. The grave furnishings also included a chisel. The adze bears evident use-wear traces. It is bent, probably at the place where the wooden handle ended. Traces of hitting against hard objects are also evident on both ends of the tool, which are bent in places. Slightly concave lateral edges and slight curvature of the edges places the adze from grave 91 between the adze from El 'Adaima (Needler 1984: 282, Pl. 45, 182) and the object purchased by de Morgan in Luxor (Needler 1984: 282, Pl. 45, 183). The tool belongs to Odler's type A2.

Tell el-Murra

In a Naqada culture site located approx. 10 km east of Tell el-Farkha, a set of craftsman's tools was found in a grave dated to the First Dynasty. The set included a chisel, an axe, and an adze. The adze belongs to Odler's type B1. It has rounded tip and slightly tapering lateral edges.

Tarkhan

Tarkhan is another cemetery where adzes were found as grave offerings. A large tool, similar to the one from Abusir el-Meleq, comes from grave 1933. The artefact belongs to the same category, which is Odler's type A3. Another tool of this type was found in grave 1015 dated to S.D.77 (Petrie 1913: 8, Pl. V:28), where two other adzes were found as well: one of the B2 type (Petrie 1913: Pl. V:28) and the other of the A2 type (Petrie 1913: Pl. V:27). All the adzes were found placed behind the head of the deceased. One adze of type B2 (Petrie 1913: Pl. V:29) comes from grave 412, dated to the reign of Narmer (Petrie 1913: 9). Another tool of that type was found in grave 27 (Petrie 1913: Pl. V:15). An adze found in grave 122 is of a different type. The grave contained a complete set of tools, analogical to that found in Tell el-Murra. The set included a chisel, an axe, and the adze, which can be classed as type B1 (Petrie 1913: Pl. V:25). The entire set is dated back to the second half of the First Dynasty (Petrie 1913: 10–11).

Turah

The cemetery in Turah produced one example of an adze, found in grave 18k3. It has straight lateral sides, slightly flaring towards the cutting edge (Junker 1912: 55, Abb.

73). The end is semi-circular. In terms of morphology it belongs to Odler's type B2. The absence of other furnishings does not allow for precise dating of the object (Junker 1912: 73). It is worth mentioning that the artefact was incorrectly labelled as an axe during the analysis of the materials from the site (Junker 1912: 55).

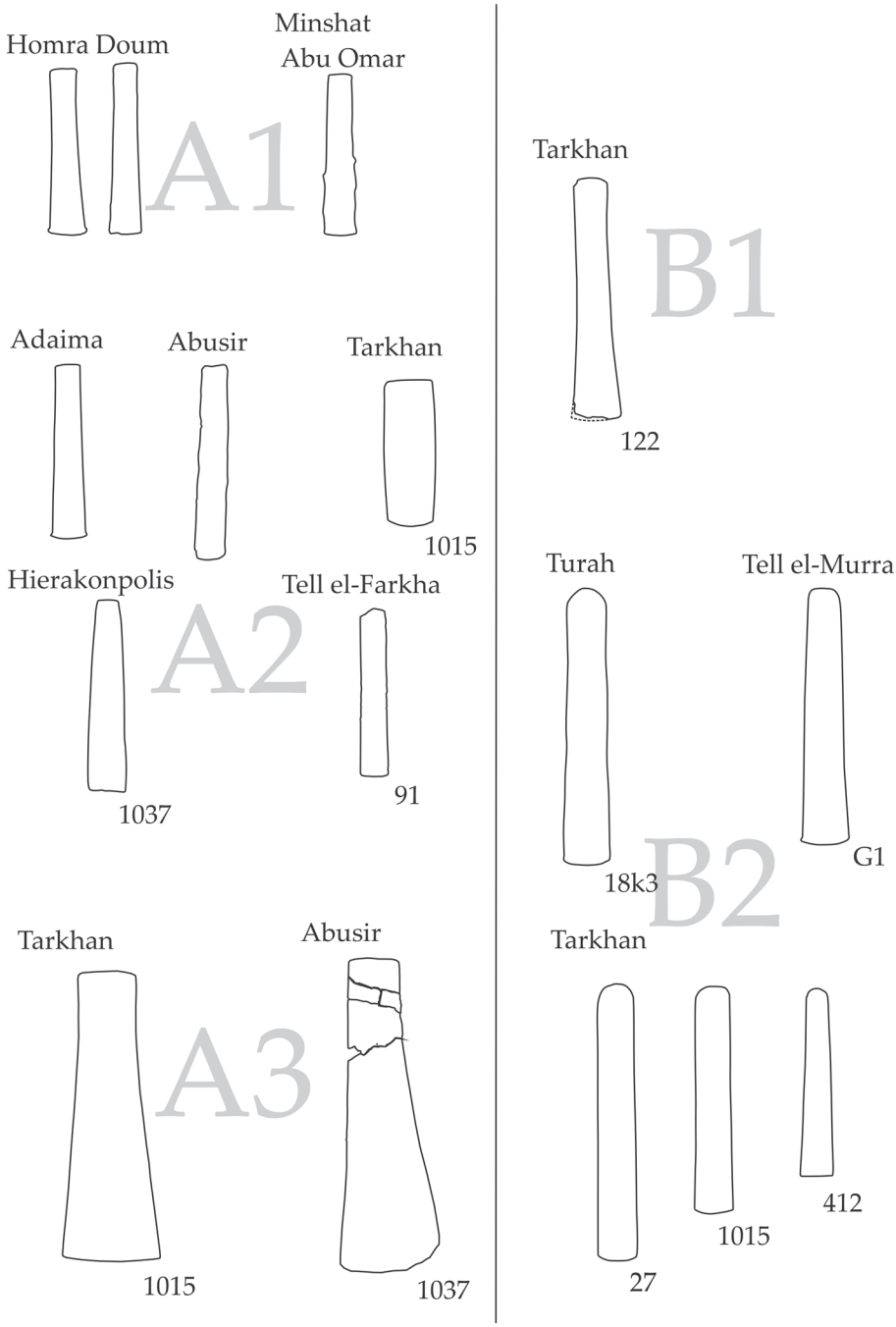
The predominant type of adze in the 4th millennium BC is Odler's type A2. It is clear that tools representing type B begin to appear later, more or less during the reign of the First Dynasty. Some of the artefacts, specimens of the A1 type, refer in terms of their morphology to objects known from Levant.

Kafr Hassan Dawood

The cemetery turned out to be very rich in finds of copper objects. Among all the types of tools found at the site, adzes are the most numerous. There were 26 of them in total (Rowland 2014: 284). No other site, so far, has encountered such an accumulation of this type of tools. Finds of copper objects from KHD are currently being studied, hence data on them are incomplete. We know that adze appear in the KHD IV to KHD VI phases (Rowland 2014: 283), which corresponds to the period between Naqada IIIB and IIID (cf. Rowland 2014: Table 1). Most of them, as many as 18, are dated to the Naqada IIIB – C1 phases. The oldest object of that type was discovered in grave 523. Other adzes were found, among others, in graves: 300, 371 or 547 (Rowland 2014: 284–285). Of the great interest are the finds from the graves: 142, in which the adze was part of the toolkit with a chisel and knife; 1008 and 1041, where broken tools were found, the parts of which were placed next to each other (Rowland 2014: 284, Fig. 13). Due to the state of the publication, the finds from KHD cannot be classified into typological groups.

In my opinion, such a large accumulation of adze at one site shows that the inhabitants of the nearby settlement were engaged in crafts, probably carpentry or stone vessels production. Especially the first option seems to be highly probable as large numbers of trees could have grown in Wadi Tumilat. I think that the grave context of their finding excludes the possibility that these tools were trade commodities.

ADZES


Homra Doum
Minshat Abu Omar
A1
Tarkhan
B1
122
Adaima
Abusir
Tarkhan
1015
Hierakonpolis
Tell el-Farkha
A2
1037
91
Turah
Tell el-Murra
18k3
G1
B2
Tarkhan
Abusir
A3
1015
1037
Tarkhan
1015
412
27

Axes

Axes are very rare tools in Egypt. This may stem indirectly from natural conditions in the region. In the warm and dry climate prevailing in Egypt, trees suitable for constructing large buildings do not occur, hence there was no need for tools for cutting them, especially given that plants growing on the Nile, e.g. tamarisk, could have easily been felled with tools like adzes. Yet, the locally available timber was not enough to satisfy the needs of the growing Egyptian state. Therefore, unsurprisingly, it was imported from other regions as well. This is evidenced by remains of wood of *Cedrus libani* in Ma'adi (Kroll 1989: 134–135; Rizkana and Seeher 1989: 76), and *Cedrus libani*, *Pinus halapensis* or *brutia*, and *Cupressus serpenvirens* in Badari (Brunton and Cahon-Thompson 1928: 38, 62–64, 95). With the importation of good-quality timber there emerged a need for proper tools for its processing. This is why axes only became more widespread with the development of monumental architecture, which means in the Dynastic Period (cf. Kühnert-Eggebrecht 1969).

Axes were used mainly for wood processing, although they could have been used as weapons, as well. The axe head was fixed to the wooden shaft, with the cutting edge parallel to the axis of the shaft.

Morphologically, some axes are closely related to adzes. This often leads to mistakes resulting from the lack of a clearly defined distinction between these two types of artefacts. Based on the available complete tools one can conclude that axes were much shorter and thicker than adzes. Analysing the dimensions of particular artefacts, it can be assumed that every tool whose length exceeds three times the width of its cutting edge should be described as an adze.

The known examples dated to 4th millennium BC can be assigned to two categories: rectangular axe heads (A), subdivided into tools with a curved cutting edge and slightly rounded sides (A1) or with a straight cutting edge (A2); and trapezoidal axe heads (B), subdivided into tools with a curved cutting edge (B1) or a straight cutting edge (B2).

Abusir el-Maleq

A small, nearly rectangular axe was found during exploration of grave 55k3. The sides and cutting edge of the tool are slightly curved (Scharff 1926: 45, 144, Abb. 256). It can be included into type A, although some features of type B are evident as well, making the axe similar to the artefact from Tell el-Farkha. Vessels found in the grave allow the assemblage to be dated most likely to Naqada IIIB-C1 (Scharff 1926: 144).

Adaima

An axe and an adze were found in a vessel dated to Naqada II. It is one of the very few artefacts of that type recovered from a settlement context rather than a cemetery. The

axe is trapezoidal with a slightly curved cutting edge and butt. It can be classed as the B1 type. Similar artefacts were found in Ma'adi and Matmar.

Hu

The exploration of grave U74 produced a set of copper objects, including an axe, an adze, and a chisel. These finds can be dated back to the times of the First Dynasty (Petrie 1901: 52). The axe resembles an artefact from grave 122 at Tarkhan and has similar morphological features. It can be assigned to the A1 type.

Ma'adi

Ma'adi is the only Lower Egyptian culture site where copper axes have been found. Three or four axes were most likely found during the research, but they are very poorly preserved. Additionally, during the conservation treatment the corrosion was mechanically removed, completely damaging one artefact. The original shape of the axes can only be reconstructed based on a photograph published by Rizkana (Rizkana and Seeher 1989: 15–16). The photograph most probably shows the fourth axe, later lost (cf. Baumgartel 1955: 13, note 3). If we assume that all the axes looked like the one shown on the photograph, we would be dealing here with three or four artefacts of the B1 type. Nothing is known about the context in which the artefacts were discovered. It is worth noting here that no artefacts are known from Ma'adi that could be considered as predecessors of copper axes (Rizkana and Seeher 1989: 16). This may suggest that the axes were imports.

Matmar

The oldest axe found in Egypt comes from the archaeological site of Matmar. The artefact was discovered in looted grave no 3131. Fortunately, the axe was hidden under a wooden coffin. The grave dates back to the Naqada II period (Brunton 1948: 16). The axe belongs to the B1 type: it is trapezoidal in shape and has a curved cutting edge (Brunton 1948: Pl. XVI: 47). Baumgartel (1960: 14) admits the possibility that the axe is an import. This was suggested earlier by Brunton (1948: 21), who underlined the high content of nickel in the artefact, uncharacteristic for Egyptian objects.

Tarkhan

Three axes were found in the Tarkhan cemetery. The first one was discovered in grave no 7, dated to the reign of Narmer. The artefact has a rectangular shape and its cutting edge is straight rather than curved (Petrie 1913: Pl. IV: 13), which places it in the A2 type. The second axe was recovered from grave 122, which is slightly younger than the one described above and dated to S.D. 81. The axe is rectangular but, unlike the first one, its cutting edge and sides are slightly curved and its butt is concave (Petrie 1913: Pl.

IV: 14). The tool can be assigned to the A1 type. The last axe was found together with large adze in grave 1015. The burial is slightly younger than the previously described grave 122. The tool has a very elongated shape, but its considerable thickness suggests that it can be considered an axe. The remaining morphological features allow it to be classified as type A2.

Tell el-Farkha

Only one artefact from Tell el-Farkha site belongs to the group discussed here. It is a small axe from richly furnished grave 63 dated to the Naqada IIIB period (Dębowska-Ludwin 2012). In spite of progressive corrosion, its shape and dimensions can easily be determined. It is trapezoidal in shape, with a convex cutting edge, and the lateral edges seem to be slightly concave. The artefact matches the definition of the B2 type, although it most probably represents a transitional form between types A and B. The trapezoidal outline is still evident, although it is not as clearly marked as in the axe from Matmar. The sides are nearly parallel, flaring only slightly towards the cutting edge. The typological change may perhaps have occurred precisely during the phase of Naqada IIIB – C1, from which time on axe heads started to evolve towards more geometrical forms.

Tell el-Murra

One of the graves in the cemetery adjoining the Murra settlement produced a set of tools, including a chisel, an adze, and an axe. The axe displayed morphological features making it similar to the one from grave 63 in Tell el-Farcha, but it was found in a much younger grave. The assemblage can be dated to the 2nd half of the First Dynasty. The axe represents type B2.

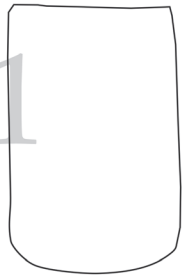
The above analysis of copper axes originating from the 4th millennium BC demonstrates that the first axes that appeared in Egypt were of the B1 type. Such tools were found in Adaima and Matmar, but the largest number were probably discovered in Ma'adi. This suggests that axes were tools that came to Egypt from Levant along with merchants transporting copper. We can assume that axes started to reach Egypt during the Naqada II period and quickly spread in this area. With the passage of time, axes evolved towards more geometricized shapes, through tools with nearly parallel sides to rectangular axes of type A. The change took place during the Naqada IIIB period, when both types briefly co-occurred.

AXES

Tarkhan

122

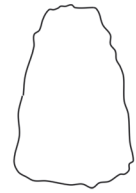
Hu



U74

A1

Ma'adi

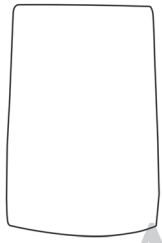


B1

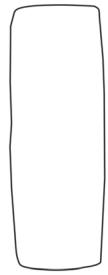
Matmar

3131

Tarkhan



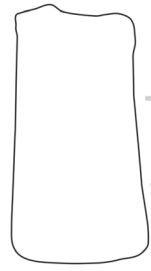
7



1015

A2

Tell el-Farkha



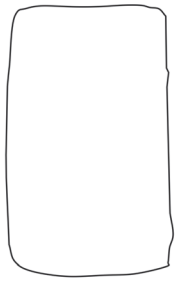
Grave 63

Tell el-Murra

Grave G1

B2

Abusir el-Meleq



55k3

Chisels

Copper chisels derive from their flint predecessors. Such tools were in use at least from the Fayum Neolithic, with examples known from site T near Qasr el-Saga (cf. UCL 3702–3703), among other places. According to Petrie (1912: 19), chisels are among the oldest copper artefacts in Egypt. He distinguished three basic types, described as bare metal, tang in handle, and handle in a socket. Additionally, each type was further subdivided into four categories with respect to the cross-section. Petrie's system is not fully applicable for artefacts known from the 4th millennium BC, as it places objects having similar shapes but performing various functions within the same group. Analysing the known examples of elongated, rectangle-sectioned copper artefacts with at least one end sharpened, two separate categories can be distinguished, with the criterion of function as the basis of the division. The first group are typical chisels, distinguished by their massive construction, with the lengths around 10 cm. Such tools first appear in the second half of phase Naqada III. They were used for working stone and other hard materials. Chisels were used by striking the butt, which was always straight, with a hammer, with the force of the blow being transmitted to the cutting edge to cut off a piece of the material. For functional reasons, chisels were massive and relatively short, to make them resistant to bending. The second category are objects known as gravers. They were more slender tools, typically small, and they were suitable for working with soft materials. Gravers were most likely used in carpentry and in construction works, where holes for attaching wooden structures had to be precisely (as for the standards of the era) cut out. They might also have found application in the manufacture of flint tools. Gravers were set in wooden hafts. They were held in the hand and used by scratching or engraving the material, or less commonly by hitting the handle with another object.

Proper chisels

Given the small number of extant tools, their typology is difficult to determine. Such objects have analogies in southern Levant, where chisels were part of the Kefar Monash hoard (Tadmor 2002: Fig. 15, 5), and they were also found in Ashqelon-Afridar (Segal *et al*. 2004: Fig. 1, 12–13). In Egypt, chisels are known from the following.

Hu

A set of carpentry tools including a chisel comes from the stolen grave of U 74 in Hu. Not much is known about the morphology of the tool, but given the context of the find, it can be assumed that, like other carpentry sets, it was also propre chsel in this case (Petrie 1901: 52).

Kafr Hasan Dawood

Kafr Hasan Dawood is a cemetery situated in Wadi Tumlat. The research carried out in that site produced a significant number of copper tools, predominantly adzes. The finds are still being analysed and are being successively published. The available data indicate that in grave 142 dated to Naqada IIIB a set of tools was found, consisting of an adze, an axe, and a chisel (Rowland 2014: 287, Fig. 15).

Tarkhan

A few examples of chisels are known from this site, all of them dated to late Naqada III (Petrie *et al.* 1913: 11). All the chisels are similar in shape: they are cuboid bars of copper. Where they differ is in details. The artefact from grave 1059 (Petrie *et al.* 1913: Pl. IV: 3) has a protuberance near the cutting edge, the one from grave 170 (Petrie *et al.* 1913: Pl. IV: 5) has the cutting edge more curved, while the last one, sound in grave 122 (Petrie *et al.* 1913: Pl. IV: 4) is most akin to the chisel from Tell el-Farkha. The similarity goes beyond the shape alone: as in Tell el-Farkha and Tell el-Murra, the artefact in question was found as part of a set, in this case consisting also of an axe and an adze.

Tell el-Farkha

A very well-preserved chisel was found during the exploration of grave 91, where it co-occurred with an adze (see chapter above). It is an elongated copper bar of square section, with one end sharpened and the other end cut flat. The tool bears distinct use-wear traces. It was obviously used as a chisel, by striking the blunt end with a heavy object, with the end slightly crushed as a result. The chisel is bent and twisted along its axis. The artefact dates to period Naqada IIIB. A smaller chisel was found in 2016 during the works on the eastern Kom. This one seems to have been used for more precise operations. It is rectangular, with the walls flaring towards the blunt butt, a shape probably intended to make striking easier and protect the tool from bending.

Tell el-Murra

Like other chisels, the one from Tell el-Murra comes from a grave. The assemblage dates to around the middle of the First Dynasty and, apart from many ceramic artefacts, it also contained a set of copper tools, including an adze, an axe, and a small chisel. The chisel is slightly smaller than that from Tell el-Farkha, although it resembles it closely in terms of morphological traits.

It is worth noting that chisels are known almost exclusively from sepulchral contexts as elements of tool sets. It can be supposed that the deceased buried in such graves were craftsmen producing stone vessels or wooden objects.

Chisels – gravers

The vast majority of these tools have been found in the Naqada cemetery, with only one graver originating from another site. The known examples are small objects, up to 10 cm in length. As mentioned, they were fixed in wooden handles, some of which survived, for example objects from grave 3504 in Saqqara currently kept in the Petrie Museum (UCL 30435, 30436). Chisels-gravers can be divided into two types: type A, of roughly square section, and type B of rectangular section. Tools of type A occur in variants with flattened (A1) or blunt (A2) butt.

Naqada

It is difficult to determine precisely how many tools of the type under discussion were discovered during Petrie's excavations of the sites of the Naqada complex. As with other artefacts, the publications do not offer a complete picture. Fortunately, some part of the materials recovered by the Egyptian Research Account are available in the Petrie Museum. The most likely number of gravers discovered in Naqada is eight. The oldest example, representing type A1, dates to Naqada I and comes from grave T.297 (UCL 4239). Another three tools were found in graves T.162 (UCL 4298), T.807 (UCL 5073), and T.1270 (UCL 4467) dated to Naqada II. The artefact from grave T.102 cannot be precisely dated. The second subtype, A2, is represented by two tools, of which one is dated to Naqada II and was found in grave T.162 along with the A1 graver mentioned above. The provenance of another artefact remains unclear (cf. UCL 19839).

In addition, one graver of type B is also known from Naqada. It was found during the exploration of Predynastic grave T.63 (UCL 36150).

Tell el-Farkha

A single graver was found in the Central Kom in a layer connected with occupational phase 4, dated to Naqada IIIA1–B. It is an elongated copper bar, roughly rectangular in section, and it represents type B. The walls flare towards the cutting edge, and the blunt butt is missing. The tool was originally most likely fixed in a wooden haft.

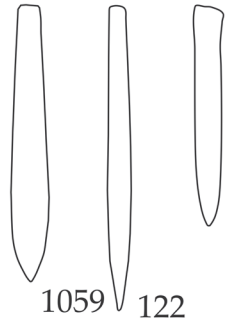
CHISELS

Chisel- chisel

Tell el-Farkha

91

Tarkhan



1059 122 170

Tell el-Murra

G1

Chisel- gravers

Naqada

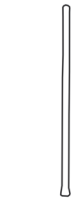
A1

T.162
4289

T.807
5073

T.297
4239

Naqada



A2

19839

Naqada

B

T.63
36150

Tell el-Farkha

Daggers

Very few weapons have survived from the 4th millennium BC. Considering that major centres were most probably fighting among themselves (Anđelković 2011), the dozen or so military artefacts known from the period seems to be a grossly under-representative number. It is highly likely that weapons damaged in combat or taken from the enemy were melted down. The tradition of making daggers can be traced back to the early stages of the Naqada period, and the form itself derives from flint tools (cf. Petrie 1920: 25), which is why it comes as no surprise that the earliest finds are made of wood and painted to resemble copper objects.

During Naqada I, elaborate flint knives in the shape of a spindle or rhombus begin to appear in Upper Egypt. They continued to be manufactured in the next phase of development of the Naqada culture. A comprehensive analysis of rhomboidal knives is presented by Kohler (2016). These objects were used by setting one end in an organic handle. Although conventionally called knives, they were actually often longer than 20 cm which, along with having two cutting edges, makes them more akin to daggers. The provenance of copper daggers from flint knives was noted early by Petrie (1925: 25). Another argument for such a genesis of cooper daggers, one that passed unnoticed by Petrie, was the discovery of such objects – but made of wood – in the Hierakonpolis cemetery. The artefacts resembled rhomboidal knives in shape, but were painted red which, in the opinion of the author, was intended to create the appearance of a fresh, unpatinated copper. These wooden artefacts come from the beginning of the Gerzean phase of the Naqada culture (Petrie 1920: 25). Rhomboidal knives gave rise to two main types of Egyptian daggers, which to a certain degree reflect two main types of flint knives of that period. The first type (A) has a triangular blade. The probably oldest examples (type A1) have a tang for attaching the handle and are rhomboidal in section, exactly like their flint counterparts. The known examples of daggers of that type unfortunately cannot be precisely dated, but it can be assumed that they appeared around the middle of the Gerzean phase. It is probably from that type that the "classic" Near Eastern dagger (type A2) developed, with a triangular blade attached to the handle with rivets passing through the blade's arched base. A characteristic feature of this dagger type is a change in the cross-section of the blade. Even though the oldest extant dagger is flat, later specimens of the A2 type have a thickened rib running through the middle of the blade to make it stiffer. Such daggers became widespread in the second half of the Gerzean phase (around S.D. 53–55). The second type of dagger (Type B) comprises rectangular blades with blunt, rounded tips, and with handles attached by means of a shaft. Petrie (1920: 25) described such tools as flaying-knives and included them among knives. However, their morphological traits like the length of the blade and the fact of having two cutting edges

are typical of daggers rather than knives. The earliest examples are dated to around the middle of Naqada II and come from Diospolis Parva (Petrie and Mace 1901: 24).

El-Amrah

A dagger with an ivory handle found in el-Amrah is definitely the oldest artefact of that type (Randall-MacIver and Mace 1902: 23, Pl. VI: 1–2). The dagger comes from looted grave B230 dated to SD 40–54 (Petrie 1917: Pl. XXXIII:1), which means to the Gerzean period. The artefact had initially been published as made of copper, but after it was cleaned in the Cairo Museum it turned out to be made of silver (Baumgartel 1950: 9). It has a single rivet for handle attachment and the tip of the blade is triangular.

From the same cemetery comes another dagger (from grave A131), dated back to the late stages of the Naqada IIIA period (SD 56–64, Petrie 1917: Pl. XXXIII:2-SD 61–62) (Randall-MacIver and Mace 1902: 23, Pl. X. 5). Unlike the first one, it has a rib in the middle of the blade. The handle has not survived, and the tip is triangular. A single hole for attaching the handle is evident near the base. Both daggers from el-Amrah should be classed as type A2.

Homra Doum

One dagger was recovered from the site, analogical to that from grave B230 in el-Amrah (A2). In the same context, a silver blade of type B was found (Baumgartel 1955: 9; Pl. II:1, 3).

Naqada

According to Baumgartel (1950: 10–11), Petrie himself found a copper dagger in grave T.836, which he later documented in detail. What makes this artefact stand out among other daggers is its elongated shape and a distinctly marked rib. The base is more curved and has holes for two rivets. The artefact definitely belongs into the A2 type.

The number of daggers known from the Naqada culture is relatively small, yet there are grounds to believe that such artefacts were actually quite popular. First, there is a larger number of daggers made of bone, and they share the same morphological features as their metal counterparts. Two such objects were described by W.M.F. Petrie (1920: 25, Pl. XLVI: 21, 22), unfortunately without mentioning their origin or dating. One bone dagger was found during the research in the administrative-cultic centre in the Western Kom at Tell el-Farkha (Ciałowicz 2012c: 241, Fig. 55). The Egyptian provenance of daggers with middle rib is suggested by the discoveries of decorated ivory handles in Naqada culture sites, with one of the most spectacular examples known from a mastaba in the Eastern Kom at Tell el-Farkha, dated to Naqada IIIA2/B1 (Ciałowicz 2012: 241, Fig: 55). An analogical artefact, currently on display in Rockefeller Museum in

Jerusalem, was found during the research at Ai (Callaway 1972: 315, Fig. 72). It is very close to the Tell el-Farkha handle in terms of both shape and ornamentation.

The site also yielded one blade described by Petrie as a "flaying knife". It was found in grave 807 (Baumgartel 1955: 16; Petrie and Quibell 1896: 27, Pl. LXV: 23), and can be dated to the first half of the Gerzean phase (Baumgartel 1955: 16).

Badari

Little is known about the context in which a type B dagger was found in Badari site. The dagger was reportedly discovered in Protodynastic grave 3200. The artefact is quite unusual, since the cutting edges, which are typically nearly parallel, here are converging. It is also unclear whether the blade was broken or it actually has a rounded rather than oval tip (Brunton 1927: 10; Pl. XX: 66).

Hemamieh

Along with the sites of Qau and Badari, this site was investigated by a mission from the British School of Archaeology in Egypt (Brunton 1927). During the research near Hemamieh, a small Protodynastic cemetery was discovered. Grave 1964 contained, among other objects, a very typical example of a type B dagger (Brunton 1927: 10, 13; Pl. XX:67).

Kafr Hasan Dawood

The British-Egyptian mission exploring the site found in grave 834 a long dagger of type B, dated to the close of the 4th millennium BC (Rowland 2014: Fig.12). The artefact resembles a dagger discovered in grave 1917 in Tarkhan.

Tarkhan

Three daggers were found in the site, all of them representing type B. The first two come from grave 22. Unfortunately, this grave assemblage cannot be dated. The daggers have very typical shapes (Petrie 1913: 10, 23; Pl. IV: 1, 7). The third artefact discovered in Tarkhan (in grave 1917) is sometimes described as a saw (Baumgartel 1955: 15). It has a very long blade of 32.4 cm. Baumgartel (1955: 15) notes that one of the edges has a series of small triangular teeth. It is difficult to determine today whether this was indeed a saw, or the cutting edge is corroded. The original drawing of the artefact does not show the teeth (Petrie 1914: Pl. III: 6). The dagger dates to Naqada III (Petrie 1914: 9) and it resembles another "saw", namely one of the artefacts from the Kfar Monash hoard (see below).

Turah

Two tanged daggers of rhomboidal section were found in grave 18e3. Unfortunately, the grave contained no other artefacts, which means it could not be dated (Junker 1912: 54–55, 62, Abb 73, 74). The tools should be classed as representing type A1.

Kfar Monash

The appearance of daggers at Kfar Monash has not been sufficiently researched as yet. One should also take into account the relations with Levant. Some daggers found in the Near East are undistinguishable from those known from the Naqada culture. An especially problematic find is a hoard found in Kfar Monash (in present-day Israel), dated back to the Early Bronze IB – Naqada IIIB-IC, which comprised four such artefacts.

In her analysis of the hoard, Tadmor (2002) refers to other finds from Levant. She mentions two daggers from the cemetery at Azor, dated back to EB IB (Ben-Tor 1975: Fig. 12: 4–5), one from Biv'tayim – another cemetery from the period (Sussman and Ben-Ariech 1966: 39, Fig. 10), and – in the Hebrew version of the text – unpublished finds from Naval Tavor and Ma'abarot. However, one of the daggers from Azor does not have a rib, and the artefact from Biv'tayim differs in shape, tip, and manner of handle attachment. The remaining two artefacts cannot be assessed as they have not been published. In general, only one dagger from Azor can be undoubtedly considered as an analogy to the artefacts from Kfar Monash. One needs to ask, however, whether it is not an import. Similar daggers are known from Egypt and Nubia, with the oldest example originating from Naqada and dated to the Gerzean period (cf. Ciałowicz 1985: 173–178). It is strikingly similar to one of the daggers from Kfar Monash, and also has space for two rivets (Petrie and Qubel 1895: Pl. LXV:3; Petrie 1916: 28–29, Pl. XXXIII:3, XXXIV: 37–38[1]). Another similar copper dagger perhaps comes from cemetery W-1 in Nubia, dated to Group A. The description of grave W-10 suggests that it contained an artefact resembling a long, rounded spearhead. Unfortunately, the published report from the research provides no drawing or photography of it (Seele 1974: 41).

The lack of fitting analogies in the Levant and the fact that daggers appeared much earlier in Egypt argues for interpreting the artefacts from Kfar Monash as Egyptian imports or imitations of Egyptian forms.

The hoard from Kfar Monash also includes so-called spearheads. They are triangular, tanged blades, with a rib in the middle. These artefacts resemble daggers of type A but are larger: the smallest spearhead is 33 cm long, while the largest is 66 cm long and weighs more than 2 kg (Hestrin and Tadmor 1963: 279). Any spearhead longer than 30 cm (not to mention those much longer) would be very impractical in use. It seems justified therefore to suggest that these objects were instead used as daggers or swords. However, whether they are Egyptian imports or imitations of Naqadian weapons remains an open issue.

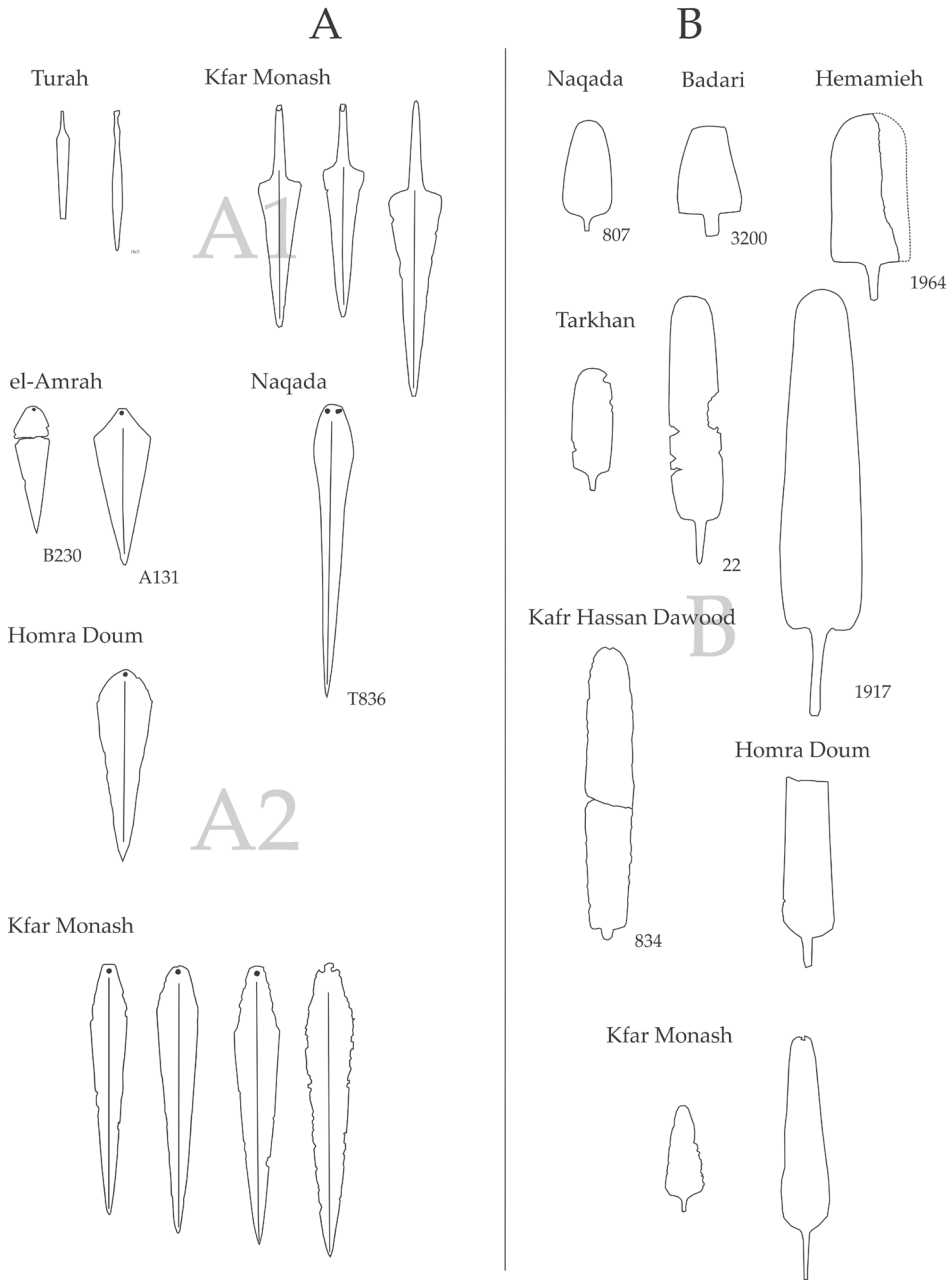
Two daggers of type B from the hoard in question are undoubtedly associated with the Egyptian cultural milieu. One of them is a small dagger and the other has been

[1] The lack of one of the rivets and the broken tip may suggest that the photograph actually shows two different daggers.

described as a "saw" (Hestrin and Tadmor 1963: Pl. 28: B–C) because, as in the blade from Tarkham, one of its edges is toothed. The dagger features a symbolic representation in the form of an oval object with two arms ending in radial lines. A similar motif can be seen between the arms. The image raises associations with the symbol of the goddess Bat. Representations of her in the form of the head of a cow with a star between the tips of its horns are known at least from Naqada II.

A copper dagger was found in the Main Deposit in Hierakonpolis, but this artefact has no good analogies among the weapons from the 4th millennium BC discussed above. It is closest to type A1, but it is not rhomboidal in section (Quibell *et al.* 1900: Pl. XXIV: 2)

DAGGERS


A
B
Turah
Kfar Monash
A1
Naqada
Badari
Hemamieh
807
3200
1964
Tarkhan
el-Amrah
B230
A131
Naqada
22
T836
Homra Doum
A2
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Kafr Hassan Dawood
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Homra Doum
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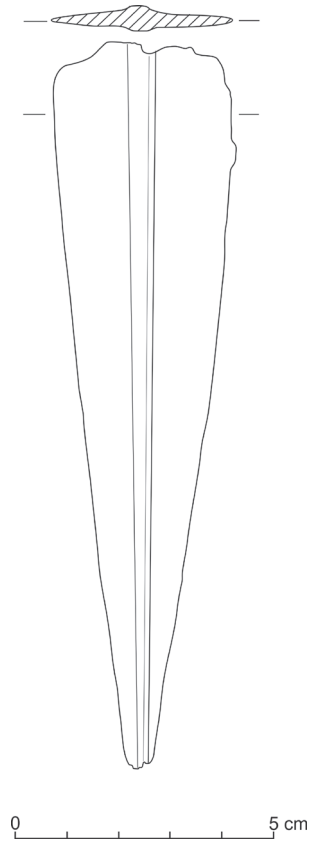
Kfar Monash
Kfar Monash

Details from Hierakonpolis Grave 100 painting depicting militarymen using harpoon as a melee-weapon



Ivory handle and dagger model made of bone, Tell el-Farkha

Fishhooks

Copper fishhooks are extremely rare finds, with most of the known examples originating from the Nile Delta. This is not very surprising: the many oxbow lakes and branches of the Nile abounded in fish, sometimes of considerable size (cf. Makowiecki 2012).

The mentioned tools derive from previously used hooks made of bone and shell. It is worth emphasising that copper fishhooks were manufactured in a workshop operating in Ashkelon. That such hooks were being imported is evidenced by the discovery of a fishhook in Site H (MacDonald 1932: Pl. XXVIII: 8), on the trade route leading to Egypt.

Fishhooks were usually made from a wire, either square-sectioned or hammered flat for stiffness. Two typological groups can be distinguished, with the basis of the division being the shape of the artefact. The first group is that of 'S' shaped hooks, with the end bent into an eye for attaching the line. The second group is that of 'U' shaped hooks.

The number of the artefacts is too small to allow for chronological differences in the spreading of hooks to be analysed.

Abydos

Two fishhooks were found during research in the Abydos settlement. There is little information available about the context of their discovery. All that is known is that they were recovered from the predynastic settlement. Both objects are 'S' shaped hooks (Peet 1913: Pl. III: 3–4).

Ballas

A hook was found in grave 103 dated back to the Early Dynastic period. The hook represents the 'S' shaped group, but neither the drawing nor the publication provide information concerning the section of the wire from which it was made (Petrie and Quibell 1896: 7, Pl. LVX: 17).

Buto

One 'S' shaped hook was found in Buto, in layers corresponding with the period of the Lower Egyptian culture development (von der Way 1986: Fig 4: 8).

Kom el-Ahmar

The archaeological research led by de Morgan brought about the discovery of one fishhook. Little is known about the context, as the find has never been published by its

discoverers. It is currently kept in the Brooklyn Museum. The hook dates to the Naqada II period. It is 'S' shaped and has a square section (Needler 1984: 290, Pl: 47:200). Needler (1984: 290) claims that the hook was made by cutting it out from a copper plate, but such technology of manufacture seems very unlikely.

Ma'adi

The biggest known collection of Pre-Dynastic fishhooks comes from Ma'adi. During the exploration of the settlement six hooks were found, of which five were complete. All these artefacts belong to the same 'S' shaped group (Rizkana and Seeher 1989: 14, Pl. 3:1–6).

Matmar

Scholarly attention focuses on grave 2649, where an object resembling a small anchor was found. In my opinion, despite the remains of a line discovered on the spikes of the anchor, the artefact was not used for fishing, instead being more probably an amulet of a kind. This is suggested by the lack of any point where a line could be attached, like an eye to pull it through or a protuberance on which it could stop. However, from Matmar also comes one classic example of a fishhook. It was found in grave 5100 (Brunton 1948: 16, Pl. XVI: 40). The artefact belongs to the 'S' shaped group, and has a clearly marked eye to pull the line through. The pottery found in the grave, among others a D-ware vessel, makes it possible to date the hook to the Naqada IIIB–IIC period (Brunton 1948: Pl. XII: 18).

Tell el-Farkha

Three complete or almost complete fishhooks were found at Tell el-Farkha – each in a different kom. They are dated similarly – all originate from phase 4, which means the Naqada IIIA–IIIB period. The hooks represent both types, with two 'U' shaped artefacts found in Koms C and E, and one 'S' shaped hook in the Western Kom (Czarnowicz 2012: Fig. 3: 5–7). All were made from square-sectioned copper wire.

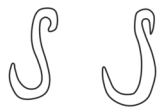
Fishhooks are one of the very few categories of copper objects known primarily from settlement contexts. Most of them became widespread during the Naqada II period. Admittedly, local equivalents made of other materials are known, but it cannot be ruled out that at least some of the copper hooks were imported. This is indicated on the one hand by the fact that most finds come from sites situated in the Nile Delta, which served as centres of redistribution for goods obtained through long-range trade with the Levant, and on the other by them gaining popularity in a period when contacts with Near East were intensifying.

'S' shaped hooks prevail in Egypt. The only two examples of 'U' shaped objects come from Tell el-Farkha. They may have been a local variant produced in a workshop located near the settlement.

FISH HOOKS

Ma'adi

Abydos



Matmar

5100

Tell el-Farkha

W/08/22

Ballas

Q103

Tell el-Farkha

C814

E/05/73

S-shape

U-shape

Harpoons

In Egypt, in a culture that rose on the banks of the Nile, harpoons are among the most popular tools from prehistory. Even though the raw materials kept changing, the shape remained unchanged until the reign of the XVIII dynasty (Brewer and Friedman 1989: 103).

The first harpoons appeared at the beginning of the Neolithic. They are known as early as the Fajum A culture, even though none of the artefacts linked with this culture have been found in situ (Ciałowicz 1999: 216), and they also occur in the Badari and Merimde cultures (Ciałowicz 1999: 216). The largest number of finds come from the Naqada period. Their popularity peaked during the Gerzean phase of the Naqada culture (Naqada II), when harpoons became popular grave offerings. Naqada II saw a rapid territorial expansion of the Naqada culture, which in a relatively short time spread throughout the whole of the Nile Valley, and by the end of the period unified the Nile Delta, previously inhabited by the Lower Egyptian culture (Anđelković 2011). Harpoons did not lose their popularity during the next period (Naqada III), with most of the finds known coming from the Delta.

Morphology of Pre-dynastic Egyptian harpoons

Harpoons belonging to early Egyptian cultures were made in a very similar fashion. One could even venture to say that they represent a continuous development from the Fajum A culture to that of Naqada. Two types were predominant. The first type had one big barb at the tip of the head with a sharp edge running from the tip to the end of the barb (Type A). The second type had additional barbs on one side. In bone harpoons the barbs were created by cutting deeply into one of the edges. Copper harpoons could have one to three barbs, all of them on one side and curved towards the tang. The artefacts of the second type can be further divided into subtypes based on the manner of attaching the line. The first subtype (B1) comprises harpoons with a protuberance at the end of the shaft and a groove above it, while those of subtype B2 have characteristic small protuberances, usually three. Subtype B3 has well-defined protuberances in the area of attachment, and the last subtype (B4) has only one protuberance, but the shape of the tool itself is highly geometric. A characteristic feature shared by all harpoons from the Pre- and Early Dynastic periods is that they have barbs only on one side. The vast majority of copper harpoons provided with more than one barb had triangular or sub-rectangular sections of the barbs, and typically a square-sectioned tang. On its end were protuberances or grooves which helped attach the head to the wooden shaft. Some scholars believe this area was soaked with poison (Ciałowicz

1999: 216). Harpoons were initially made of bone or horn, but in the Naqada culture copper tools became highly popular. They were imitations of bone harpoons, and for some time both variants coexisted, although among copper harpoons those with more than one barb were much more popular. Analysing the manufacture of harpoons it seems clear that it was the mass and kinetic energy of the projectile rather than its sharp edges that allowed for piercing the skin of the prey, while the barb prevented the harpoon from falling out of the body.

Ways of use of harpoons

Harpoons are not frequent discoveries, but they appear in most Naqada culture sites, like Naqada, Mahasna, El-Amra, Adaima, or Ballas (Brewer and Friedman 1989: 103). Before the arrival of the Naqada culture, harpoons were not particularly common in the Delta: in the site of Maadi only one example was found (Rizkana and Seeher 1989: 23). Harpoons were very often found in graves of men, women, and children alike, which may suggest that even women and children participated in the hunt for the fish trapped in the Nile marshlands (Ciałowicz 1999: 216). The most important find undoubtedly comes from the Mahasna site, where a harpoon head wrapped in cloth was found in grave H23, dated back to the Naqada IIA period (Ciałowicz 1999: 216). The artefact survived well, together with a piece of cord that connected it with the wooden shaft, and the remains of the shaft itself. Researchers consider this grave to be a burial of a warrior, which is indicated by other pieces of weaponry and numerous mace-heads found with the deceased (Ayrton and Loat 1928: 22–23, Pl. XX:3).

So how did people hunt with harpoons? The weapon was set on a wooden shaft of medium length. Judging from representations of warriors and hunters, its length can be assumed to be close to the height of an adult man. It may have been that everyone participated in the hunt. Men hunted for big Nile mammals, while women and children hunted the fish that remained in the marshlands after the flood. There is no agreement among scholars as to whether the shaft was permanently attached to the head or it could fall off after hitting the target. If the latter was the case, the shaft might have played the role of a buoy, indicating the direction taken by escaping prey (cf. Ayrton and Loat 1928: 22–23; Ciałowicz 1999: 217; Brewer and Friedman 1989: 21–23). However, it seems unlikely for the head not to be firmly fastened to the wooden part, as only this would guarantee the projectile piercing the skin of the prey and penetrating deep enough into the body to stick inside. With the head not attached permanently to the shaft, the energy accumulated in the shaft and transmitted to the head might cause it to harmlessly bounce back instead of piercing the target. Additionally, stuck in an animal, a complete harpoon with the shaft would cause it great pain. Any movements of the shaft caused

by the escaping animal would be transmitted to the head and result in the barbs tearing the flesh and vital organs. In the end, the prey would die or at least be severely wounded and weakened.

Representations in art show that harpoons were also used as a melee weapon.

En Besor

Two copper objects from En Besor are undoubtedly imports from Egypt. They are dated to the end of EB IB (Gophna 1995: 14) – Naqada IIIB–C1. Those objects are a harpoon with a single barb and a loop-headed pin. The objects may have belonged to a member of an expedition that came to En Besor, an Egyptian trade post in southern Levant. While military use of the pin can be ruled out, the harpoon is definitely a weapon. Even if we assume that the relations between the Egyptians and communities inhabiting southern Levant were friendly, the members of expeditions may have nevertheless been armed. A journey through the Nile Delta inhabited by numerous dangerous species like crocodiles and hippos required a certain amount of precaution. The archaeologists researching the site believe that the pin and the harpoon might have belonged to a dignitary overseeing the exchange of goods (Gazit 1995: 224). This seems probable, as harpoons might have had a symbolic meaning in Egypt, linked with social status (Czarnowicz 2018).

Gerza

One harpoon of the A type is known from the Gerza necropolis. It was found in grave 67, regarded as the richest burial in the cemetery. The grave offerings included, for example, a zoomorphic cosmetic palette shaped like a fish and a pear-shaped mace-head (Petrie 1912: 5, Pl. IV: 2). The assemblage can be dated to the Naqada II period.

Kafr Hassan Dawood

The site of Kafr Hassan Dawood lies in Wadi Tumilat, some 40 km from Ismailia. The vast cemetery was explored by a joint mission from the Egyptian Ministry of Antiquities and UCL. In four different graves ten harpoon points were found (Rowland 2014: 287). Drawings of two of them were recently published by Rowland (2014: Fig. 14). The first one was recovered from grave 828, dated back to Naqada IIIC1 (Rowland 2014: 285). It has two barbs and the end of its tang is thickened, with two incisions. The first barb is not very deeply cut, which makes the harpoon very similar to the one known from the Tell el-Farkha settlement (type B2). The second harpoon, dated back to the Naqada IIIB period, was found in grave 298. It is slightly bigger than the first one but very similar in shape. The only difference is that instead of two incisions on the end of the tang it has two protuberances (type B3).

Minshat Abu Omar

Minshat Abu Omar is the easternmost of all the sites discussed here. It is a complex of several cemeteries, mostly from the Pre- and Early Dynastic periods but also from the Roman period. Two harpoons were found in a rich burial (Grave 173 (126)) dated to the reign of the First Dynasty (Kroeper and Wildung 2000: 109–111). The pottery found in the grave, cylindrical vessels in particular, indicates that the finds cannot be dated later than the beginning of the Naqada IIIC1 period (Jucha 2008: 71). According to Rowland (2014: 285), grave 173 dates to Naqada IIIA1–C1.

The two harpoons are quite similar to each other. They are closer to the finds from Tell el-Farcha settlement rather than to the harpoon from grave 55 in Tell el-Farkha cemetery. The first barb is not incised very deeply, the second barb, closer to the base, is rectangular rather than square, and instead of a single, pronounced protuberance for attaching a line there are two small protuberances, which is characteristic of the B3 type.

Naqada

The manner of publication does not make it clear how many harpoons and of what type were found in the graveyard explored by Petri's team. What seems certain is that two A1 harpoons were discovered there, meaning those having a slightly curved tang and one large barb. One of them was found in grave B99 (Petrie and Quibell 1895: 23; Pl. LXV: 8) dated back to the Naqada IIC–D period, and the second harpoon, slightly larger, was found in grave T9 and is also dated to the Gerzean period. In his "Tools and Weapons" Petrie (1917: Pl. XLIV) additionally published another two harpoons of that type, of which the artefact presented as number 24 in Plate XLIV comes from looted grave 1808 originating from the Naqada II period. On the same plate Petrie (1917: Pl. XLIV: 25–28) also presented harpoons being a sub-variant of harpoons with single barb, namely artefacts with small barb and long, thin tang. All that is known is that these artefacts originate from Naqada site. Another publication by Petrie provides information that there were three more artefacts of that type, but "none of them were found in recorded graves" (Petrie 1920: 24). Petrie's "Tools and Weapons" also includes photographs of three harpoons belonging to the B type. These harpoons are dated back to the First Dynasty period and were found in Naqada. Two of them are nearly identical with the finds from grave 55 in Tell el-Farkha (Petrie 1917: Pl. XLIV: 34,35), while the last one belongs to the B2 type, even though it has a very geometric shape.

Tell el-Farkha

Six harpoons were found in this site. Two most important examples come from rich grave 55. It is a whole burial complex, consisting of the main tomb with four chambers provided with a high superstructure and surrounded by a wall, with accompanying

graves adjacent to the wall (Dębowska-Ludwin 2012: 69–70). The complex can be dated to Naqada IIIC2–D (Dębowska-Ludwin 2012: Tab. 1). Grave goods included two harpoon heads, which were found lying next to each other (Dębowska-Ludwin 2012: 70). They are almost identical: both have one sharpened edge and two barbs. The tang is rectangular with almost straight sides and square section. Near the end of the tang there is a another spike for attaching the line connecting the shaft to the head. The first barb is deeply incised, and the second one is square-sectioned near the base. Both artefacts can be included into the B4 type. It should be emphasised that grave complex 55 is one of the richest and largest in the site. The deceased buried there most likely enjoyed high social status.

Another harpoon originating probably from the Tell el-Farkha cemetery was found in settlement layers in the eastern part of the site. It was accompanied by numerous artefacts, including stone vessels of much earlier chronology than the room in which they were found. It is highly possible that the artefacts had been stolen from an older grave. This is indicated by the context – how could such valuable objects, originating from a much earlier period, find their way to a poor household in an impoverished site situated on the margins of the old burial ground? In terms of morphology the harpoon resembles its bone-made predecessors. The sides are curved, and the place where the line was attached is marked by a deep incision in the thickened part of the tang. The artefact belongs to the B1 type.

Two more harpoons originate from settlement layers in the eastern part of the site. The first one is a perfectly preserved specimen with two barbs. However, it differs from the harpoons from grave 55. Its upper edge is slightly curved, but, unlike the artefacts from grave 55, there is no spike for attaching a line, only two small protuberances on the tang. The front barb is not as deeply incised as in the harpoons from grave 55, and the second barb resembles a dorsal fin of a shark in shape and is more elongated at the base. The artefact belongs to the B3 type, and dates to the Naqada IIIB period. It was found in a part of the site possibly occupied by a service settlement for the big mastaba situated nearby. The second harpoon is incomplete, as only remains of the tang and first barb survived. It may have been a single-barbed harpoon, which is suggested by its dimensions. The chemical composition of the metal has been determined: the artefact is made of copper with traces of arsenic (Cu-As), most probably originating from Sinai deposits (Rehren and Pernicka 2014).

Another partially preserved harpoon was found in the central part of Tell el-Farkha site. Only part of the front barb survived. The harpoon was probably manufactured analogically to the one described above, and the chemical composition is almost identical. In this case as well, the copper comes from Sinai (Rehren and Pernicka 2014).

Tell el-Iswid

One example of a type B copper harpoon was found in the site. Unfortunately, the artefact is damaged, as the barb is missing, and the published drawing was made prior to the

conservation, hence nothing is known about how the line was attached. It was found in settlement layers dated to the Naqada III period (Midant-Reynes and Buchez eds. 2014: 147; Pl. 12:5).

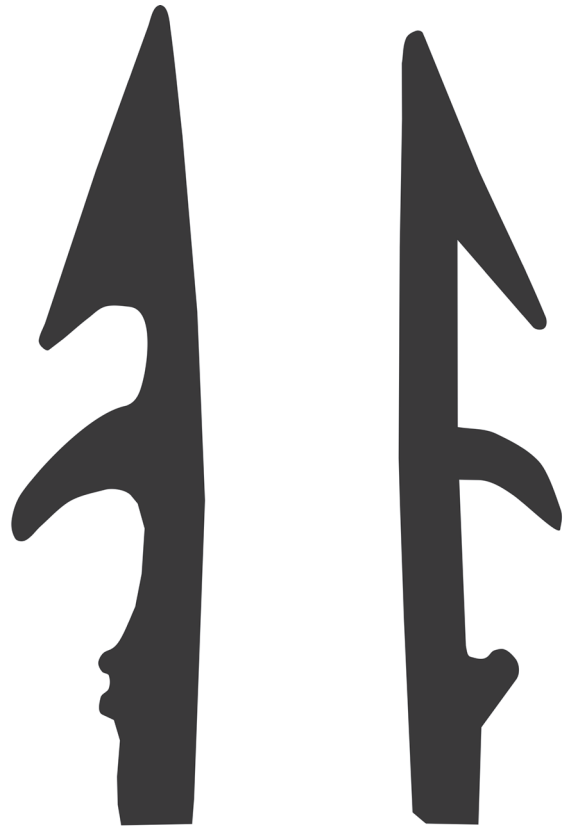
Tell el-Murra

Tell el-Murra is located approximately 10 km east of Tell el-Farkha. During the research, a grave was found containing, among other objects, two harpoon heads. The pottery found in the grave allowed the find to be dated to the Naqada IIIC1 period. The harpoons differ in size. Both have a straight body, but both barbs of the bigger head are of a highly geometricised shape, which makes it similar to the artefacts found in grave 55 in Tell el-Farkha. However, the harpoon from Tell el-Murra does not have a spike for attaching the line. Instead, it has a protuberance and two incisions in the same area. The smaller harpoon head is of a similar construction, but it is less geometrical. This can be clearly seen in the area of the second barb and the place of line attachment. Both artefacts from Tell el-Murra represent the B2 type, which means multi-barbed harpoons with small protuberances in the area of the line attachment.

Tura

During the research in Tura site a single harpoon was found in a grave dated back to the Naqada III period. It was designated as number 19i2. The artefact is well preserved. It belongs to the B1 type, as indicated by the thickened end of the tang (Junker 1912: 55).

The analysis of the artefacts allows some conclusions to be drawn concerning the evolution of the shape of harpoon heads. Type A seems clearly older, even though its youngest examples appear as late as the Naqada IIIB–C1 period. Type B must have emerged during the Naqada III phase. The oldest specimens had slightly curved tangs thickened near the end and deep incisions used for attaching a line. These elements, as well as the shape of the barbs, evolved over time to become much more geometricized in Naqada IIIC2–D. The way the line was attached also changed, evolving through incisions on the thickened part towards a single, pronounced protuberance. The first barb evolved as well, and the angle at which it connected with the tang increased considerably. We can therefore assume that harpoons similar to those from Tell el-Farkha prevailed until Naqada IIIB. The period of Naqada IIIC1 saw an evolution towards the geometrical form prevailing in Naqada IIIC2–D. Unfortunately, the insufficient number of artefacts does not allow for more detailed analysis.



Nagada III B

Nagada III C2-D

Typological comparison between the 'old' type and 'geometric' type of double barbed harpoons

Knives

According to Petrie there were two types of copper knives in use in Egypt. The first group are typical artefacts with one cutting edge and a long tang for attaching a handle placed at the extension of the spine. The other group are knives with two cutting edges and a tang set in the middle. Their blades are rectangular or trapezium-shaped, with rounded points. Petrie described this category of objects as "flaying knives" for their perceived similarity to throwing knives. He suggested they were used in tannery for removing the skin of an animal (Petrie 1917: 22) This interpretation was criticised by Baumgartel (1955: 16) who claimed such objects could not have been used as flaying knives. Petrie himself admitted that their blades were always thin and weak (Petrie 1913: 23). In my opinion Baumgartel is right. Admittedly, the knives described by Petrie have two cutting edges, which makes them similar to modern-day throwing knives. However, the material used for their manufacture (copper), the absence of a sharp point, and above all the absence of any blade reinforcement (like a rib) make this weapon soft and unsuitable for penetrating hard obstacles by throwing from a distance. The rounded point would hamper piercing, while the insufficient rigidity of the blade would make it bend upon striking an obstacle, making it even more difficult to pierce the target and possibly leading even to damage to the knife. It is worth asking whether such artefacts can be called knives at all. A classic knife is a small object with one cutting edge and a tang protruding from the opposite edge. The primary function of such tools was cutting off pieces of relatively soft materials or incising, less often piercing, them. In my opinion only such objects can qualify as knives. Do "flaying-knives" meet the criteria? In terms of morphology, these artefacts differ from classic knives. They might rather have been used as daggers or, with respect to the largest specimens, short swords of a kind. This also applies to two tools known from Turah, resembling "flaying-knives" but having blades of rhomboidal section (Junker 1912: 54–55, Abb. 73–74). They are thus presented here in the chapter devoted to daggers.

Summing up, in this study objects included into the category of knives are only those which morphologically resemble their modern-day counterparts. Few such artefacts have been discovered in Egypt in the context of sites from the 4th millennium BC. This makes it impossible to draw more detailed conclusions concerning their typology and chronology.

El-Amrah

The artefact discovered in el-Amrah differs from other Egyptian knives with the position of the tang. However, it has only one cutting edge and differs considerably from Petrie's "flaying-knives" in terms of morphology. The knife was found in grave b80.

When discovered, it was set in a handle made from a "cloven foreleg of a small animal" (Randall-MacIver and Mace 1902: 27, 40, Pl. XII:9). The point has unfortunately broken off and has not survived to this day.

Naqada

The research revealed one knife with the tang at the extension of the spine. The artefact is unfortunately broken, and the point is missing (Petrie and Quibell 1897: Pl. LXV: 23). It was found in grave 63 dated to the end of Naqada II (Baumgartel 1995: 16).

Tell el-Farkha

Three knives in total were found in the site. The oldest originated from phase 1 and was discovered within the so-called Lower Egyptian residence. Only the blade survived, which is triangular with a rounded point. According to my knowledge, this knife has no analogies in other sites of the Lower Egyptian culture, but a very similar object has been found in Israel, in the site of Ashqelon-Barnea. It dates to period EB IA2, which corresponds to the time when the Lower Egyptian residence developed in Tell el-Farkha.

Another knife from Tell el-Farkha was found in the Eastern Kom in 2011. In a room dated to phase 4 a large copper knife was found, whose shape resembled that of a type of flint knife. It is the largest copper object discovered in Tell el-Farkha so far (19×5 cm). It has a well-defined handle, which is an extension of the spine. The spine is straight and blunt, and terminates in a slightly upturned point, passing into a curve which passes into the blade. The blade and the spine are parallel. The only known artefact to show a passing similarity to the knife from Tell el-Farkha is a knife from Abydos, currently in the Petrie Museum in London (UC16203). The blades of the artefacts are similar in shape, but this is where the similarities end – the knife from Abydos has no handle and is much smaller than the artefact from Tell el-Farkha.

Ornaments

Copper was used in the manufacture of four types of ornaments: beads, earrings, finger rings, and bracelets of all kinds. Beads are among the earliest copper objects in Egypt. In general, ornaments are rare, and quite often single finds. It would be difficult to discuss the differences in their style and morphology, so they are analysed jointly here. Pins pose a major problem. Not a single decorative pin has survived to the present, but many artefacts regarded as awls have missing ends. One can suppose that decorative copper pins were known in pre-dynastic Egypt, especially given that similar objects made, for example, from bone are known from that period.

Finger rings

Such objects, made from copper sheet hammered flat, are of small diameter and width. The largest number of rings were found during Petrie's excavations (Petrie 1896: 26–27), with the earliest examples occurring as far back as Naqada I. An interesting artefact was found in Naqada in grave 1552: a ring made from a wide band of sheet copper features a decoration in the form of a punched zigzag pattern (Petrie 1896: 26; Pl. XLVIII: 10).

Beads

Beads occurred in graves as early as in phase Naqada I. The majority of the finds come from three sites: Badari, Mostagedda, and Abusir el-Maleq. They do not represent high levels of craftsmanship and they did not require any sophisticated manufacturing techniques: they are simple tubes formed by bending a copper sheet band (Baumgartel 1950).

Bracelets

Bracelets were produced from a range of raw materials, with ivory, seashells, horn, and even greywacke as common examples (Petrie 1927: 6). Copper bracelets are very rare finds, but four main types can nevertheless be distinguished: bracelets made from copper wire (often of more than one coil), and closed copper rings having oval section, plano-convex section, and oval section with knobs. A large group of these artefacts was discovered in Tell el-Farkha (Czarnowicz 2012: 348). The oldest bracelets from that site originated from phase 3, which falls to the Naqada IID2–IIIA1 period, while the majority were recovered from settlement layers associated with the subsequent phase. Three of the basic bracelet types are represented there: made from wire (Czarnowicz 2012b: Fig. 3:2), oval-sectioned (Czarnowicz 2012b: Fig. 3:1), and with plano-convex section. Among

Naqada culture sites, other examples of the last two types are known from Minshat Abu Omar (Kroeper & Wildung 1985: 88) and Hierakonpolis Fort Cemetery graves 66 and 158 (Adams 1987: 86, 162). A very well-preserved bracelet with knobs was found in the Egyptian trading post in Tel Erani dated to phase Naqada IIIB–C1, and a similar one was discovered during the research in Tura site (Junker 1912: 54, Pl. 18k.2).

The finds from Abusir el-Malek deserve special attention. In grave 1053, no fewer than nine bracelets of various types were found, including two very interesting specimens of a form unknown from any other site (Scharff 1926: 55–56, 155). They were small rectangle-sectioned rings with diameters of 6.5 cm and 7.4 cm. What is surprising is that both bracelets are decorated with animal motifs on the external surfaces. The first, narrower one (cat. no. Berlin 19 034) features the representation of a snake, and the other (cat. no. Berlin 19 033, Scharff 1926: Abb. 21) is adorned with three crocodiles. The artefacts are believed to have been made using the lost wax technique (Scharff 1926: 55, Abb. 20), which is highly surprising. Previously, this technique was only known to have been used for creating artefacts found in the "Cave of the Treasure" in Nahal Mishmar. With the decline of the Chalcolithic cultures the technique apparently fell into oblivion. Further analyses of these artefacts are perhaps necessary to confirm this surprising finding.

Earrings

Only one artefact can be fully credibly included into this category, a small ring made from copper wire discovered in Tell el-Farkha. The object is approx. 4 cm in diameter and the wire is 0.3 cm thick. One of the ends is sharp, while the other is cut flat. In the central part, an incision spiralling around the artefact is evident. Such objects are quite rare finds, and may have been produced *ad hoc*.

Loop-headed pins

This is a very characteristic group of objects, with examples known both from Upper and Lower Egypt. These artefacts differ from common pins and awls by having an eye formed by turning back the head to make a loop rather than by means of piercing or drilling.

Loop-headed pins gained popularity as early as in late Naqada I, although Baumgartel (1950: 17) challenges such an early chronology for grave T1345. The issue is very ambiguous. Baumgartel published photographs of the artefact from grave 1345 (Baumbartel 1950: Pl. III: 14), but no such object can be found in the catalogue of the Petrie Museum, where a completely different pin is listed as belonging to that assemblage (cf. Petrie Museum UC4327). On the other hand, the catalogue lists another artefact dated to Naqada I, designated as UC4128. Thus, perhaps loop-headed pins did actually appear so early, although it seems safer to assume that they became widespread in the Gerzean phase.

It is not fully clear how the artefacts in question were used. As the diameter of the loop sometimes considerably exceeds the thickness of the shaft, they could not have been used as sewing needles. Needler (1988: 290) suggests they may have been used as cloth fasteners, although he admits that they seem well suited as awls as well. Artefacts of that type seem suitable for manufacture of objects from rope or cord, like fishing nets or cordage. Nets used by Egyptian fishermen must have required frequent repairs, and these could conveniently be done with small loop-headed pins. The oval tip facilitated untying knots, and the loop could be used to thread a strand and manipulate the pin while mending the net. Larger specimens may have been used in the same way but with larger nets made from thicker cord. Similar tools are still used today by traditional ropemakers and craftsmen making fishing and sailing gear. On the other hand, similar objects are known from other areas in the Near East as well (Baumgartel 1950: 23), for example from Tepe Hissar, while representations of people wearing loop-headed pins as dress ornaments are known from Mesopotamian art. Moreover, in such cases the loop served for suspending a short string of beads made of precious stone, with a cylinder seal attached at the end. A reconstruction of such an ornament is on display in the Pergamon Museum in Berlin. It cannot be ruled out that loop-headed pins were used in this way in Egypt, which is possibly indicated by the discovery of such objects in Abydos in graves of Qa'a (Petrie 1901: Pl. XLIV: 48), Djet (Petrie 1901: Pl. XXXVIII: 92), Djer (Petrie 1901: Pl. XXXV: 93, 95), and in the tomb of Khasekhemwy. The artefact from the last tomb was made of silver and had a serekh with the name 'Aha' on the shaft (Dreyer 2006: 114–115, Taf. 27b). It is also possible that the objects in question were originally netting needles but came to be used for other purposes with time.

There are two basic types of loop-headed pins, differing primarily in size. Smaller objects (type A) reach approx. 10 cm in length and can be divided further into three

sub-groups. The first sub-group has oval-sectioned shafts (A1), while in the second sub-group the shafts are rectangular in section (A2). There is also a variant in which the head is bent into a loop and wound around the shaft beneath the loop (A3). Pins with oval-sectioned shafts are apparently older than those having rectangular sections, the latter appearing at some point during phase Naqada II. (brak informacji o typie B)

Abydos

Two loop-headed pins of type B were found during Petrie's excavations, and they are today kept in Petrie Museum in London under inventory numbers UC16206 (complete specimen) and 36274 (broken-off tip). The objects date to Naqada III.

Ashkelon

A type A pin was found in Ashkelon. It is particularly noteworthy given that workshops producing copper tools were located in that site, which means the artefact is likely a local product rather than a Naqadian import. The pin was found in the part of the site occupied in EB IA, which means in phase Naqada IIb-c.

Badari

Three objects representing the category in question were probably found in the site. The oldest one, found in grave 3, dates back to Naqada I (Brunton and Caton-Thompsom 1928: 60). Unfortunately, the publication does not include the drawing. Another find is a pin of the A3 type, dated to the close of the Gerzean phase (Brunton and Caton-Thompson 1928: 60, Pl. LIV: 9). Another artefact, described as a netting needle (Brunton and Caton-Thompson 1928: 60, Pl. LIV: 8), is probably a damaged loop-headed pin.

En Besor

One loop-headed pin was found in this Egyptian trading post located in southern Levant. It is very typical, with a shaft of rectangular section, representing type A2 (Gazit 1995: 224). It can be dated to EB IB, which corresponds to Naqada IIIB–C1 (Gophna 1995: 14).

Hemamieh

One artefact belonging to type A was found in the upper settlement layers, but it is impossible to assign it to any sub-group based on the published data alone.

Kom el-Ahma**r**

Two artefacts of the A1 type were recovered during the excavations carried out in the settlement. No detailed information on the context is available. All that is known is that the

artefacts date to late Naqada I or early Naqada II (Needler 1984: 290–292, Figs: 22:92, 93, 201, 202).

Tell el-Farkha

Four loop-headed pins were found in the Central Kom at Tell el-Farkha, of which two represented type B and the other two type A2. The artefacts were recovered from layers dated to Naqada IIIA1–C1, and those representing type B do not appear in the site before phase Tell el-Farkha 5 (Naqada IIIB–C1).

Tel Erani

A copper loop-headed pin was discovered by a Polish-Israeli team exploring the site. The pin, of type A2, was found in layers connected with the Egyptian trading post. It was not strictly an import, as it seems to have belonged to an Egyptian living in the trading post. This is important, as neither in Erani nor in En Besor did the inhabitants engage much in fishing.

Naqada and Ballas

The interpretation of finds from these two sites is very difficult. Publications present only a selection of objects discovered there, and this is particularly true with respect to artefacts occurring in larger numbers. This also affects the analysis of loop-headed pins. The presence of such artefacts is mentioned in the monograph of these sites, but merely two examples are presented (Petrie and Quibell 1896: Pl. LXV: 15). In another publication Petrie (1917: Pl. LXV: 102–109) mentions no fewer than seven objects. However, a search in the Petrie Museum database[2] has revealed as many as 16 loop-headed pins. Moreover, not all of the finds can be matched between the two lists, so the total number of objects is impossible to determine.[3] Among the objects presented in the catalogue, UC4128 from grave 1490 dates to Naqada I. The majority, like UC4301, UC4410, UC4522 or UC4586 originate from the Gerzean period. The first and third from this group, as well as UC63564, can be assigned to type A2. The remaining artefacts, namely UC4410, UC4586, UC4598, UC5070, UC5071, UC5072, UC5074, UC5287, UC4128, UC4175, and UC58008 represent type A1. In addition, one object attributable to type A3 was found in the cemetery (UC5436). Four objects from the above list probably originate from Ballas (UC5070, UC5071, UC5072, UC5074), and one from the settlement (South Town) (cf. Petrie 1917: Pl. LXV: 102-109; Petrie and Quibell 1896: Pl. LXV: 15, 19).

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[2] The catalogue is available from: http://petriecat.museums.ucl.ac.uk/search.aspx

[3] E.g. Baumgartel (1950: 17; Pl. III:14) published a photograph of the artefact from grave 1345, which could not be identified in the collection of UCL.


A
B

Spearheads

Copper spearheads are extremely rare finds in Egypt. They appear in Naqada III C1. Only two examples are known, and both are quite similar in appearance. The blade resembles that of a dagger, although it is more oval than triangular in outline. The blade is strengthened by a rib passing through its middle, and in place of a handle there is a socket for attaching the spearhead on a wooden pole.

One of the spearheads comes from the Tarkhan cemetery (Petrie *et al.* 1913: 21, Pl: IV: 6), grave 474, which according to Baumgartel (1955: 11) dates to SD 79 or earlier. The other comes from the cemetery at Kafr Hasan Dawood (KHD 3122). It was found during the exploration of grave 371, dated to Naqada III C1 (Rowland 2014: 284; Fig: 11).

Similarities and differences between Egypt and the Levant regarding production of copper objects

Early metallurgy in Egypt certainly had much in common with that of the Levant. During the Predynastic and Early Dynastic periods, a significant portion of the raw material required for making copper tools originated from the east and was brought to Egypt by the intermediary of southern Levantine communities. Although this still remains to be fully convincingly proved, it can be assumed that the Egyptians must have relied on the know-how and technological solutions borrowed from the people of the Near East, who had already been experimenting with the manufacture of copper objects for at least few centuries by that time. Despite many similarities, some differences are also evident between the two regions, which can be seen in the morphology of certain artefacts. In this chapter, similarities and differences between products of Egyptian and Levantine coppersmiths are discussed, as well as the genesis of these differences.

From the typological perspective, two major differences can be demonstrated between the corpus of copper tools known from Egypt and that known from southern Levant. First, miniature models of tools were created in Egypt for funerary purposes, to furnish the deceased for the afterlife. They are known from graves, and typically include objects in the shape of real tools cut out from copper sheet. This custom is unknown from the Levant. Second, the range of forms produced from copper is much broader in Egypt, encompassing luxury objects like bracelets and decorative pins, but also weapons (knives, daggers), and a wide spectrum of tools, among which fishing tackle of all kinds prevailed. Objects like harpoons, loop-headed pins, and awls of various kinds were by far the most common copper artefacts in Egyptian sites of the Pre- and Early Dynastic era. Adzes, which could be used for processing both wood and stone, also gained popularity in that time. Copper artefacts typical of the Naqada culture were not exported to the Levant. Despite a developed network of contacts relying on barter exchange, such objects are nowhere to be found in the Near East. The only exceptions are artefacts discovered in En Besor (Gophna 1985) and Erani (Czarnowicz 2016b). The contexts in which they were found (in both cases within Egyptian trading posts) suggest they belonged to Egyptians who arrived in the Levant with merchant caravans.

The situation in the Levant looked slightly different than in Egypt. During the Chalcolithic, when the first copper objects appear, the spectrum of copper artefacts is very broad, and it encompasses both tools and luxury objects. The latter include, among

others, the symbols of power uncovered in the Cave of the Treasure in Nahal Mishmar. Basic tool forms like adzes, axes, and awls maintain the same shape despite the collapse of the Chalcolithic cultures. What changes at the turn of the 5th and 4th millennia BC is that luxury objects cease to be produced.

Unfortunately, the state of research does not allow for determining whether or not the technological aspects of copper artefacts are similar in both regions. In the Levant, the state of research on the issue is sufficiently advanced for reconstructing the details of manufacture, but the available studies for Egypt in the 4th millennium are very few. T. Rehren and E. Pernicka's (2014) studies of artefacts from Tell el-Farkha suggest that towards the end of that period the Egyptian craftsmen may have been capable of using similar technological solutions as their Levantine counterparts. This applies, among others, to the technique of hammering used for making cutting edges harder.

Copper objects from Egypt and the Levant show certain similarities. There is a group of artefacts which share very similar morphologic traits, above all knives and small loop-headed pins. The best-preserved examples come from Tell el-Farkha and Ashkelon-Barnea, with objects from both sites (especially small knives) being nearly identical. Naturally, items like needles, awls, and pins are morphologically virtually identical, although in this case caution is required, since their shapes are strongly determined by their functions. On the one hand, trading in such objects cannot be convincingly proven, but on the other one cannot reject the possibility, especially given that the similarities go beyond morphology and also encompass the technology of manufacture (cf. Rehren and Pernicka 2014; Halicz *et al.*).

Adzes and axes stand out in this group. As with awls and pins, their appearance is determined to a significant degree by the role they were to perform. Yet, the specimens from Egypt and Levant differ in terms of style. Adzes and axes known from Egypt have a straight or slightly arched cutting edge which does not extend beyond the width of the artefact. Analogical tools known from the Levant are different, with the cutting edges extending beyond the lateral sides. It is worth noting, however, that due to the wear resulting from hitting hard surfaces with the cutting edge, such tools were frequently recast and tempered again, which may explain the disappearance of these extended parts.

So, can we say that Levantine metallurgy was closely connected with that of Egypt? Beyond any doubt, in that part of the world the knowledge of copper processing first emerged in southern Levant and from that area it spread to other regions. Towards the close of the 5th millennium BC, Levantine coppersmiths attained true mastery, being capable of manufacturing such sophisticated objects as the crowns and sceptres known from Nahal Mishmar. True, their knowledge did not survive the crisis that affected southern Levant at the turn of the 5th and 4th millennia BC, but it was not all forgotten. Interestingly, there are grounds to suggest that a group of people from the Beer-Sheva region migrated to the Nile Delta and settled there, bringing with them the knowledge

of copper processing. This is indicated by the discovery of imported pottery during the research in Buto. These were vessels typical of the final Chalcolithic in the Levant, with good analogies in the Beer-Sheva region. The fact that both ritual vessels and everyday forms were found indicates that a group of southern Levantine people were present in Buto. These newcomers are believed to have been immigrants seeking refuge in the Delta rather than merchants (Faltings 2002: 168). Further development of the Lower Egyptian culture brought about the establishing of regular contacts with southern Levantine communities, resulting in – as evidenced by the finds from Ma'adi – copper from Wadi Araba mines starting to appear in Egypt. The mechanisms of these contacts are discussed further in this book.

With all likelihood, at least some part of copper artefacts reaching Egypt were produced in workshops operating in the Ashkelon region. This was simply cheaper than transporting raw material to Egypt and processing it further there. Nevertheless, the majority of copper artefacts were local products, created using technological solutions borrowed from the Levant and advanced further in Egypt.

Relations between Egypt and the southern Levant and the economy of exchange

Copper was undoubtedly an important raw material in Egypt as early as the Predynastic period. A quantities of were obtained from abroad, above all through the intermediary of Levantine communities. Therefore, before we can recapitulate the state of knowledge concerning the emergence of copper metallurgy, it is worth presenting how the relationships between Egypt and Levant developed in the period discussed in this study, and discussing the mechanisms of exchange.

Over the 60 years that have passed since the publication of Y. Yadin's (1955) paper, several different models have been proposed to explain cultural relationships between Egypt and the Levant. Most of them were marked by a very selective approach, being focused on the last decades of the 4th millennium BC and trying to explain the phenomenon of the Egyptian presence in southern Levant. One of the first attempts at a comprehensive presentation of the dynamics of the relationships was that undertaken by L. Watrin (1998: 1215–1226). Based on general models of exchange proposed by C. Renfrew (1975), Watrin identified four phases of contact. In the first phase, the exchange involved intermediaries. During the second phase, which fell to EB Ia, both communities had free access to the places of exchange located on the other side. In this model, the exchange was in the hands of narrow groups of people from both communities, who resided in factories operating beyond the borders of their own respective cultural areas. The subsequent two phases were marked by the presence of Egyptian administration in the Levant, with the last phase seeing the exchange dominated by the Egyptians.

A different view was presented by T. Levy and E. C. M. van den Brink (2002), who distinguished six phases of what they described as Egyptian-Levantine Interactions (ELI). The first stage began around 3900 BC, with occasional contacts between the two regions lasting until the beginnings of EB Ib (ELI 1–3). As emphasised by the authors of the concept, the number of imports was at this stage very limited in Egyptian and Levantine sites, and does not allow for making further conclusions as to the nature of the relationships. The next three phases (ELI 4–6) cover a period of more intensive contacts, reflected in cultural transformations that took place both in Egypt and southern Levant.

A broader division, and one based primarily on the developments taking place in the Levant, was presented by P. de Miroschedji (2002). He distinguishes as many as seven phases of contact, although they cover a much longer period than in the models

presented above. Only four of these phases fall within the 4th millennium BC. According to de Miroschedji (2002: 39–41), phase I, which lasted until ca. 3500 BC, was characterised by occasional contacts between the two communities. The contacts took place on the occasion of exploration of new areas in search for natural resources. This is confirmed by nomadic camps in Sinai where both Levantine and Egyptian pottery was found. The next phase saw the beginnings of the Egyptian expansion, which stemmed both from the use of donkeys for transport and from the growing interest in Levantine products in Egypt. This was the phase during which regular contacts were established, which in the next phase resulted in the establishment of Egyptian colonies in the southern part of southern Levant. Further development (phase 4) led to establishing Egyptian administration in the colonised territories.

An important study concerning Egyptian relationships with southern Levant was published by U. Hartung (2014), who distinguishes five phases. He places the establishment of the relationships in the final Chalcolithic. He believes the exchange was performed by intermediaries and that it was the Levant that can be seen as the centre, while Egypt played the role of peripheries in that period. However, the question emerges: is it justified to describe these relationships in terms of the centre-periphery model, since the contacts between the two cultures were only occasional, if they took place at all? Hartung also admits a possibility of migration from southern Levant to Egypt towards the end of the Chalcolithic. In the next phase broader cooperation was established, and the exchange intensified. This was due to the presence of Egyptian merchants in the Levant, and Levantine merchants in the Nile Delta. The subsequent phase is associated with further expansion of the Naqada culture. At that time, which in Hartung's opinion means in the second half of the 4th millennium BC, permanent Naqadian colonies were founded in the Levant, which in the next phase led to the creation – under the inspiration of Egyptian authorities – of a special area controlled from the central site of Tell es-Sakan.

Among the existing models describing Egyptian-Levantine relationships (Anđelković 1995, 2012; Gophna and Gazit 1985; Amiran 1965; Yadin 1955), the most probable one seems to be that positing exchange of goods between the two regions as an impulse for development of settlement enclaves within some of the sites located in the Shfela, the Negev, and the coastal plains. The main champions of this idea were R. Amiran (1970: 94, 1974: 10–11) and A. Ben-Tor (1982, 1986), who believed this was the way for Egypt to gain access to locally unavailable resources. These claims of the Israeli researchers provoked criticism, with the main argument against the existence of relationships based solely on the exchange of goods being the inevitable "negative economic balance". This term was first used by Y. Yekutieli (1998: XXII–XXIII), who claimed that the cost of maintaining colonies must have far exceeded the profits that the Egyptian side could have possibly gained from their resources. Other scholars emphasised that the communities inhabiting the Levant had no goods to offer that would be of value for the Egyptians

(Kansa 2001: 54). Another important voice in this discussion was that of R. Gophna (1992: 386), who argued that given the uneven social development in the Levant and Egypt exchange of goods on equal terms was not possible, as the more developed group would always exploit the other side.

But can we really apply the rules of a free market economy to relationships between two civilisations of the 4th millennium BC? It seems more justified to use another approach. Relations in the 4th millennium BC were much more direct, relying on contacts among merchants leading caravans from one centre to another. The price was fixed by bargaining and reflected the necessity or desire to obtain certain commodities rather than the real costs of their manufacture. This fits much better to a model known as the bazaar economy, which some economists believe to have been the predecessor of the free market of capitalism (Tax 1953; Katzin 1960). One characteristic of this model is that the same person combines the roles of the seller and buyer, often being only an intermediary between the manufacturer and the receiver (Geertz 1963: 34 Fanselow 1990: 251). Prices are fixed by means of bargaining (Dewey 1962a, 1962b; Davis 1973; Geertz 1978; Alexander and Alexander 1987; Fanselow 1990: 254–255). The relationship between trading parties is highly important in the "bazaar" model, with price and innovation playing less important roles. It is the responsibility of contractors to provide the product, and when a problem emerges with supply for any reason, it is their task to fulfil the contract. This made exchange to certain extent safe and eliminated the need to search for new suppliers – the contractors, be they merchants, local chieftains or communities, would do their best to satisfy their client's needs. Such approach builds a relationship, often involving elements of clientelization (Geertz 1978: 29–31), and makes both sides of the contract dependent upon one another to certain extent.

The bazaar economy model fits perfectly into the relationships linking Egypt with southern Levant.[4] Although the development of the two regions followed different trajectories and the social structures differed as well, the relationships between them bear hallmarks of such an economic system. The centres of power had already developed on the Egyptian side by that time, initially local and later central, and they were interested in acquisition of certain goods. What mattered for them was quantity and quality rather than price. The other side exported the surpluses of their production. For a long time, these relationships either relied on intermediaries or, as in the view of C. Renfrew (Renfrew and Bahn 2002: 352), emissaries were sent to the other side or to places in-between the two areas. The channels of exchange remained the same, and the relationships became more intense with time. Moreover, the discoveries from Tel Erani suggest that the site served as a kind of an assembly point, where products from various parts

[4] It needs to be emphasised that this model applies to the relationships between Egypt and Levant, not to the mechanisms operating within these two communities, which are also influenced by social development.

of the Levant arrived (cf. Braun 2016). Enclaves established towards the close of the 4th millennium BC came to serve as a form of bazaar where exchange deals could be made.

It is worth emphasising that the presence of Egyptian pottery in Sinai suggests that this area should also be taken into account when discussing Egyptian-Levantine relations. This hypothesis is corroborated by lead isotope analyses of copper samples from Tell el-Farkha, which show that at the close of the 4th millennium BC copper from Sinai was present in Egypt (Rehren and Pernicka 2013). Thus, we have an axis of Egypt-Sinai-Levant, in which the territory of Sinai is a poorly developed area benefitting from the achievements of its neighbours. A. Khazanov (1984: 203) claims that nomads cannot exist without symbiosis with settled populations, who provide them with necessary agricultural produce. Sinai was a periphery of the world in that time. The people from the Levant exchanged goods with Egyptians, but were also sending some to nomads inhabiting southern Negev and Sinai, in exchange for some commodities (e.g. copper) desired by the Naqadians. Egypt played the role of a world centre in that period, and the Egyptians were capable of accumulating large surpluses of agricultural products for trade. Of particular importance was grain, and also fish and animals, possibly exported for meat (Abłamowicz 2012; Czarnowicz 2012; Makowiecki 2012; Sowada 2018). The existence of the discussed axis is particularly evident in the final stages of Egypt's relationships with the Levant.

The relationships presented above fit into the world system perspective described by I. Wallerstein (2007), in which a world means an entity stretched in time and space, encompassing a number of communities bound by relationships. In this model, all regions of a world-system can be included into one of four categories: core, semi-periphery, and periphery.[5] The core areas are those best developed, semi-peripheries use contacts as means of development, and peripheries are unable to develop independently without a connection with the core areas. Wallerstein's model can be applied to our situation under certain conditions. In the 4th millennium BC the impact of the political and social centre in Egypt on the semi-peripheral southern Levant was very limited. The communities inhabiting the two regions seem to have developed relatively independently, and the greatest achievements of the developing area, i.e. the emergence of urban culture and progressing urbanisation, arose as a result of local social processes rather than as borrowings from the centre. In consequence, the communities from both sides engaged in the contacts from starting positions that were more even, even if attempts at exerting control over some aspects of the relationships (e.g. on the trade routes) by the Naqadians are to certain extent evident.

Summing up, the most likely model of relationships seems to be a trilateral exchange of goods among Egypt, the Levant, and nomadic tribes inhabiting southern Negev and

[5] Or developed, developing, and poorly developed states.

Sinai. In this system, southern Levant was not just the receiver of commodities brought from Egypt, but it also redistributed some portion of the imports among the nomads in exchange for copper, necessary both for the internal market and as a raw material important for exchange with the Egyptians. This kind of system was in place especially in a period when the contacts became more intense, which took place due to the development of the Naqada culture and the foundation of the first proto-urban centres in the Levant, like Tel Erani. Before that time, the relationships were occasional and indirect, and they cannot be fitted into any single theoretic model. The whole of the relationships in question can be divided into the following stages:

Phase 1
Initial
(Badari culture – first half of Naqada I = Chalcolithic in the Levant)

The appearance of the first imports can be traced back to the close of the 5th millennium BC. The current state of research does not allow for conclusion whether this resulted from direct contact between Egyptians and southern Levantine populations. If such contacts indeed took place, they were most likely accidental, connected with the exploration of Sinai by both sides. The Sinai was probably explored in search of valuable resources, including copper ores, as this was the time when copper became more widely used. One can assume that these initial contacts were established bypassing the natural link between Upper Egypt and the Levant, i.e. the Nile Delta. The Badari people, and later the Naqadians, probably used direct routes to Sinai via the Red Sea. Contacts were occasional, and circulation of artefacts between the two regions took place via Sinai nomads, whose mobile lifestyle led them into contact with settled people inhabiting southern Levantine settlements, and who probably reached Egypt as well. The imported artefacts are predominantly luxury goods, including jewellery, gold, and stone vessels. The people of the Levant developed a particular liking for Egyptian mace heads. In light of the arguments presented in this study, export of freshwater molluscs from Egypt in the Chalcolithic should be questioned. Imports reaching the Levant were reserved for a narrow circle of recipients. Judging from ceramic vessels known from graves of the Badari culture and the Amratian phase of the Naqada culture, agricultural products like wine and olive oil started to reach Egypt as early as the turn of the 5th and 4th millennia BC (Lovell *et al.* 2006). B. Rothenberg (1995) points to the role of copper in the relationships between Egypt and Levant, claiming that during his research in Sinai he discovered traces of camps left by people who arrived from Egypt, whose arrival was connected with attempts at extraction and smelting of copper ore. In his opinion, the Egyptians were only capable of obtaining metal containing too much

calcium, which made it unsuitable for making tools. Unable to solve this problem, the Egyptians were to give up these experiments and initiate the import of raw material from the Levant, where local communities were already familiar with the proper techniques. Rothenberg dates the camps and the phenomenon they reflect to the turn of the 5th and 4th millennia BC. One can assume that the interest in new luxury goods in the Levant and in the locally unavailable raw materials in Egypt grew with time, resulting in the intensification of contacts. The relationships came to include the people inhabiting the Nile Delta as well, who infiltrated the upper course of the Nile and the Mediterranean coast.

Summing up, phase 1 saw a circulation of goods being of interest to upper classes in Egypt and the Levant. The contacts were occasional, and the exchange was in the hands of nomadic tribes whose annual migrations brought them in contact with both the Egyptians and the Levantine communities.

Phase 2
Emigration from Levant
(mid-Naqada I = turn of Chalcolithic/EB Ia)

At a time corresponding to the close of the Chalcolithic in the Levant, a group of the Levantine population associated with the Be'er-Sheva culture arrived in Buto in the Nile Delta. This phenomenon clearly stands out from the general picture of contacts (Watrin 2007). It is reflected by the occurrence of typically Chalcolithic vessels made in the Levant in layers associated with phase Buto Ia, which in phase Ib are replaced by forms which were similar but manufactured using local raw material available in the Delta. The archaeological evidence indicates that the newcomers were looking for a new place to settle down. No traces indicative of trade have been found, and the newcomers established a colony of a kind in Buto. This migration took place in the final stage of the Levantine Chalcolithic, and can be correlated with the abandoning of sites near Be'er Sheva, possibly due to climate changes. The changing climate caused further desertification of the Be'er Sheva region, where one of the centres of the Chalcolithic culture was situated. This most likely fuelled a migration towards the Mediterranean coast. One large group migrated north-west, bringing the knowledge of copper processing to the Askelon region, while another group may have turned west and settled in the Nile Delta. Such a possibility was suggested by L. Watrin (2007) and other researchers. The crisis did not hit the entire southern Levant with the same force. Some communities remained active and were still interested in maintaining exchange of goods. The migration of the Be'er Sheva population took place somewhat on the margins of these relationships.

Phase 3
Period of Lower Egyptian domination
(second half of Naqada I – Naqada IIIB–C = EB Ia)

Despite the crisis that affected some areas in the Levant, the mines situated near Wadi Feinan remained operative, and in the many other parts of the region – like the Jordan Valley, Shfela, or the coastal plain – the climate allowed for olive cultivation and viticulture. New places became settled, including Tell Hujayrat al-Ghuzlan in the Gulf of Aqaba, where the population were engaged in copper processing and manufacturing ingots which were later distributed to production centres on the Mediterranean coast. These centres manufactured artefacts to meet local demand, but also for import to Egypt. Lead isotope analyses confirmed that copper objects from Ma'adi were made from raw material originating from the Wadi Feinan mines, while ingots fit, in terms of size and shape, moulds discovered in Tell Hujarat al-Ghuzlan. In phase 3, the spectrum of goods exported from the Levant to Egypt changes as well. While they had previously included primarily luxury objects of various kinds, now these were mainly ornaments and small amounts of pottery. There is no indication of the presence of people from the other side, either in Egypt or in Levant. Goods started to circulate using different routes. The previously active Red Sea route waned in importance, and more and more objects were arriving in Egypt via Lower Egyptian settlements. It is not yet possible to determine whether the people from the Delta imported goods for their own needs and only traded the surpluses with Upper Egypt, or they focused on redistribution of imported goods as a major branch of their economy. According to the current state of research, the predominant role in this exchange, at least initially, was played by the settlement in Ma'adi, from where numerous examples of imported vessels are known. The disproportion between the number of imports discovered in Upper and Lower Egypt indicates that a significant proportion of goods must have remained in the domestic market in Ma'adi. Towards the end of phase 3, another site in Lower Egypt seems to take the leading role. This is Tell el-Farkha, which was particularly active in a period corresponding with Naqada IIC, when Ma'adi was abandoned. During phase 3 the exchange was probably performed indirectly, using a network of intermediaries.

Reassuming, phase 3 is characterised by indirect relationships which still relied on intermediaries, although with Lower Egyptian communities starting to play a significant role. People from the Delta gained a predominant position during phase 3, monopolising the exchange with Upper Egypt, although Levantine products were brought to them by intermediaries from Sinai. This applies not only to agricultural products like olive oil and wine, but also to copper originating from Wadi Feinan and smelted in Aqaba Bay workshops. The hypothesis positing direct transport of this precious resource using the sea route from Tell Hujayrat al-Ghuzlan to Ma'adi should be rejected, given the small quantity of the material. Such small quantities were more convenient and safer to transport overland.

Phase 4
Intensification of contacts during the development of Tel Erani settlement (Naquada IID – Naquada IIIA2 = EB Ib1)

The increasing social stratification was one of the most clearly discernible elements in the development of the Naqada culture. Political-religious centres emerged and started to compete among themselves. This broadened the circle of potential recipients of goods imported from the Levant. Copper delivered by intermediary of people from Sinai and the Nile Delta was a valuable resource used for manufacture of tools and weapons, and luxury goods like wine and olive oil emphasised the social status of those who could afford them. To meet the demand, it became necessary to increase the volume of goods reaching Upper Egypt, which was not an easy task. The Upper Egyptian centres were most likely interested in the diversification of supply, which probably explains why they started to exploit copper deposits in the Eastern Desert and tried to subordinate the tribes inhabiting Sinai. Up to this point, the exchange relied on intermediaries who did not have their own production facilities in the Levant, relying on bilateral exchange instead. The scale of this increased demand is reflected by grave U-j from Abydos. The vessels placed to this grave are estimated to have a capacity of 4,500 litres of wine[6] (Dreyer 2011: 132). The transportation of 700 vessels was a difficult task in itself, not to mention gathering such an amount of wine, for which something had to be offered in exchange. The increase in imports took place in phase Naqada IIC, which in the Levant corresponded to the turn of EB Ia and Ib. This is the time when Tel Erani comes to prominence. During phase 4, the population inhabiting this site developed sufficiently for buildings exceeding typical households in size to appear. The site became more densely built up, and a defensive wall was erected around the settlement. Moreover, the residents started to decorate their vessels in a very characteristic manner. It seems likely that the sites where such pottery prevails were somehow connected or even controlled by the central site, which undoubtedly was Tel Erani, occupying more than twenty hectares in area and protected by a massive wall. The discovery of pottery typical of Erani C style in grave U-j is indicative of contacts with this proto-urban settlement situated at the margins of the Negev. One can thus suppose that the rise of a strong centre like Tel Erani in the Levant allowed for the growing demand for imported goods in Egypt to be met. The emergence of some form of authority exerting control over both the settlement itself and the surrounding areas created the capability to prepare larger volumes of goods for export. Who was responsible for the transport in that period remains an open issue. Since evidence for the presence of culturally foreign people is lacking both in Egypt and the Levant, it is possible that nomads were still used as intermediaries. For the nomads from Sinai and Negev

[6] Comparing this to the current wine production in Poland, grave U-j held around 1% of the annual output of all 230 wineries active in Poland (based on data from https://businessinsider.com.pl/).

this may have been an opportunity to obtain agricultural produce. This is suggested by the discovery of a central complex of grain silos in Ptora near Tel Erani, with a capacity exceeding the needs of the local population (Milevski *et al*. 2009). Another possibility is that the transport involved people from the Levant (associated with the Erani horizon), who never stayed in Egypt for too long, or Naqadians operating in a similar manner. Finally, it is also possible that the exchange took place somewhere between the Delat and Negev, in a place where emissaries from both sides could meet.

The growing demand for imported goods is reflected, among other things, in the expansion of the Naqada culture northwards. During phase 4 the Naqadian settlement expanded from the south to areas previously occupied by the Lower Egyptian culture, and settlers from the south appeared in the Delta. In Tell el-Farkha, phase Naqada IIID2 saw the foundation of what is known as the Naqadian Residence. This large building, in its final stage reaching monumental form, was not only a dwelling for a representative of a political-religious centre from the south, but it also played a role of a trading post, taking over the tasks related to the exchange of goods with the local Lower Egyptian population and their further redistribution up the Nile. The Residence comprised residential quarters as well as storage rooms where fragments of Levantine imports were found (Czarnowicz 2012). The building had its heyday after the cultural unification of Egypt (Naqada IIIA) when the inhabitants of the Delta adopted Naqadian cultural patterns. This took place still within the discussed phase 4 of Egypt-Levantine relationships.

Simultaneously, Egyptian pottery for the first time came to appear in the Levant in larger amounts. This may reflect attempts of Upper Egyptian centres other than the one controlling Tell el-Farkha at establishing their own exchange networks, possibly via Wadi Tumilat, thus bypassing the eastern part of the Delta (Rowland 2014).

Summing up, we can conclude that during phase 4 an increase in the amount of exchanged product is evident, as also is the development of contacts in connection with the increased demand for imported goods. On the one hand, the exchange was probably dominated by Tel Erani, and on the other the people from Upper Egypt worked to increase their control over the circulation of imported goods.

Phase 5
Taking the trade routes over by the Egyptians
(Naqada IIIA2–B1 = beginning of EB Ib2)

In this phase the Egyptian expansion progresses further, and more and more imported pottery appears in the Levant, cylindrical vessels in particular. These vessels were found in coastal sites and in those not far inland, which suggests a wider use of sea transport by the Egyptians. Other than that, no major differences can be seen as compared with the

previous phase. The increased Egyptian presence in the Levant might be connected with the rivalry among major Upper Egyptian centres. Trying to secure undisturbed access to raw materials and agricultural products, they were sending expeditions in search of needed commodities. Tel Erani waned in importance, perhaps due to internal competition in the Levant, and the Naqadians worked to fill the resulting vacuum.

Phase 6
Domination of the Naqada culture, foundation of trade posts in the southern part of southern Levant (Naquada IIIB2–C1 = EB Ib2)

In phase 6 Levantine imports ceased to appear on the Nile, while goods imported from Egypt appeared in the Levant in significant quantities. This may have stemmed from the Egyptians taking control over the trade routes and using their own vessels for the transport of goods.

Egyptian wine jars seem much better suited for transport than their Levantine counterparts. Despite being heavier, their shape is better suited for that purpose, as a pair of such vessels could be easily loaded on a donkey using ropes. They could have been easily transported by boats, too, and they took up less storage space than the Levantine vessels. Being well fired, Egyptian wine jars were very durable, which allowed for more wine to be transported. Their strongly outturned rims allowed the vessels to be better attached during transport. Therefore, it comes as no surprise that the Egyptians preferred to use their own vessels for transport and storage of goods. The discoveries of Naqadian pottery in the Levant suggest the existence of up to six settlement enclaves permanently inhabited by people from Egypt who, apart from En Besor, lived in separate quarters within settlements of Levantine communities. Such trading posts were established in Tell es-Sakan, Tel Erani, Tel Lod, Ma'ahaz, and Lahav. Settlement enclaves may have also existed in Ashkelon and el-Magar, but at the present state of research and analysis of materials from past excavations this cannot be confidently confirmed. The relationships between the newcomers and the local population were likely friendly, although P. de Miroschedji (2015: 1012) suggests that the defensive wall surrounding Tell es-Sakan may be indicative of unrest. The absence of traces of damage or fighting seems to disprove this suggestion. Destruction of trade-related buildings was only recorded in Tel Erani, but it has not as yet been determined whether this was not due to natural disasters, and even whether the people from Egypt were still inhabiting the buildings at that time. In other sites the picture is quite clear, and no evidence has been found to suggest social unrest on an ethnic basis. The aim of the trade posts was to accumulate goods obtained from Levantine merchants in exchange for those brought from Egypt. Another important task was to accommodate expeditions arriving from the Delta and organise caravans heading

for Egypt. The enclaves were limited in size, typically from one to a few households, with a capacity for up to 20 people at any single moment. In Tell es-Sakan and Tel Erani a few phases connected with the Egyptian presence were recorded, which indicates continuous occupation over a relatively long time. Goods were transported from Egypt primarily along the land route using what is known as the Horus Road, and next along local routes through Negev to En Besor. There caravans could stop to rest, benefitting from the nearby waterhole. From En Besor the caravan could have followed north, through Ma'ahaz to Tel Erani and further to Lod, or have chosen the route deeper into Shfela to Lahav. Simultaneously, the sea route was used, which allowed for a direct journey form the Delta to Tell es-Sakan or Ashkelon. Sea transport was much more convenient for commodities such as wine, olive oil, and timber, but other products were probably transported that way as well, to be later exchanged in Tell el-Sakan or Ashkelon.

The exchange was controlled by people from Egypt. After the political unification, long-distance trade became the monopoly of the ruler, with the exchange supervised directly by priests. This is particularly evident in Tell el-Farkha, where the administrative-cultic centre situated in the Western Kom housed chapels alongside storage rooms. The hypothesis positing priests' control over the circulation of goods has also been supported by J. Castro (2016: 160). The particular interest in trade with the east becomes evident in Egypt from the times of Iry-Hor (Ciałowicz 2016).

The range of traded goods remained unchanged, although the suppliers of copper changed over time. At the early stages of the relationships, the raw material reaching Egypt originated primarily from Wadi Feinan, as evidenced by analyses of copper artefacts from Ma'adi (Pernicka and Hauptmann 1989), but at the close of the 4th millennium BC the copper from Sinai deposits was used (cf. Rehren and Pernicka 2013). Egypt was sending expeditions to Sinai in search of resources as early as during the reign of Iry-Hor (cf. Tallet and Laisney 2012), but in the times of Narmer copper was still acquired through the Levantine enclaves. After all, it is generally believed that one of the main reasons why these trade posts were established was the search for deposits and suppliers of copper (Dessel 2009: 133 n.3, 143 n.21) as well as some form of control of the routes leading from Arad to copper mines in Sinai (Amiran and Alon 1993: 82). At least two sites strongly involved in relationships with Egypt, Tel Lod and Lahav, produced artefacts related with copper smelting dated to late EB Ib2 (Golden 2002: 222–223; van den Brink 2002: 291). Judging from ceramic vessels discovered during the exploration of trade post buildings in Tel Erani, Levantine products reaching Egypt originated from various parts of southern Levant (cf. Braun 2016).

In phase 6 it becomes clear that the relationships were actually trilateral rather than bilateral. On the one end there was Egypt, capable of producing huge amounts of food: grain in particular, and also meat and fish. That these resources were traded is indirectly evidenced by the data from Tell el-Farkha. Unfortunately, the exchange of agricultural

products is difficult to confirm with archaeological methods, since they left no detectable traces in the archaeological record. As for animal bones, it takes DNA or strontium isotope analyses to determine whether the meat was traded. Unfortunately, comparative materials required for performing such analyses according to proper methodology are hard to find in Egypt. This becomes even harder with respect to cereals. Certain hints at the exchange of grain with the Levant can be derived from the research in Tel Erani, where a concentration of grains was found during exploration of a courtyard in front of the younger building of the Egyptian trading post. A detailed analysis revealed numerous fragments of chitin shells among the cereal grains. The shells were identified by D. Iwan from the Polish Academy of Sciences as belonging to beetles of Tenebrionidae family, *Zophosis (Oculosis) punctata punctata* Brullé, 1832. They feed on stored grain. In the opinion of Iwan, their accumulation in one place indicates that large amounts of grain were kept there in tightly closed permanent containers. These containers could have been ceramic vessels or baskets woven from reed, as textile bags of any kind would have been bitten through by pests. The absence of pottery in that place suggests that either the containers were made form organic materials or, more likely, the dead beetles were removed from ceramic vessels along with some of the grain they damaged. As in Egypt grain was typically stored in mudbrick silos, one can assume that the grain was not stored there for a long time, but to await in containers for transport. It needs to be emphasised that bread baking installations were admittedly discovered in the courtyard, but the primary function of this space was the storage of goods to be exchanged with the local population. Perhaps, the grain from Egypt was meant to be transported to a complex of silos like the one discovered by Milevski's team in Amacia (Milevski *et al*. 2009).

The recipients of Egyptian products were the Levantine communities who exchanged them for wine and oil olive popular in Egypt, as well as for timber, and lapis lazuli imported from the east. The Levant also offered natural resources like bitumen from the Dead Sea, semiprecious stones, and copper. These resources came from nomadic tribes inhabiting southern Negev and Sinai, which is evidenced by numerous finds of pottery datable to Naqada IIIB-C1 known from the peninsula. These finds include primarily storage vessels. The nomads engaged in trade, acted as a link with copper-bearing areas, and, as shown by the discoveries from Camel Site, were themselves involved in copper recycling (Segal and Rosen 2005). They probably bought damaged copper tools to recast them. As argued by A. Khazanov (1984: 203), nomadic groups with their economy based on animal herding cannot exist in a vacuum, and require regular supply of plant-based products from settled communities. Contacts with the people from the Levant allowed the nomads to obtain this necessary supply. We could thus call it a symbiosis of a kind. Each of the involved communities exported their surpluses in exchange for commodities needed in the local market. The exchange was a friendly economic partnership which followed the principles of a bazaar economy.

Phase 7
the fall of the enclaves in southern Levant (from Naqada IIIC1 = close of EB Ib2)

According to one of the most popular views, the Egyptian presence provoked increasingly strong opposition in the Levant. The people from the Levant were to rise up against the economic domination of Egypt (Yekutieli 2008). True, the close of EB Ib2 must have been an unstable period. Towards its end, and in the beginning of EB II, the settlement network started to change, increasing centralisation became evident, and the main centres were surrounded with defensive walls (de Miroschedji 2014). But can these developments be connected with the Egyptian presence? Today there is absolutely no archaeological evidence to support such a claim. The Egyptian occupation concentrated in a few settlements in the south of southern Levant, so how could it threaten powerful centres like those in the Jezreel valley in the north? The reasons for the unrest should instead be looked for in the developments taking place among the major Levantine centres, admittedly with the economic rivalry in the background. Perhaps the escalation of unrest and hostilities among the major centres inclined the Egyptians to retreat from the Levant. The situation that emerged at the turn of EB Ib and EB II probably hampered trade relationships, which had previously relied on goods from various parts throughout the Levant being transported to trade posts situated in Negev, Shfela, and the coastal plains. Perhaps the traditional system of exchange known from the bazaar economy model could not be further used, as hostilities among the centres had broken the links with local merchants. Among the hallmarks of this economic model is the slow spread of information and limited flexibility in changing suppliers. This made it necessary for the Egyptians to take some action, and soon they realised they actually no longer needed the intermediary of southern Levant to gain access to certain goods. First, the Egyptians scaled up their presence in Sinai and made attempts at subordinating the region in order to secure a direct supply of copper. They initially used the route leading through the Delta, and the expeditions were organised by the same centres that previously redistributed the goods imported from the Levant. As a result, despite the smaller volume of imports passing through Tell el-Farkha, this centre of cult and administration remained active and did not lose its importance until the reign of Den. Simultaneously with the decline of Naqadian trade posts in the Levant, the first vineyards were established in the Delta. The wine they produced was meant to fill the gap left by the broken supply from the Levant. In later years, the sea route linking Egypt with northern Levant came to be used on a larger scale.

Conclusion

Copper artefacts are relatively common in Egypt in the 4th millennium BC. Compared with other regions of the Near East, a significant diversity of tool forms and the presence of ornaments are evident. Weapons are much more common than in the Levant as well. The development of metallurgy in Egypt was a very rapid process. Over the course of a few centuries an efficient industry relying on a previously unknown technology developed, local deposits of raw material were identified, and its extraction started. However, the beginnings were not easy. In the opinion of Rothenberg (1995), technological problems encountered by the Egyptians when experimenting with the new material were significant enough to convince them to acquire it from Levantine communities instead. The oldest copper artefacts discovered in Egypt originate from the Badari culture (Brunton and Caton-Thompson 1924: 33, Pl. XXVI: 5112). They probably arrived via the Red Sea from Sinai as a result of Badari groups exploring neighbouring areas. However, they should be seen as accidental finds, as copper objects are extremely rare finds in the Badari culture. Thus, the beginnings of Egyptian metallurgy should be sought elsewhere. In my opinion, the knowledge of copper processing was most likely introduced to Egypt by people who came from the Levant and settled in some places, among them Buto, at the beginnings of the 4th millennium BC (Faltings 2002; Watrin 1998). These people originated from the Negev, an area where specialised coppersmith workshops operated in the final Chalcolithic. They had the skills and knowledge necessary for manufacturing copper artefacts. If they could make pottery characteristic of their culture in Buto, why could they not produce copper tools as well? Unfortunately, layers dated to the period when these people came to Buto are buried deep beneath the surface of the tell and reaching them requires much time and effort, and no traces of a coppersmith workshop have been found in Buto as yet. The possibility of adopting the technology in question in the manner presented above was mentioned some time ago by Hartung (2014). It is worth recalling the technological similarities in the manufacture of copper artefacts, described in an earlier chapter. It seems that the technology used by Egyptian craftsmen shows no novel traits, which would be expected had they learned to work with copper by experimenting on their own, without contact with people from the Levant. So, could the first coppersmith workshop have been established as early as during the development of the Lower Egyptian culture? The answer to this question can indirectly be derived from the results

of excavations in Ma'adi. The ingots discovered there, probably originating from the vicinity of present-day Aqaba (cf. Eichmann *et al*. 2009: 30–31) and cast from copper originating from Feinan (Hauptmann 1989) demonstrate that artefacts were produced locally, in workshops situated on the Nile. Local manufacture of copper objects in Egypt is additionally corroborated by discoveries of typically Naqadian forms, e.g. harpoons, being imitations of bone tools known from Naqada culture sites. On the other hand, some of the artefacts found in Tell el-Farkha have close analogies in Ashkelon (Czarnowicz 2012), meaning that some of the tools were likely imported as finished products.

As trade with the Levant was conducted via the trade route leading from the Nile Delta through Sinai, the inhabitants of Lower Egypt had easier access to imported raw material and objects. The final recipients, however, were the communities inhabiting the south of Egypt. Institutions of power emerging in the Naqada culture showed interest in acquisition of various valuable goods – wine and olive oil, as well as a new raw material for making tools: copper. The specific geographic conditions of Egypt, including the predominant role of just one communication artery – the Nile River – made it relatively easy to cut some centres off from supply from the settlements redistributing Levantine imports, like Ma'adi and later Tell el-Farkha. In my opinion this was the reason why deposits in the Eastern Desert came to be exploited. The decision may have been affected by other factors as well – the redistribution centres may have been controlled by political opponents, or this may have been an attempt at reducing the costs of supplying raw materials. More research is needed to verify these assumptions and to determine the exact date when the change took place.

What is certain is that at some point the supply of copper from Feinan ceases or becomes much more limited. One could venture to claim that this happens at a certain, very specific, moment. Rather than with the fall of Ma'adi (where the mentioned ingots of Feinan copper were found), it might be connected with the decline of the centres situated in the Aqaba Bay region, where the copper ore was smelted. Analysing the activity of coppersmith workshops operating in Feinan, the second half of the 4th millennium BC was clearly a time of crisis. While the workshops had been flourishing at the close of the Chalcolithic and at the beginnings of EB 1, the development halted in EB 1b and the majority of the known production centres disappeared. This is confirmed by radiocarbon dates obtained in sites from the Feinan region (Levy *et al.* 2015; Hauptmann 2007; Adams and Ganz 1995). The revival comes in phases EB 2–3, and the large-scale extraction of copper ore in the region can be assumed to have been caused by the pharaohs of Egypt taking control over the Sinai outcrops.

The copper from Feinan is replaced in Egypt by that originating from Sinai deposits. This is reflected in the archaeological record, and has been confirmed by analyses of copper samples performed by various research teams (Rehren and Pernicka 2014; Kmošek *et al.* 2018; Rademakers *et al.* 2018). Among other places, tools made from Sinai copper were found in Tell el-Farkha (Rehren and Pernicka 2014) and Tura (Rademakers *et al.*

2018). The paucity of comparative materials does not allow the date when the Sinai copper appears in Egypt to be precisely determined. Among the samples analysed to date, the earliest originated from contexts dated to Naqada IId2/IIIA1 (cf. Rademakers *et al.* 2018: Table 2; Rehren and Pernicka 2014; Czarnowicz 2012: Table 1). Interestingly, this is a time when contacts between Egypt and southern Levant intensify.

The question that needs to be asked here is: how exactly did the copper from Sinai reach Egypt? It is worth noting that in the 4th millennium BC, Sinai was inhabited by nomadic tribes. The limited research carried out in the region suggests that these people were culturally closer to Levantine communities than to those from nearby Egypt (Beit-Ariech 2003; Ganz 2000: 37–38). A survey conducted by Ophir Expedition revealed numerous small settlement units. In the south of Sinai, a group of sites were discovered with houses consisting of a series of rooms surrounding a central courtyard (cf. Beit-Arieh 2003: 101–110). These sites were occupied by local prehistoric communities of goat and sheep herders, who also engaged in the mining of turquoise – a material for which the demand was constantly growing in Egypt, with its growing social stratification (Beit-Arieh 2003: 97–99). Some of the sites were also connected with the acquisition, processing, and most likely recycling of cooper. The research on sites 1035, 1038, 1039, 1041 and 1177 revealed remains of installations and artefacts associated with copper smelting (Beit-Arieh 2003: 295–375). Beit-Ariech (2003) dates these finds to EB 2, although both Naqadian imports and local ceramics indicate that we are rather dealing here with occupation from a period corresponding to phase Naqada IIIB–C1, i.e. the second half of EB 1b. The vessels on which Beit-Ariech (2003) based his dating are primarily holemouth jars, which have a very long lifespan. The imports discovered in the mentioned sites clearly date the finds to phase Naqada IIIB–C1 and have analogies in many sites from northern Negev, Shfela, and coastal plains like Tel Erani (Czarnowicz 2016: Fig. 3–4), Tell es-Sakan (de Miroschedji 2015: 1016), En Besor (Gophna 1990) and Lod (Paz *et al*. 2005: 149), and within the range of the Naqada culture, for example in Tell el-Farkha 5 (Sobas 2012: 190–193). A possibly earlier chronology of many of the Sinai sites was also suggested by D. Bar-Yosef (Bar-Yosef *et al*. 1986: 147–149), who carried out his research in the same area as the Ophir Expedition.

Proceeding from later written sources and from archaeological data, Ben Yosef (2018: 210) describes three main way: trade, sending expeditions in search for resources, and exerting economic and military pressure. The discovery of a *serekh* of Iry-Hor in Sinai a few years ago (Tallet and Laisney 2012) suggests some form of infiltration of the peninsula by the Egyptians. However, convincing archaeological evidence for a permanent Egyptian presence in the region is yet to be discovered. Most likely, the rising Egyptian state tried to subordinate these areas to some extent, although for the time being this cannot be proven before the times of the Third Dynasty (Ogden 2000: 149–150; Mumford 2006; Sowada 2009: 185). Therefore, it seems that the Egyptians obtained the raw material by means of trade. The fact that no residences of Naqadian merchants have been

discovered and the highly dispersed settlement pattern with no central settlements where larger-scale exchange would be possible indicate that the role of intermediaries in this trade was instead played by people from the Levant. According to Dessel (2009: 133 n.3, 143 n.21), the desire to secure a supply of copper was precisely the reason behind the establishment of Egyptian trade posts in southern Levant. The interest in this raw material is emphasised by the fact that installations and artefacts related with manufacture of copper objects were found in some of the places where Egyptian settlement enclaves are confirmed or where there is evidence for the presence of Naqadian merchants. This applies, among other places, to Tel Erani (Genz 2000: 60), Tel Lod (van den Brink 2002: 291), Small Tel Malhata (Genz 2000: 60), and Lahav (Golden 2002: 222–223). Perhaps this can be seen as attempts at taking control over the trade routes leading to copper-bearing areas, which would not be surprising given that from the very beginning of their contacts with the Levant, the Egyptians aimed at direct exchange, trying to eliminate intermediaries wherever possible.

It is traditionally believed that the copper-bearing areas were controlled by Arad (Amiran and Alon 1993: 82; Amiran *et al.* 1973), a city established on the route to copper mines and allegedly controlling the transport of raw material from Sinai as well. Unfortunately, lead isotope analyses conducted on copper objects from the site show a connection with Feinan ores (Hauptmann *et al.* 1999: 11–13). An interesting perspective was presented by Finkelstein (1995: 79–80), who proposed that, rather than being connected with the urban civilisation emerging in the Levant, Arad was founded as a political and economic centre for the nomadic groups from the south. In this view, it was Arad that was the destination for copper and probably other resources from Wadi Araba, southern Negev, and Sinai on the one hand, and for products obtained from southern Levantine communities and necessary in areas where farming was impossible on the other. The participation of nomadic tribes in copper circulation has been noted by the most prominent scholars interested in the nomads of southern Levant, including Rosen (1993) and Avner (Avner *et al.* 1994). However, it turns out that these nomadic communities were not only involved in copper mining, but they were responsible for its recycling as well. This is evidenced by research at Camel Site (Rosen). We can thus conclude that the nomads were engaged in copper circulation in a complex manner. They acquired the ore primarily from Sinai, smelted it, and also re-cast broken tools into copper. But what did such communities need? Khazanov (1984: 203) believes that nomadic groups whose economy relied on goat and sheep herding could not have survived without regular supplementation with farming produce. Even more than by contacts with Levantine people, such opportunities were offered by exchange with merchants arriving from Egypt. As mentioned earlier in the text, the key role in this system was played by people from the Levant, who acted as intermediaries. The fact that intermediaries were used instead of direct exchange in Sinai proves that the trade in that period was

ruled by mechanisms of a bazaar economy. This system collapsed soon after the death of Narmer. The rising Egyptian state finally gained control over copper-bearing areas of Sinai and started to exploit their deposits on a larger scale. It was probably also around that time that the copper originating from Nubia started to be used (el-Gayar and Jones 1989: 31–40). This, together with the establishment of vineyards in the Nile Delta, made maintaining enclaves in southern Levant unnecessary.

Contacts with southern Levant were highly beneficial to Egypt. They provided access to copper and copper artefacts, and allowed for the introduction of the technology necessary for copper processing. In exchange, Egypt could offer food surpluses, above all cereals, needed by the inhabitants of inhospitable areas of Sinai and Negev. The attempt at recapitulation of the state of knowledge on the beginnings of copper in Egypt presented in this study point at a unique position of the Levant in the development of copper-related crafts on the Nile. However, much remains to be discovered. Particularly promising perspectives open up with respect to the research on contacts with copper-bearing areas in the Arabian Peninsula, its western part in particular. This, however, requires many more tests and analyses to be performed, especially concerning the identification of deposits and the technology of manufacture. In this context it is worth emphasising the results achieved by researchers from Belgium and Czech Republic. Unfortunately, the situation is not helped by the Egyptian law which bans taking any samples abroad for laboratory analysis. I hope the political situation in Sinai improves enough to allow for resuming research in the region, as this is the key to understanding the mechanisms behind the relationships between Egypt and the Near East in the 4th millennium BC. Also, the first 4th-millennium BC coppersmiths' workshop in Egypt still awaits discovery.

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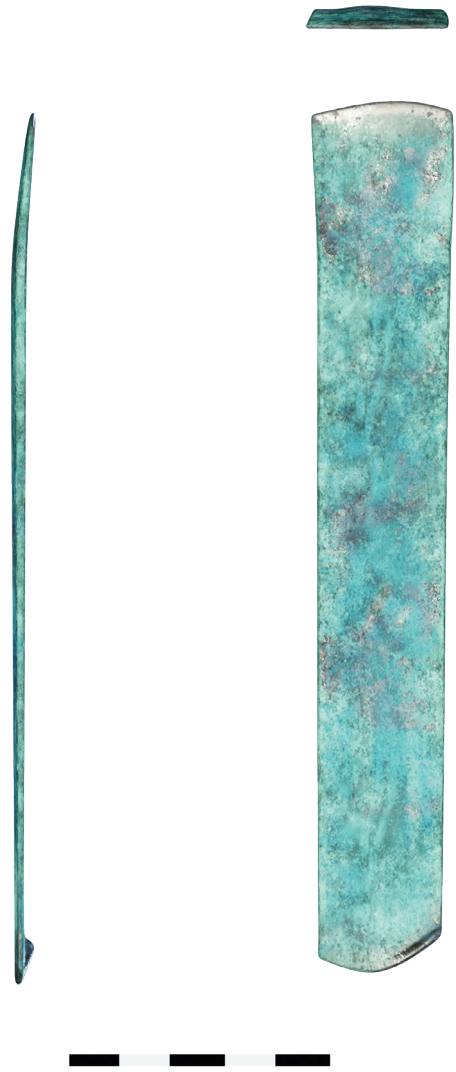
Plates

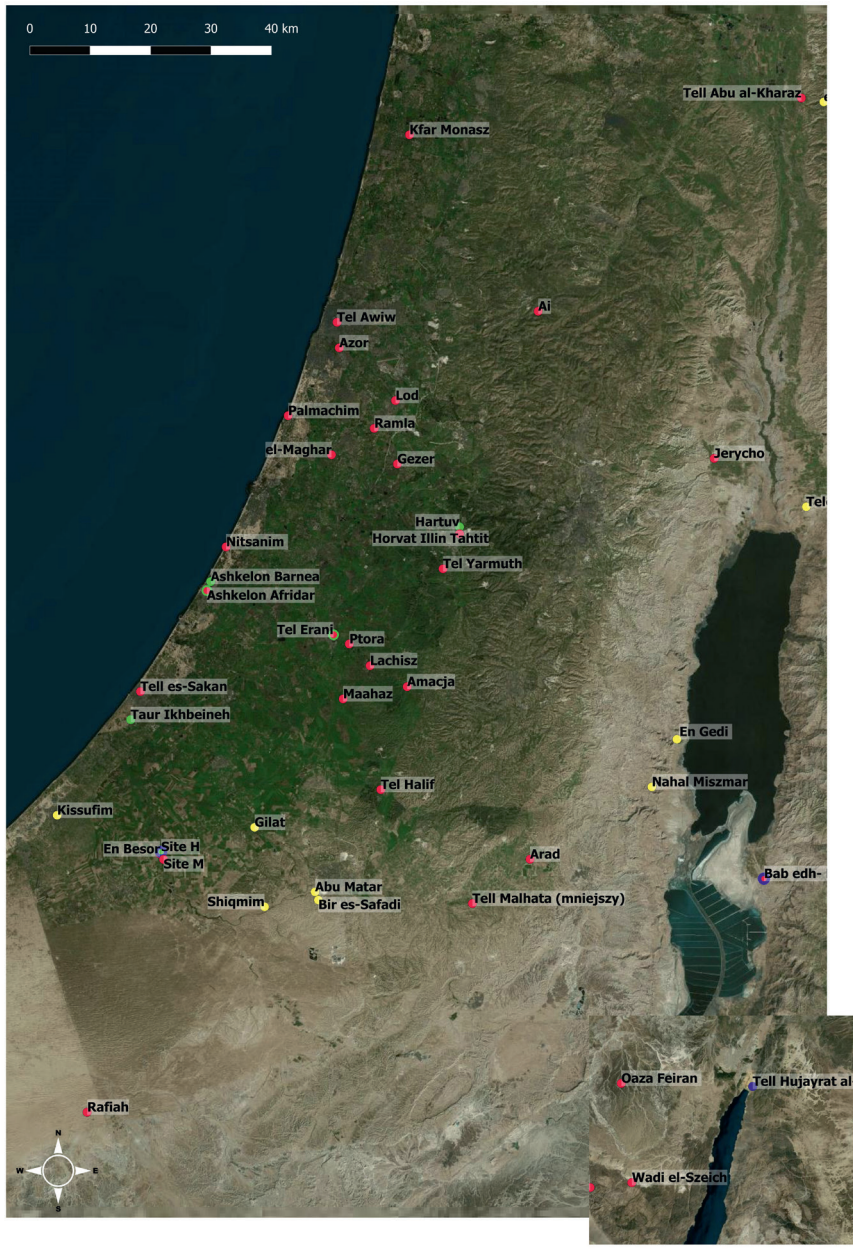


The model of an adze

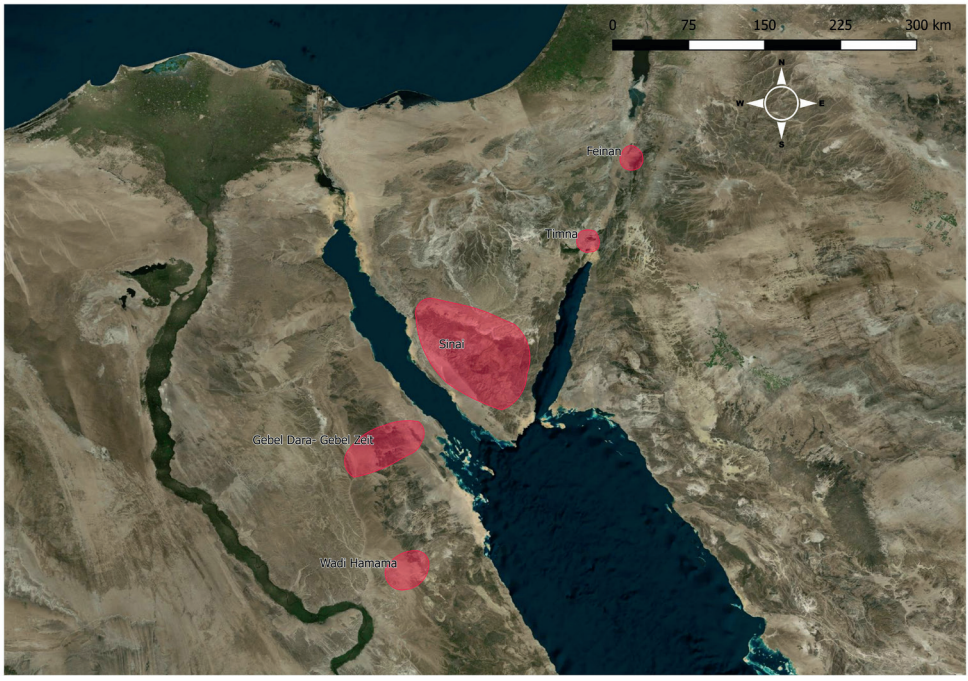
The model of the harpoon

The model of the copper dagger with the handle.

Most important sites mentioned in the text

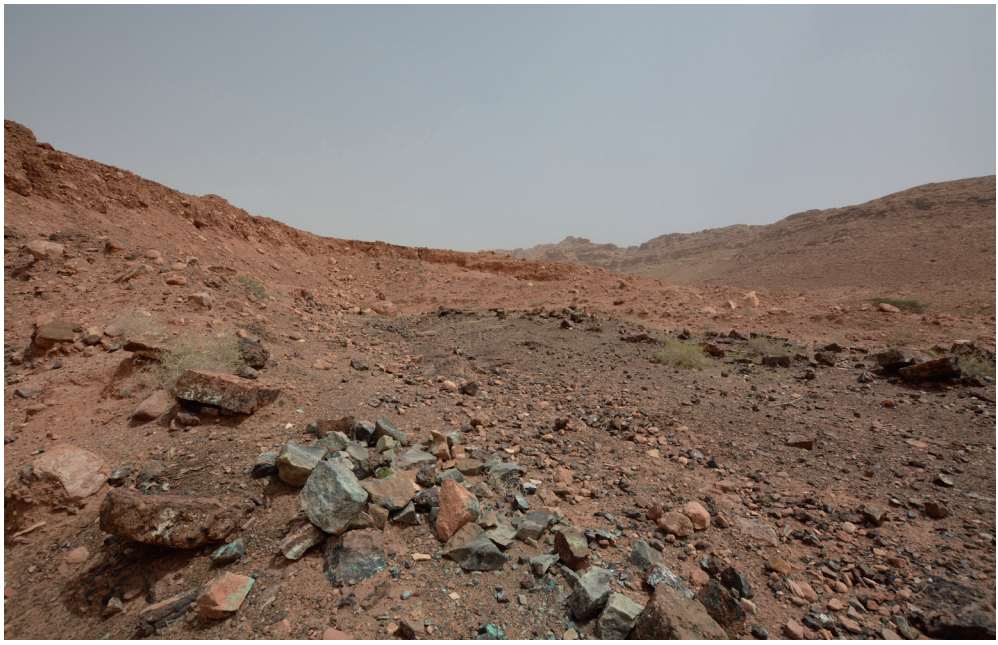


Chalcolithic and EBA sites with Egyptian imports



Copper extraction areas

Wadi Dana on the way to Feinan



Wadi Feinan

Wadi Feinan, malachite-rich deposits in limestone rocks

Copper implements from Tell el-Murra

Loop-headed pin with cylinder seal and bead attached on the sting, from Mesopotamia. Pergamon Museum

The book is a result of research conducted as a grant awarded from the National Science Center (Poland) entitled „The comparative analyses of Early Bronze Age Egyptian and Southern Levantine copper tools including the influences from the Arabian Peninsula and Mesopotamia region". In recent years, the application of laboratory methods has popularized studies on the origins of raw materials used to make tools discovered in the near east. Unfortunately, the law in force in Egypt makes it virtually impossible to carry out such research. Despite the advances in both field and laboratory research, archaeologists are still struggling with interpretation and chronological difficulties, and even problems with attribution of tool finds to proper categories. I therefore decided that to move forward with the research it was necessary for a publication summarising my studies on copper objects, one taking a more typology-oriented approach, showing the origins, development and stylistic changes of in the most common types of tools and weapons used in Egypt more than 5000 years ago.

Profil-Archeo

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