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What Makes the World Go Round? Silenced Consequences of the Introduction of Metallurgy

Summary

This paper discusses the underdetermined changes brought about by the introduction of extractive metallurgy in the southern Levant. It takes a long-term-perspective. The author sums up current perspectives with regard to a modified chronology based on calibrated radiocarbon dates before re-evaluating the interconnections between technical innovation and social change. Arguments in favor and against a Schivelbuschian view on extractive copper metallurgy are discussed as well as a variety of social fields in which changes can be detected.

Keywords: Metallurgy; technical innovation; Southern Levant; Chalcolithic; Early Bronze Age.

Dieser Beitrag beschreibt die Veränderungen, die die Einführung der extraktiven Metallurgie in der südlichen Levante bewirkten. Dabei wird eine Langzeitperspektive eingenommen. Der Autor fasst aktuelle Perspektiven im Hinblick auf eine geänderte Chronologie zusammen, die auf kalibrierten Radiokarbondaten basiert. Damit können die Verbindungen zwischen technischer Innovation und sozialen Veränderungen neu bewertet werden. In diesem Zusammenhang werden Argumente für und gegen einen an Schivelbusch angelehnten Blick auf extraktive Kupfermetallurgie sowie auf eine Vielzahl sozialer Bereiche diskutiert, in denen Veränderungen festgestellt werden können.

Keywords: Metallurgie; technische Innovation; Süd-Levante; Chalkolithikum; Frühbronzezeit.

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1 Introduction

This paper deals with technical innovations in the Chalcolithic and Early Bronze Age of the southern Levant. Even though the first usage of metal started in the Neolithic,[1] this issue will not be broached here. The focus will be on the period in which the smelting of ores and casting of objects started. Not only is a much more elaborate technology required for this procedure, but also significantly higher amounts of labor. The interconnections of this complex metallurgy with other innovations can only be understood in a long-term perspective.

Neither the radicality nor the underdeterminded nature of the changes caused by smelting and melting technology are well understood. Chronological errors as well as sociological and technological misconceptions have shrouded a clear view of the sequence of events and their interregional consequences. New data suggest that surprisingly complex metallurgy was not only established in the second half of the 5th millennium BCE, but also interwoven with innovations in social distinction and religious acts. A close analysis of these finds implies that a major advantage of metal objects did not lie in their functionality but in their use as prestigious objects. It is argued that probably without knowledge of possible future uses, the introduction of metallurgy was a lengthy process that took place via overlapping gift-giving networks.

Only after social and ideological innovations had set free significantly more labor in the Early Bronze Age can a new usage of metal items be seen. These can be summed up as a "package of efficiency" consisting of the use of animal traction, flint sickles and heavy copper tools. Metal is then produced in much higher quantities that clearly exceed household needs and starts to substitute for lithic tools. This is possible because of a social reorganization, the freeing of available labor by simplifying traditional crafts and other innovations, mainly in transport, which slowly change the technical sub-structure of societies that used metal objects. In the long run, not only tools, but also sign systems, exchange relations and power structures are significantly transformed, not in every case intentionally.

I start with providing a short chronological and regional overview of the area studied, including a summary of the conventional interpretation of metallurgy and its role in the cultural evolution of the ancient Near East. In a second step, many important finds are re-dated based on new radiocarbon results. This, in turn, has major consequences for the understanding of the chronological position of several technical innovations and will result in a narrative about how innovations transformed, some would possibly say malformed, life in the prehistoric Levant. The sequence of events will not only deal with changes in material culture, but also social changes into which the production of metal

1 Molist et al. 2009.

objects was embedded. This account shows that many changes are due to shifts in communication and production systems that begin to center less on personalized contacts and creativity, instead stressing impersonal exchange mechanisms.

2 Metallurgy and society: previous research strategies and biases

The introduction of metals into prehistoric Europe[2] has been discussed extensively, but the resulting models have not been tested for the Middle Eastern archaeological record. The vast difference in the state of research and published data between Europe and most regions in the Middle East make such a task rather challenging. Therefore, a focus on the southern Levant was chosen; the state of research there is at a similar level, and therefore differences can not so easily be explained away by a lack of study.

The perspective chosen sees metals and society closely interconnected and changes in technology as pushing specific social developments. This point of view makes extensive use of anthropological data and sees technology as something evolving to overcome practical problems. Major issues with previous attempts to understand the introduction of smelting metallurgy can be summed up as either viewing efficiency as deterministic or relying heavily on ethnographic data. While the inherent concepts have their strengths in explaining prehistoric technology, there are also certain problems involved. Even though modern studies of innovations show how their diffusion can be steered and controlled, and are often based on the perceived superiority of a technology, this can hardly be proposed for copper metallurgy. In fact, copper tools were inferior from a functional point of view in comparison to flint tools.[3] Economic models that stress usage and function are therefore not very convincing and also ignore the variety of social factors that could affect the success of an innovation – especially gift giving and marriage alliances, as has been demonstrated with a variety of ethnographic data.

On the other hand, analogies from recent or sub-recent societies also have several severe shortcomings. Most societies researched by social anthropologists have had contact with so-called 'complex' or 'industrialized' societies or with neighboring groups that had such contacts. The living space of such groups has been further and further reduced during the period of colonialism and as a consequence of heavy industrialization. Therefore, they represent in no way an original way of life. Even though ethnographic data can be very good for modelling human behavior on a broad, comparative level, one should be extremely careful about simply generalizing the living conditions and social

2 Strahm and Hauptmann 2009.

3 Jørgensen 1985.

relations of the few groups who have evaded Western influence to model a general and universal stage of human social evolution.[4]

Thus, in the following, technologies are analyzed as being part of a network of social relations in which they are actors among the various producers and users. This seems to be a promising way to avoid the previously mentioned misconceptions. Yet, the fact remains that in the archaeological record there are periods in which new technologies were adapted quickly and experimented with. The question that follows is if it is possible to identify the characteristics of these periods and if it is also possible to explain from a *longue durée* perspective why such experimental societies were successful at some times and why during other times the majority of societies adopted totally different strategies.

3 The state of research

The topography of the southern Levant (covering the modern states of Israel, Jordan, the Palestinian Autonomous Territories, as well as parts of Syria and Lebanon) dominates the possible routes along which any kind of information, including innovations, was able to spread: from Sinai in the south to the Lebanon in the north, there are nearly 300 kilometers of coastline that favor communication of any kind using ships. Contact between the coastal regions of Egypt, Cyprus and Anatolia via the Mediterranean was thus easily possible. When travelling east, on the other hand, there are several areas that, like the Golan, lie more than 1000 to 1200 meters above sea level. In the inland, the river Jordan is the central communication axis, connecting the Sea of Galilee with the Dead Sea. From there, only wadis allow travel in southern or southeastern directions. Further to the east and southwest, there are again mountain and desert areas; the Negev and the Arabah. Travel and transport within these regions is as difficult today as in prehistory. For example, access to drinking water is very limited in many places. With the exception of the river Jordan, the region lacks large waterways that can be travelled by boats, which even in Roman Europe was the quickest way to travel. This variety of climates and landscapes is reflected in a diversity of archaeological cultures, art styles and settlement strategies.[5]

The use of major amounts of smelted copper objects begins during the Chalcolithic or *Ghassulian* period. There is no broad consensus about the chronological frame of the Chalcolithic, and both its definition and the chronological and geographical limits are disputed.[6] Teleilat Ghassul was excavated from 1929 to 1938; it is situated on the

4 Cf. also Wolf 2010.

5 Lovell 2001, 51; cf. Levy 1998 for a different view.

6 Rowan and Golden 2009, 3–10; Gilead 2009. The concept of a Levantine "Chalcolithic" was first brought up by Albright, who in the early 1930s argued that some forms of Neolithic ceramic vessels could be explained as archetypes for later Early

northeastern shore of the Dead Sea.[7] It became eponymous for the *Ghassulian* lithic industry, and this name was later transferred to the complete set of Chalcolithic material culture.[8] In the following, the term Chalcolithic will be used synonymously to *Ghassulian*, although there are good reasons to have the Chalcolithic sequence begin earlier and differentiate an Early (*Wadi Rabah*), a Middle (*Tsafian, Besorian*) and a Late (*Ghassulian*) Chalcolithic phase.[9] However, we lack copper from these periods, contradicting the term 'Chalcolithic' – at least in the tradition of prehistoric archaeology.

Within the southern Levant, the density of research is highly diverse and therefore the knowledge of many regions is sparse, and the archaeological record is far from representative for the whole region.[10] The geomorphological variability determines that some areas are quicker and more intensively urbanized, and this as well as political factors blur the knowledge, publication and distribution of sites and finds. The *Ghassulian* ends between 4000 and 3900 BCE, leaving a gap of several hundred years before the commencement of the Early Bronze Age (in the following: EBA).[11] Only in recent years have a few sites been published that can be dated to that period.[12] Therefore the apparent gap is likely caused by lack of research, and it will be necessary to re-think our models about the Chalcolithic–EB development.

For a long time it was assumed that metallurgy started with simple flat axes in the *Ghassulian*, and then became more and more complex until the beginning of the Urban Revolution. This traditional logic saw metallurgy as one of the major factors for the beginnings of social complexity, apart from the sailboat and development of writing.[13]

Triggered by technical innovations that allowed the smelting of copper ores, the social systems of the region were thought to be drastically changing. The intensified use of copper would have necessitated a re-organization of available labor, because the labor process needs greater manpower and specialized knowledge. To use copper in the long run, it was thought that tight social control mechanisms were needed, as well as increased power of elite groups. This would theoretically have led to a network in

Bronze Age types, and therefore an intermediate stage should be introduced. Cf. Albright 1931; Albright 1932.

7 Mallon, Kœppel, and Neuville 1934; Koeppel et al. 1940.

8 Neuville and Mallon 1931; Neuville 1931.

9 E.g., Garfinkel 1999; Kerner 2001; cf. also Rowan and Golden 2009, 5–10.

10 Rowan and Golden 2009, 14–20; Gilead 1988.

11 Cf. Klimscha 2009b. Although the exact dating of that beginning is difficult to pinpoint, cf. Genz 1997; Joffe and Dessel 1995; Kerner 1997. Some authors claim that there is another Ghassulian phase, namely 'Terminal' Chalcolithic, bridging the time from 4000 to 3600, but a correlation of the available radiocarbon data used for this phase and archaeological strata is not convincing (Joffe and Dessel 1995, 514; contra: Rowan and Golden 2009, 12. Cf. also M. Burton and Levy 2001).

12 Klimscha 2009b; Klimscha 2012; Khalil and Schmidt 2009. Cf. also the chronological table in Levy 2007, 14. It was certainly not the only site settled in this period and new, yet unpublished data from Ashkelon seem to point in the same direction (information provided by Amir Golani, IAA, Jerusalem).

13 E.g. Childe 1947; Childe 1951; Levy 2007.

which only a selected range of settlements were involved in the *châine opératoire* of metal production. And this in turn would have amplified specialization and in the long run the Urban Revolution.

In such a model, copper ultimately does not only change the means of production but also the division and organization of labor in prehistoric social systems, i.e. the relations of production. The available evidence for specialization, central cult places and control mechanisms limiting the access to prestigious goods and social elites suggests a much stricter social differentiation than in the Pottery Neolithic.[14] This would, in fact, be a major factor in the evolution of social complexity.

Apart from the aforementioned new data concerning the Chalcolithic–EB transition, there is also considerable change in what was traditionally accepted as the beginning of metallurgy. One of the most important finds from this time is a hoard found in the so-called *Cave of the Treasure* in the Nahal (Wadi) Mishmar along the western shore of the Dead Sea. Apart from a large number of copper mace heads, it included 'scepters', 'standards', 'crowns' and vessels. The latter examples show very complicated shapes. Some have figurative elements protruding from the objects that could only have been produced in the lost wax casting technique.[15] The find was traditionally dated by radiocarbon dates from the cave to the time around 3600 BCE. Thus, the highly complex metal finds were thought to mark the beginning of the Early Bronze Age metal tradition that was considered to be a major factor in urbanization.[16] The hoard had been wrapped in a reed mat and hidden in a natural crevice of the cave. New radiocarbon samples from this mat now date the hoard to between 4350 and 4250 BCE, more than 500 years prior to what was previously assumed.[17] The old carbon-14 dates were derived from samples from the settlement layer post-dating the hoard and were never really appropriate for the copper items.

Originally, this early date was taken as proof that the mat was a "holy item" which had been in use during this long time span, but because of its special status was used carefully enough to survive several centuries.[18] However, recent excavation data and a re-evaluation of older absolute dates render a different scenario much more plausible: the hoard belonged indeed to the second half of the 5th millennium BCE. Apart from the new carbon-14 dates, this argument can be summed up as follows:

– all available comparisons for the 'complex' metal objects that were cast in lost wax technique, that is 'scepters', 'standards', 'crowns', etc., are from *Ghassulian* contexts

14 Kerner 2001; Klimscha 2014.

15 Cf. Bar-Adon 1980. For online pictures cf.: https://de.wikipedia.org/wiki/Nachal_Mischmar#/media/File:Hecht_090710_Sceptre.jpg (visited on 17/01/2017); http://www.metmuseum.org/toah/hd/nahl/hd_nahl.htm (visited on 17/01/2017).

16 Bar-Adon 1980.

17 Cf. Aardsma 2001; Klimscha 2013.

18 Aardsma 2001.

and can be radiocarbon-dated independently into the second half of the 5th millennium. The only exception seems to be Givat Haʿ Oranim in Israel, but the carbon-14 samples are from a completely different cave than the standards and thus cannot be used to date them[19];

– the flat copper axes show good analogies in *Ghassulian* contexts but are different from Early Bronze Age axes with flatter shapes and flanges;[20]

– the available carbon-14 dates for *Ghassulian* contexts end between 4000 and 3900 BCE.[21]

This new chronological frame has important consequences for our understanding of the role of metallurgy in the prehistoric Levant.[22] Instead of being the end of a tradition of craftsmanship, the technical peak is now placed at the very beginning.[23] This, in turn, means that almost all metallurgical innovations now have to be within ca. 300 years instead of a millennium: from 4500–4000/3900 BCE during the *Ghassulian* Chalcolithic, there is evidence for intentional copper-arsenic alloys, lost-wax casting, the use of precious metals, surface manipulation of metal objects, specialized metal weapons and the use of heavy metal tools such as axes. In the 4th millennium, only slight alterations follow: ingots of standardized shape are produced for trading in smelted copper, while tools and weapons become larger and more efficient; this leads to the disappearance of their stone counterparts around 3600 BCE. During the period discussed here, metallurgy appears in such a technical perfection that there must have been precursors.[24]

When considering the ways in which metallurgy can change society, there is the straightforward thought that metal objects can substitute for objects made from other materials such as flint, ground stone or bone (skeuomorphism). The level of production (Fig. 1a) is difficult to reconstruct, since there are only a few excavated and published metal workshops in the southern Levant. Possible consequences could have included damage to the environment due to inappropriate use of wood. Further, the poisonous gases that were released during smelting and melting may have had a negative effect on

19 Cf. Scheftelowitz and Oren 2004.

20 Klimscha 2010.

21 Gilead 1989; Klimscha 2009b.

22 For a more detailed discussion cf. Klimscha 2014; Klimscha, Notroff, and Siegel 2014.

23 In this paper the terms 'technique' and 'technology' are used synonymously. Technique, as German sociology understands it, implies the interaction of mechanical, habitual and symbolic media to be effective. – Cf. Rammert 2007, 16 Fig. 1; cf. also for the application to archaeology Eichmann and Klimscha 2012, 1 Abb. 1.

24 A discussion of the influence that metallurgy had on other parts of the material culture, needs to begin in the late Pre-Pottery Neolithic B. Cf. also: Molist et al. 2009. When studying the ceramic sequence from the Neolithic and Chalcolithic, Garfinkel already in 1993 proposed to call the later part of the Neolithic, the so-called Wadi Rabah culture, Early Chalcolithic, because even if metal is still missing from that time, many social changes are already visible that are usually attributed only to the Ghassulian (Garfinkel 1993).

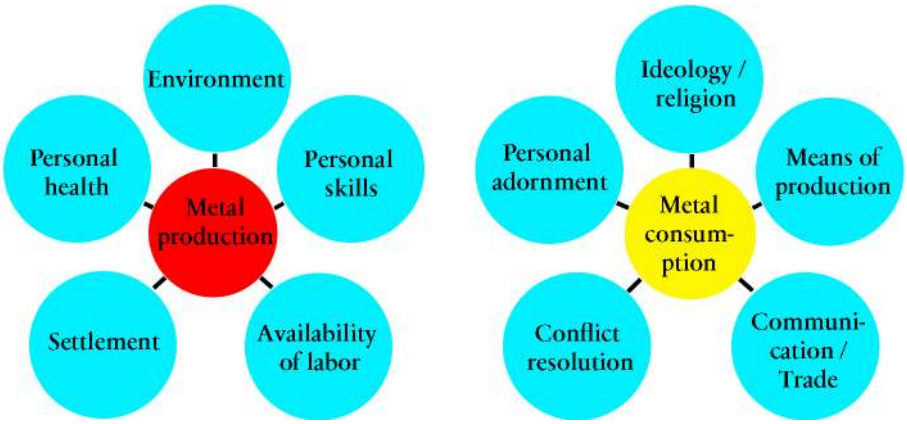

Fig. 1 Assumed secondary effects of the production (a) and consumption (b) of cast metal artifacts.

human health.[25] The increased demand for labor means that there will be a limiting factor: either less labor power for other tasks or less time for 'leisure'.[26]

This may in the long run even result in a 'de-skilling' in terms of traditional techniques because the time required for the production of copper artefacts could mean that the elaborate accomplishment of other tasks was no longer possible. The production sequence of copper also had consequences for settlement activities. Social groups had to establish a connection with the mines and casting places, either by founding new settlements or through the protection or even pacification of trade routes. The consumption of metal goods is well known and can be briefly summarized (Fig. 1b): metal artefacts can be used as tools, they can be traded in the form of ingots or semi-finished products, and they can be turned into weapons, used as jewelry or prestige goods and play an important part in religious ceremonies.

25 Such an effect was also noted by Erica Hanning during her experiments with Bronze Age smelting (E. Hanning, Bronzezeitliche Schmelzversuche auf der Henrichshütte. Lecture given at the Heinrichshütte, Hattingen, Germany, on 25th of November 2011).

26 I use the terms 'labor' and 'leisure' here to designate the time not used for task-oriented work but rather for sleep and other activities, even though I am aware of the modern implications of the term and the underlying concept of *Lohnarbeit*, 'wage labor'. I am aware that Chalcolithic labor very probably could not be turned into an exchange value.

4 Nahal Mishmar and beyond: shiny heavy metal in Neolithic exchange networks

The first metal items appear in Anatolia and Syria in layers dating to the Pre-Pottery Neolithic.[27] All objects are tempered and/or cold hammered. A major technical breakthrough happens with the smelting of ores and the casting of metal artefacts: not only does it allow the production of much larger items, but also the recycling of broken or unwanted artefacts and the fabrication of shapes that were impossible to construct with other materials. The technique allows an axe to be transformed, for instance, into a sickle, a sword, or an arm ring and vice versa. It also made possible the creation of completely new shapes such as diverse thin, long and sharp objects as well as elaborate pieces of personal adornment.

Smelting first took place around 5000 BCE in Anatolia and the Balkans.[28] A comparable early horizon is still unknown in the Levant, but this may very well be due to a lack of research. Especially for the late 6th and early 5th millennia, the archaeological data in the Levant are very sparse. At the time of this writing, the first evidence for smelting technology dates to the *Ghassulian*, from 4600/4500 BCE onwards. However, the complexity of the Nahal Mishmar finds, which can now be dated to the 44th or 43rd century suggests that there must have been a longer technological development that is so far unknown to us. Future research at Middle Chalcolithic (i.e. *Tsafian*) sites could offer some new data here.

Apart from awls and 'needles,' flat axes and adzes belong to this first horizon. They were cast in an open mold and then hammered into the desired shape. The axes are an imitation of Neolithic stone axes translated into copper. It is remarkable that the first objects larger than awls, wires or sheet of prehistoric communities in Europe,[29] Egypt,[30] Anatolia,[31] the Levant[32] and Mesopotamia are always flat copper axes. The universality of this rule is remarkable, because in the preceding periods these regions had quite distinct cultural systems. Scientific research is needed to further investigate the role of axes. The chronological primacy of axes over all other heavy metal tools must hold significance in terms of the special role axes played in these societies. The ideological charging of axes occurs not only inter-culturally, but also cuts across various ecologically distinct zones: from the Nile valley to the North Sea, prehistoric communities used copper to imitate the same *functional* tool, although not necessarily with the same morphology.[33]

27 Özdoğan and Parzinger 2000; Molist et al. 2009. From the Neolithic there are also the first larger items such as a copper mace head from Can Hassan (Yalçin 2000, 21 fig. 7).

28 Boric 2009; Yalçin 2000.

29 Vulpe 1970; Todorova 1981; Klassen 2000; Klassen 2004.

30 Rizkana and Seeher 1989, pl. 4.

31 Yalçin 2000.

32 Miron 1992.

33 E.g. Klimscha 2009a; Klimscha 2016; Barkai 2005; Jeunesse and Pétrequin 1995; Pétrequin et al. 2002; Whittle 1995.

The crafting of copper axes in the Levant does not lead to an immediate 'extinction' of stone axes, but within the lithic traditions several developments are visible. Simultaneous to the first heavy copper items, the chipped flint industry starts to exhibit creative traits. New perforated flint discs and new types of flint axes, this time with a triangular, lentil-shaped or trapezoidal section appear during the *Ghassulian* and demonstrate that the appearance of copper did not lead to the neglect of flint, but coincided with a last peak of chipped stone tool productivity.

Did *Ghassulian* metallurgy also have an influence on ceramic traditions? In the Nahal Mishmar hoard are a number of cast copper vessels that show only a slight connection with the contemporary *Ghassulian* ceramics. *Ghassulian* pottery occurs in a variety of shapes: apart from a multitude of bowls, jars and basins, there are churns, footed vessels, bottles, stands and pithoi.[34] The vessels are decorated with painting, incisions, thumb-impressed rims, fenestrated feet, applied knobs, rope decorations, fingernail impressions, multiple handles or elaborate plastic decorations like horns or animals. Multiple handles and spouts also suggest a variety of uses apart from cooking and storage. The shapes of some of the Nahal Mishmar vessels are clearly Ghassulian, resembling necked bottles and pithoi.[35] Yet, the decoration differs completely from the known repertoire and resembles the incised designs of the Wadi Rabah culture.[36] Additionally, there are burial containers, or ossuaries, which resemble anthropomorphic houses decorated in multifarious ways. The various usages of fired clay for ceramic containers are striking and enable an artistic creativity unseen elsewhere at that time.

With the end of the *Ghassulian*, this changes. Pottery from the transitional phase to the EB, at Hujayrat al-Ghuzlan for instance, is rarely decorated, and if it is not plain, it has finger impressions and small incisions (Fig. 2). With the later EB pottery tradition, this intermezzo is quickly superseded, but the variety of decorations and usages of the *Ghassulian* are not reached again. The influence of the slowly turning potter's wheel, the *tournette*, seems to have had no major consequences for the styles and shapes of pots. The only exception is the so-called V-shaped bowl. This vessel was not, as sometimes presumed, wheel-turned, but rather wheel coiled (or wheel-spun) using a slow-moving wheel that is rotated by hand.[37] Parts of slowly-turning potter's wheels are already known from *Ghassulian* contexts, but the same technology continues until the end of the Early Bronze Age, i.e. the end of the 3rd millennium, without becoming dominant in the archaeological record.

The only plausible explanation for this creative climax in the realm of flint tools and pots seems to be to assume a connection of their social meaning with that of the first copper tools. Marcel Mauss has shown that economic transactions in "archaic societies"

34 Garfinkel 1999, 200–299.
35 E.g. Bar-Adon 1980, 106 no 158; 110 no 162.
36 Garfinkel 1999, 104–152.
37 Roux 2003.

Fig. 2 Complete pots from the Chalcolithic–EB transition. Tall Hujayrat al-Ghuzlan.

are usually embedded in social bonds in the form of the exchange of gifts.[38] A gift implies three obligations: to give it to someone, to accept it and to reciprocate it. The latter must not necessarily happen immediately, but can be delayed. Of course repaying a gift starts another cycle of giving, accepting and reciprocating, and such an exchange can connect individuals or groups in the same way that a treaty does. Communication, identity and political power in such gift-giving societies are achieved by exchanging goods.

Gift exchange is a "total social phenomenon"[39] that regulates, for instance, the communication between elites, in marriages, communication with higher deities and many other phenomena. The exchange of gifts is based on culture-specific rules that define the 'right' gift for the 'right' occasion. Whoever does not own any gifts that are exchangeable according to cultural consensus will not be able to participate in such an exchange. This means that he or she will not be able to form alliances, marry or integrate him/herself in such circles. Not having exchangeable gifts, therefore, equals social impotence – the

38 Mauss 1990; cf. also Polanyi 1978; Godelier 1999; I use the term 'archaic' here to describe pre-industrial societies characterized by the importance of social relations (e.g. Lévi-Strauss), even though certain scholars have pointed out the western notions and prejudice that lead to the classification of these societies as "archaic" or "primitive" (Wolf 2010). Nevertheless, there is still a strong consensus in anthropology that there are a number of common traits that seem to be spread almost universally (Kohl 2000). Gifts are spiritually charged items, and their circulation does not follow the rules of a market (cf. Constance von Rüden's paper in this volume).

39 Mauss 1990, 22.

inability to be accepted as an actor in a social system. This is often signified in terms of gender: as an illustration of how the possession of artefacts can be used to define social roles, one could turn to Morocco, where Jews and foreigners are spoken of as females by Muslim males, because they do not wear daggers.[40]

But what happens when a new item intrudes into such gift exchange networks? There are the following extremes: either it is ignored, or it becomes very valuable to the participants of the network. The consequence of the latter is that we might find a change in traditionally exchanged goods to raise their attraction as a gift, or we see their disappearance when exchange networks stop communicating via these goods. Neolithic ceramics and axes are two types of objects that, we can assume, were charged with social meaning and exchanged in various overlapping systems of differing scales.[41] Copper must have been a shock in the reproduction of those arrangements not because it, in itself, was able to substitute for lithic artefacts, but as soon as it was comprehended as a prestigious item it started to infiltrate exchange relations. This meant that it went into competition with other prestige goods and, if it was accepted, made a shift in the directions of exchange necessary. Copper was only found in certain mining areas and was not as frequently available as other materials. Even in the case of equally rare goods, this meant a change, as the technology for the production of copper items was too complex to be easily copied. In the long run, this would also have made it necessary to shift the directions in which exchange networks that included copper were spread. Thus, it became necessary to develop new strategies to continue social relations.

This process was certainly not a short-term affair, but rather a lengthy process. When considering the new carbon-14 record, it is even possible to imagine it to have happened over several generations. Again, this could even mean that people did not realize how copper became a more and more important means of communication via exchange. People did not need to choose copper and actively change the rules of gift giving, but as soon as copper was adopted by a group with a critical size, this went on more or less semi-automatically. The size of the group must have been large enough to keep marriage circles going without being dependent on groups without copper. Thus, a stable system in which copper was used for a variety of tasks could have been established. Other groups wanting to ally with those exchanging copper were then forced to adapt to this code, and therefore the need to acquire knowledge about this technology slowly spread. Once, however, the high prestige of smelted copper items was sought after by a social group, it caused traditional exchange networks to change radically or collapse.

Such changes also necessitated transformations in the modes of production and exchange. Either copper technology was quickly acquired or other goods that could be

40 Geertz 1987, 60.

41 Cf. Reingruber 2011 for an example from the Aegean Neolithic.

used to exchange for copper must have been produced in large numbers. A consensus, to ban copper from the exchange could be another option, as well as producing substitutes for copper items or rival prestige objects, i.e. new objects of traditional materials that could compete with the new items and their meanings as prestige goods. The geomorphology of the southern Levant enabled several systems to exist simultaneously, and so according to our current knowledge, the Mediterranean coast, the Negev, the Golan, the Jordan Valley and the Wadi Arabah seem to adopt the new technology at different times.[42] Thus, a conflict over the social significance of prestige goods can be assumed, in which prestige objects of different materials played a central role, and therefore craft traditions in general flourished.

At the point when copper items were available in large enough numbers to supply many exchange participants, the networks could slowly transform into copper-based ones. In the long run, other media lost their significance, and slowly but steadily, this resulted in pots and stone tools having a *new lack of social meaning*. If this assumption holds, it should be possible to trace 'more' social meaning in copper items that, for instance, in flint artefacts. Yet, how can an archaeological analysis do this?

The problem needs to be approached from a functional point: experiments have demonstrated that flint axes are the sharpest and most efficient axes for woodworking.[43] How can it be that copper axes which are not only more difficult to produce but also not as sharp, substitute for flint axes? To understand this, we need to investigate the role of axes in prehistoric societies. Axes are a social marker in nearly all documented preindustrial societies: in New Guinea and southern Australia, for instance, male identity is based on the possession of the 'right' and the 'best' axes according to cultural consensus.[44]

Copper axes are not at all necessary for prehistoric communities. All practical functions can be carried out with flint and groundstone axes. To choose an axe of copper, therefore, is much more than a simple substitution of a tool. In some regions of Europe, it can be shown that the appearance of copper axes caused stylistic (not functional) changes in the lithic tool kit.[45] Even though a similar demonstration is still not possible in the southern Levant, the distribution of copper items clearly shows that they are not found all over the region, but concentrated in the Negev and the Jordan Valley. Since from an economic point of view no drastic differences can be noted, the question remains as to why some communities chose copper axes.

It was already stressed that copper might have played an important role in regulating status. This can be easily explained for the scepters and other objects from the Nahal

42 Cf. the radiocarbon record and Pfeiffer 2009 for a discussion of smelting places.

43 Jørgensen 1985.

44 Cf. e.g. Godelier 1987, 34; Højlund 1978; Steensberg 1980; Vial 1940; Chappell 1966, 102; J. Burton 1984; Vicedom and Tischner 1943–1948, 423–451.

45 E.g. Klimscha 2011 for the eastern Balkans.

Mishmar hoard made from arsenical copper, but can this also be true for the copper axes?

A closer look at the hoard reveals that not only the standards, crowns and vessels as well as the hippopotamus ivory objects are without practical use, but also that at least some of the maceheads were cast around a core or very badly cast and thus also dysfunctional. The copper axes should be thought of in the same way as the maceheads. They had a practical function but were inferior to their lithic counterparts. A small group of people in the southern Levant seem to have valued their axes enough to cast them into metal and thus willingly accept a functional disadvantage. Certainly this group of people also should have had access to normal axes for daily use, but the option to use a copper axe for gift giving and offerings to the gods was one possibility to distinguish oneself in *Ghassulian* society.

This personal taste was not universally accepted. We do not know of many copper axes from the *Ghassulian*, so either most of them were re-melted, or it was just one way among others to show off one's status. The typological variety of copper axes in the Levant is from the beginning fairly large and includes squat, thick types with convex cutting edges as well as very long and thin axes. Copper axes in the *Ghassulian* are not at all standardized but can be shown to follow very local traditions. The only find in which several of these traditions were found together is, again, the Nahal Mishmar hoard.

Copper axes have one major advantage over flint ones: their size. While the length of flint axes is dependent on the size of the nodules from which they are made, this limitation does not pertain to copper axes. Copper axes can therefore be produced in longer and heavier forms that signify status much better than flint axes – or, for that matter, axes from any stone. A look at some metric data clarifies exactly how copper axes differ from their flint rivals (Fig. 3): Copper axes are significantly longer and much heavier but thinner. Apart from the precious material, a greater, dysfunctional size of metal axes is a major criterion to signify the prestige of the axes.[46] In this respect, copper axes could outbid stone axes easily. Copper axes can therefore easily be shown to be superior even to the best stone axes, but not because they were better adapted to chopping wood or butchering animals, but because they were better at showing off one's status. Thus, there was no functional surplus, but a social one. The functional deficits of copper axes suggest that their main usage must have been in gift exchange. Therefore, it can be assumed that the possession of a copper axe must have also carried with it certain implications. The possession of an axe (or other copper items) does *not* justify any status, but *enables one to gain* status by manipulating exchange. On the other hand, this can also mean that status results in the possession of many copper items.

46 Klimscha 2011; Klimscha 2009a.

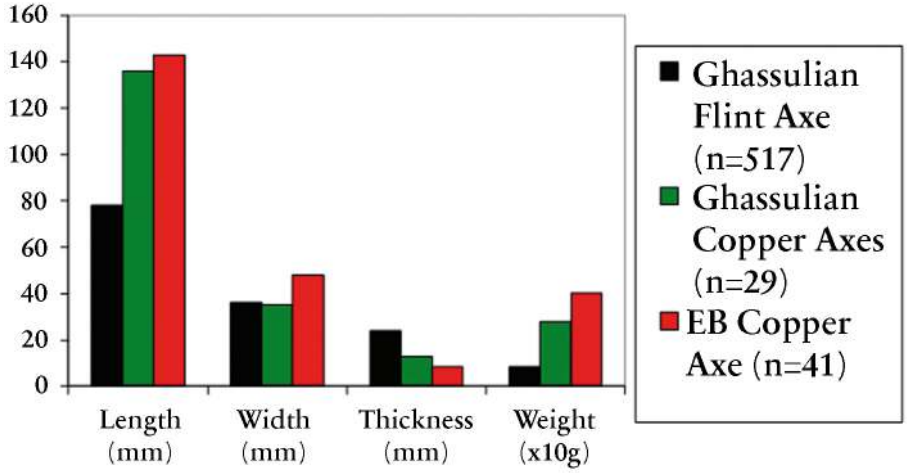

Fig. 3 Comparison of metric data of flint and copper axes from the second half of the 5th and the 4th millennium.

The possession of copper axes (or 'crowns', 'standards', 'scepters', etc.) implies that there is a connection between the person and the ability to influence social relations via exchange. Axes thus both classify and signify social status in the sense of Pierre Bourdieu.[47] They help to show off one's own status, but also their possession is a means to be classified as powerful by others.[48]

Because they are an important part of nearly all gift exchange networks, the most influential persons end up with the best and the most axes. Even though one has to acknowledge that it is also the story behind the artefact that matters, the economic aspects of gift giving must not be neglected. In the Kula, one aim is to acquire axes made from special stones, another is to barter and to get access to foreign goods that cannot be produced on one's own island.[49] Axes thus give not only the formal assurance of certain qualities; they suggest that the person possessing them is able to shift alliances, help with finding a marriage partner, has contacts with other elites, etc. Wherever anthropologists could talk to the owners of stone axes, they argued in the same way: the best man possessed the best axe, and consequently the person having the best axes should be seen as the best one in the first place.[50] The social inferiority of stone axes was also transferred to inferiority in other respects. Copper axes were for that reason indeed the best choice. Examples from ethnography might illustrate this (although they do – in no way – present a similar 'Stone Age culture'): in New Guinea, only the possession of steel

47 Bourdieu 1987 [1979], 36; 41.
48 Cf. Bourdieu 1987 [1979], 36; 41.
49 Cf. Malinowski 2001, esp. 59, 109, 136.
50 Højlund 1978.

axes allowed one to continue to "be a man", after these had been introduced by European missionaries,[51] and a similar connection between social identity and prestigious items can be assumed for prehistory. For the Chalcolithic of southeastern Europe, for example, a clear connection between elite households and male elite graves with flint axes and battle-axes can be identified.[52] Those who could not get one of the new axes had to either establish a sub-group in which the use of flint was still *en vogue*, which, in the long run, meant splitting away from existing socio-economic networks or changing to copper. Therefore, once metal axes had been accepted as being better than stone ones (just because they were *bigger*, *shiny* and *exotic*), a race started to acquire as many of these as possible and use them to gain power.

In this way, the possession of high quality axes also implies *real* power, namely the possibility to subtly manoeuvre within exchange networks and shift them in one's own favor. Similar semantic relations between artefacts and assumed abilities still exist today, for instance, when automobiles are often highly sexualized in advertisements. The relation can best be described as index linked. Via the possession of the artefact, its wearer is either seen as different, or all those who do not possess and wear such items are seen as different.

5 The role of copper artefacts in transforming networks and society

EB copper axes are longer, heavier but thinner than *Ghassulian* ones. Flint axes were not used anymore; neither the artefacts nor their production waste is found. If a similar social constellation as in the Ghassulian is assumed, all persons competing for the best exchange partner should now possess copper axes. By then, copper was used for a variety of functional tools, and several kinds of flint objects ceased to exist within the first half of the 4th millennium. However, one specific lithic tool began to be produced in huge numbers: with the advent of the Early Bronze Age, flint sickles of the standardized Canaanite type are found in significantly larger numbers.[53]

Sickles are different from all other tool types in that they actually increase from the Pottery Neolithic to the Iron Age. This increase is bound to specialized workshops and the use of either Canaanean or Egyptian blade techniques from around 3500 BCE onwards.[54] Canaanean blade production makes use of large cores that are efficiently worked, so that very long trapezoidal blades are produced. These blades are then mainly used for sickle production.

51 Cf. e.g. Godelier 1987, 34; Højlund 1978.
52 Klimscha 2016.
53 Rosen 1997, 153.
54 Rosen 1997, 59 fig. 3.19.

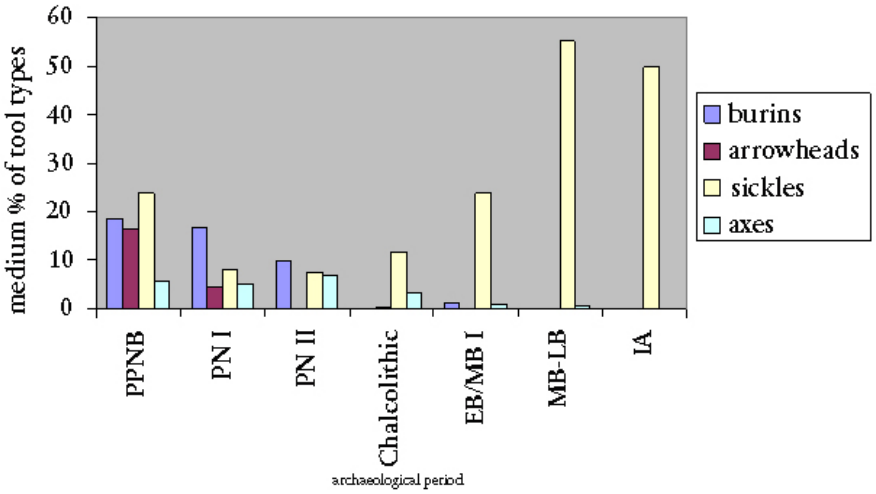

Fig. 4 Frequency of selected lithic tool types from the PPNB to the Iron Age in Western Asia (according to data taken from Rosen 1997).

While a slow but steady replacement of heavy tools by copper substitutes is apparent within the EB I, innovative and very efficient chipping techniques are used to produce small flint tools *en masse* (Fig. 4).[55] This latter change is not connected to the functionality of copper at all, but to a new organization of craft production. The Canaanite blade workshops are highly standardized and do not allow much room for individualization. The reduction sequence aims at chipping as many blades as possible from a single core. This was probably done by specialists, and it required skill and precision. The downside of this intensification and focusing of chipped stone industries was that flint was not used for the multitude of tasks that it was used for during the Chalcolithic. There can be a variety of reasons for the decline of a tool type, and the wider availability of copper in EB I seems to be only very indirectly connected with this. Copper equivalents of the flint tools known from the *Ghassulian* are unknown in the EB. They disappear for various reasons.[56] The new efficiency behind the production makes less typological/morphological variety necessary and results in strictly standardized techniques that do not allow for much variation. Thus blade production is *cleansed of creativity* and at the same time *increased in efficiency*.

55 From the beginning of the *Ghassulian* onwards, flat axes and awls were made from copper, and other flint tool types were produced less numerously until they ceased to be made in the EB I. Cf.: Rosen 1997, 112–115.

56 Cf. Rosen 1997 for a detailed discussion.

The tendency to make copper axes as long and heavy as possible but also significantly thinner can be the result of a variety of factors. When taking into account the new efficiency in tool production, one could best imagine them to be the result of innovations in casting techniques. This saved material and completed the functional requirements for long, very flat but heavy tools for sharp concussions; such a combination was only possible with metal casting technology.

Even though the production of copper axes required significantly more labor than the chipping of flint axes, this may not have been relevant in a society which had fully adapted to copper smelting and melting: the *châine opératoire* can be easily made more efficient. While the smelting and melting of one or a small number of axes may require more time and may be more complicated than the chipping of flint axes, this ratio can be altered in favor of copper axes when larger amounts of copper are used to cast several axes at once, not to speak of the material saved by recycling old axes.

Some artefacts from the Chalcolithic of the southern Levant are traditionally interpreted as representing social differentiation, and I go along with this tradition: in a cave in the Nahal Qanah, eight rings made from gold and electrum were found. These were cast in an open mold and then hammered into shape.[57] Radiocarbon dates as well as finds in the vicinity suggest a *Ghassulian* date. The absolute age has to be sometime in the second half of the 5th millennium BCE.[58] The pieces are very small with an outer diameter of 4.4 to 5.0 centimeters, and weigh between 88 and 165 grams. No standardization is ascertainable, which makes an interpretation as ingots improbable. Nevertheless, the rings do not resemble jewelry, and no obvious function is implied by their shape. This suggests that they can be understood as representing just their material: gold. This argument is also strengthened by chemical analyses that show that most of them were indeed not made from gold even though they look like it.

Most rings were made from electrum but had – by a yet unknown method – their surfaces enriched with gold. Their makers were pretending to have prepared pure gold rings. This suggests that gold had a high value, and the material 'gold' was accepted as a symbol. Otherwise, from an aesthetic point of view, the color of electrum would surely have sufficed. The rings were concentrated in two groups; five pieces were hidden between two stones and separated from another three by ca. 1 meter. They were associated with human bones and fragments of an ossuary and therefore are thought to be the remains of a destroyed grave. Individuals who had the right to be buried with ca. 1 kilogram of gold/electrum can easily be identified as an elite based on the possession of wealth. Sadly, many other graves from that time have been destroyed or robbed, so that information about such groups is still is very limited. However, if neighboring regions are taken into consideration, similar phenomena can be seen: the best example for

57 Gopher and Tsuk 1996.

58 Klimscha 2014.

the establishment of different groups that distinguished each other by the possession of material goods is the Eneolithic cemetery of Byblos in Lebanon.[59] The deceased were buried in big ceramic vessels (pithoi), and these graves can be categorized into various groups. The classification is based on distinct numbers of grave goods and the presence or absence of silver items.

Even if *Ghassulian* cemeteries do not show social differentiation similar to that known from Byblos, this does not imply an egalitarian society. The high quality casting of the "standards" from Nahal Mishmar[60] is not found regularly in settlements. If this is taken at face-value, it could suggest a limited availability of prestigious items. However, one must not forget that hoarding is an intentional deposition, while settlement finds are mostly unintentional. Therefore, the rarity of 'scepters' and 'standards' could also simply be the result of archaeological filters, and they could have been part of everyday life. Nevertheless all scepters found until now are unique. Thus, even if they were in use more often, they seem to have been a unique artefact, one whose shape, elaboration and size would very well allow social distinction.[61]

Social inequality can furthermore be deduced from rare exotic items such as ivory. Ivory is well known in the Beersheva area where it is amongst other things used to produce figurines resembling those from the Egyptian Badari culture.[62] Special ivory objects from hippopotamus tusk was found in the Nahal Mishmar and Nahal Qanah caves,[63] and a perforated rod from the latter seems to be an imitation of ivory rods found at Ghassul and Mostagedda. The finds demonstrate close relations based on elite exchange between Egypt and the Levant already in the second half of the 5th millennium BCE. The connection via Sinai, the Mediterranean or the Red Sea between Egypt and the Levant will become even more important in the Early Bronze Age.[64]

5.1 Metal in the Ghassulian cult

Copper had the biggest impact on the various modes of gift exchange. Mauss already included the sacrifice into the realm of exchange, and it is not really astonishing that the first specialized cultic areas also appear in the Chalcolithic. They seem to be connected with the cultic use of copper objects. At En Gedi, such a 'temple' was excavated. The architecture is unique and includes a feature resembling a shrine. The building can only be entered through a single, narrow entrance. The temple walls are a vehicle to bar the majority of the population from religious acts. David Ussishkin proposed that there is a connection between the En Gedi Shrine and the Nahal Mishmar treasure because of

59 Artin 2009.
60 Bar-Adon 1980, 112.
61 Cf. also Kerner 2001, 151.
62 Dayagi-Mendels and Rozenberg 2010, 29 fig. 21.
63 Scham and Garfinkel 2000.
64 Cf. Teeter 2011.

the closeness of both finds and because no temple treasure was found at En Gedi. Even if there is not much evidence to substantiate the claim of a connection between the two sites, it can be assumed that copper played a role in cultic ceremonies.

The famous wall decorations from the contemporary site Teleilat Ghassul show a star and a person next to a part of a building that could represent a shrine of the En Gedi type. Even stronger is the link with another wall decoration, which shows a procession in which a copper object of a shape similar to some scepters in the Nahal Mishmar hoard is used.[65] While the interpretation of the picture with the star is ambiguous, the connection of copper and the procession is difficult to deny. There is no reason to identify the inventory as a treasure hidden for later recycling; rather, all the items in it point to a cultic or ceremonial use. The Nahal Mishmar hoard certainly is unique in more than one way, but even if the explanation as the inventory of a shrine is refuted, the hoard demonstrates the manifold uses of copper in *Ghassulian* cultic performances.

Since metal goods started to dominate the cultic sphere, they can be seen as one of the few forms of permitted sacrifices to elder things and transcendental entities such as deities. Sacrifices are a contract between mortals and higher beings[66]: the sacrifice aims not only at pleasing the gods but also influencing their treatment of oneself. *Do ut des*. I give, so that you may give to me. However, not every object may be sacrificed or given to the supernatural beings. A society has rules about the correct way to sacrifice.[67] Therefore, metal could be used to bar access to supernatural beings as long as the secret of its creation was controlled by a small group. That would suggest a monopolization of this form of communication, and since offerings are used in many socially relevant contexts, this monopoly could be translated into social power. Those who owned copper were the only ones who could speak with the gods. For everyone else the situation was similar to that after the destruction of the Tower of Babel. One could speak, but the gods would not listen anymore.

Of course, the scenario just presented is in parts speculative. Yet, there are a multitude of explanations in every society for why a sacrifice is not successful. At the point where people can explain an unsuccessful sacrifice with offering the wrong gifts, the offering group or person becomes vulnerable. Various kinds of disasters that strike a community could suddenly be linked to people offering the wrong gifts. This could also have accelerated the shift to the production of copper items important in the cult. This is a well represented line of thinking in the discourse on Copper Age and Early Bronze Age hoarding in Central Europe and the Black Sea region[68] but has not yet been discussed in depth for the Levant. From this perspective, people who requested supernatural help were forced to turn to those with access to copper. Thus, if somehow the access

65 Seaton 2008, 285.
66 Mauss 1990, 44.
67 Hansen 2003.
68 Hansen 2013.

to copper could be limited to a minority, this would turn that minority into an elite, because it could have caused an exclusivity of communication with the supernatural. Such a monopolization of the communication with the supernatural could be mirrored in the enclosed architecture of En Gedi. Walls blocked the public from the cult, and a narrow door allowed the control (or denial) of those who wanted to offer. Metal might thus be connected with the establishment of religious elites, although it need not be the factor causing the exclusivity of the cult.

5.2 Long distance communication and metallurgy

The similarity of developmental trajectories in ceramic style and flint technology is often used to construct prehistoric communication routes and zones.[69] Before the middle of the 5th millennium BCE, several traditions can be defined within the southern Levant. With the advent of metallurgy, most were integrated into the *Ghassulian*. A number of traits in ceramic, lithic and copper technology were shared over a larger area than before. A specified set of craft traditions was shared by a larger number of people. And the influence of these workshop traditions was wider than the area for which we can identify *Ghassulian* culture. For instance, in the Eneolithic cemetery in Byblos, Lebanon, we can easily identify within a large number of local pottery designs *Ghassulian* shapes such as churns.[70]

Within this context, one has to return to a discussion of the scepters made from arsenical copper. Apart from the Nahal Mishmar treasure, similar scepters have been found at Neve Noy/Bir es-Safadi,[71] Givat Ha-Oranim,[72] Nahal Qanah,[73] Shiqmim,[74] or are depicted on Ghassulian ossuaries, for example at Azor[75]. The distribution shows that, apart from the Nahal Beersheva, the coastal plain, the Dead Sea and the Jordan valley were included in a distribution system.[76] These networks could bridge considerable distances.[77] Apart from local items such as ceramics and lithics, the cave of Nahal Mishmar included various goods that must have been produced more than 100 km away – most clearly in the case of the gold since there are no gold deposits whatsoever in the Levant. During the *Ghassulian*, metallurgical remains are centered on the Wadi Beersheva. Many finds are still skeuomorphs, imitations of objects that were traditionally produced in other materials. This is made clear by a copper shaft-hole axe from Nahal Mishmar which has part of the hafting of a stone axe modelled on it.[78]

69 Gilead 1989.
70 Cf. Klimscha 2014 for a more detailed review of the Eneolithic in Byblos.
71 Eldar and Baumgarten 1985.
72 Scheftelowitz and Oren 2004, cover image and 71 fig. 5.1–16.18, 73 fig. 5.2.
73 Gopher and Tsuk 1996, 116 fig. 4.19, 1–2.
74 Levy 1987; Shalev and Northover 1987.
75 Perrot 1961, 39 fig. 1.
76 Gošić 2008 with further references.
77 Gopher and Tsuk 1996, 234 fig. 12.6.
78 Bar-Adon 1980, 112, no. 163.

During the Early Bronze Age I, however, production changed. There were also more sites that produced copper items, and these are spread from the Sea of Galilee to the Red Sea.[79] Consequently, a much *higher exchange rate of copper* items can be supposed. Rectangular and oval ceramic molds from Tall Hujayrat al-Ghuzlan reflect this larger market for smelted copper. Ingots which would fit into these molds were found in Egypt at the site of Maadi (Fig. 5).[80] The copper used in Maadi can be archaeometallurgically traced to Wadi Feinan,[81] but the typology of the Maadi items is clearly local. Within the 4th millennium BCE, copper is transported as an intermediate good along the Sinai or the Red Sea, where it was again cast into local forms. The lithic industry of the Buto-Maadi culture does not use flint axes anymore, as they had been replaced with copper ones.[82]

After the decline of the flint workshops, there would have been difficulties in building houses, butchering animals or making new prestigious items in Lower Egypt once the copper from the Levant stopped flowing. The technology changed Lower Egyptian society in a way that made it *dependent on long range trade*. This also opened the way for a higher quantity and a different quality of trade between Egypt and the Levant: in the second half of the 5th millennium BCE, only prestige goods are transported, whereas now it is possible to identify a broader range of traded items, traded commodities and a higher quantity of trade goods. One example that highlights this connection is the distribution of so-called *Libyan* vases or wide-brimmed jars that connect both Upper and Lower Egypt with the Mediterranean coast of Africa and the Red Sea coast of Jordan (Fig. 6).[83] These goods cannot be identified as being prestigious or functional *per se*, and one plausible explanation would be that it was not the stone vessels but their content that was traded.

How does this scenario mesh with the new chronology? With the beginning of the 4th millennium BCE, there are no more finds of arsenical copper items produced in the lost wax technique. What lies behind this apparent 'breakdown' of the metal industry and its technology? To answer this question, one needs to consider that nearly all items making use of this 'advanced' technology were standards, vessels and crowns, that is, items commonly interpreted as prestige goods or ceremonial items: they neither made daily life easier nor brought a new quality to one's daily activities but instead were used to show off social differences. Thus bronze technology, which had the possibility to be shaped and further incorporated into daily life, was only used for its color and ability to signify social differences.

79 Cf. Genz 2000.
80 Pfeiffer 2009.
81 Pernicka and Hauptmann 1989; cf. also Hauptmann, Khalil, and Schmitt-Strecker 2009.
82 Rizkana and Seeher 1989, pl. 4.
83 Cf. Rizkana and Seeher 1988, 62.

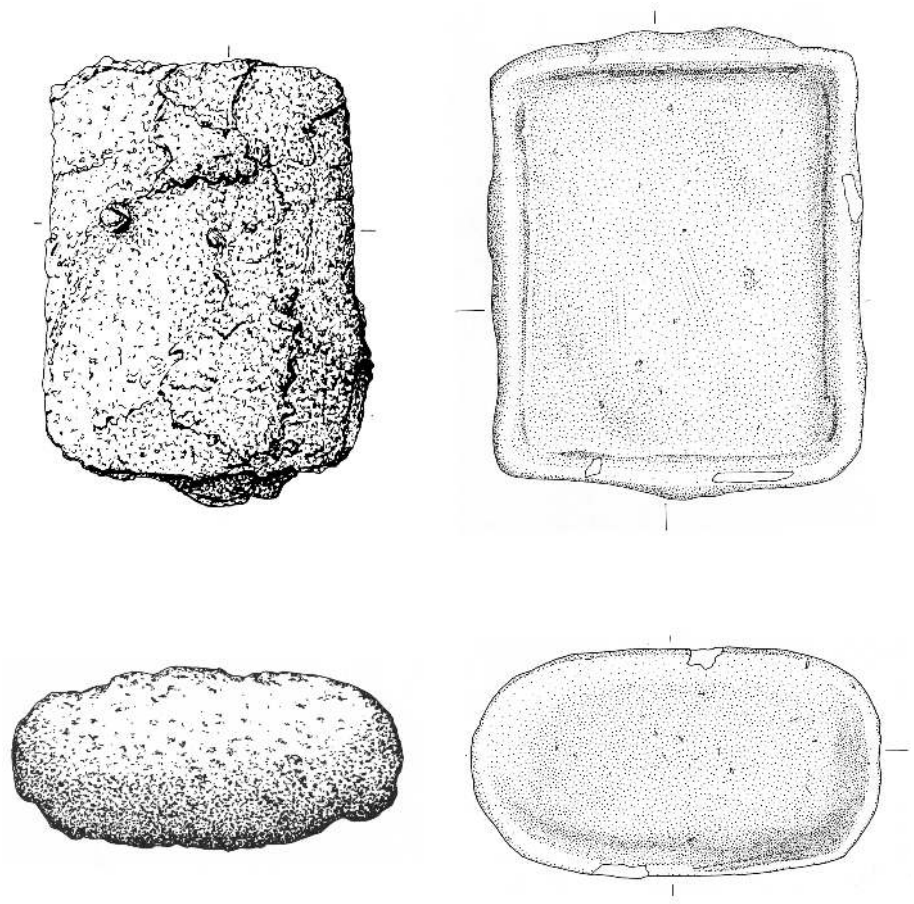

Fig. 5 Ingots from Maadi and moulds from Tall Hujayrat al-Ghuzlan, Aqaba.

Despite Moorey's claim[84], the maceheads from the Nahal Mishmar hoard show little evidence of use as weapons. They are badly cast, hollow or cast over a lithic core and thus are metal representations of stone maceheads and not copper weapons. They are *images of maceheads* made in copper (of course, many highly polished stone maceheads made from marble or other semi-precious stones could also be seen as prestigious items). This view is further strengthened by the many stone maceheads of similar shapes that show traces of usage. The weapons that were actually used were still manufactured from stone. Even so, the Nahal Mishmar maceheads *could* be seen as a new idea about the importance of conflict or power.

84 Moorey 1988.

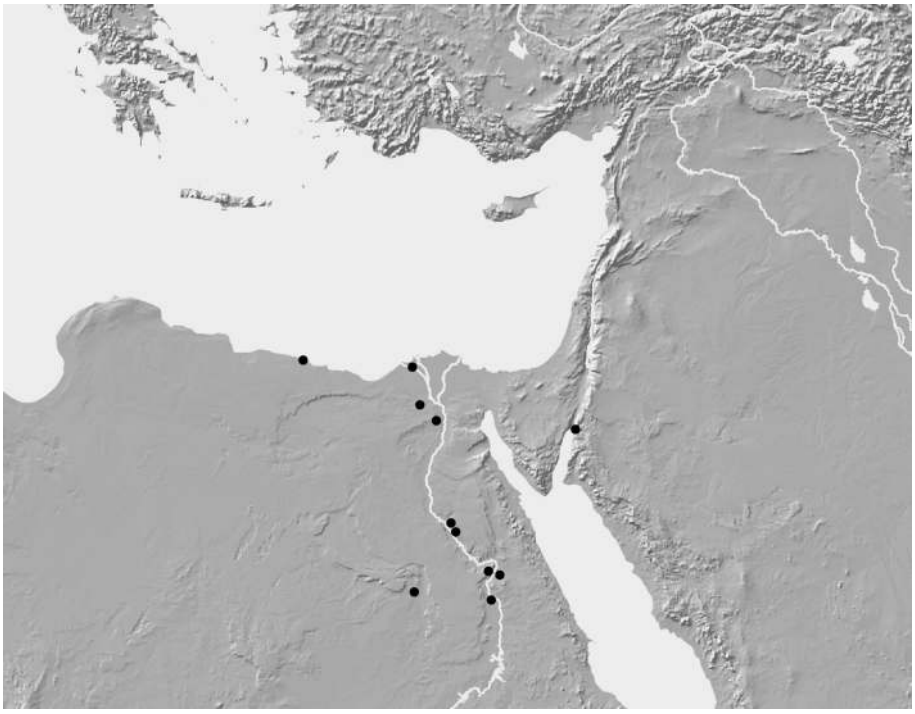

Fig. 6 Distribution of wide-brimmed jars during the 4th millenium BCE.

These principles change with the beginning of the Early Bronze Age. The donkey figurines, for example, are often taken as a continuation from the Ghassulian. However, in contrast to the zoomorphic *Ghassulian* vessels,[85] the donkeys are figurines and not vessels – although sometimes they also carry miniature vessels.[86] A depiction from the second half of the 4th millennium from Tell el-Farah (North) continues this tradition by depicting two oxen under a yoke as a decorative element in a plate.[87] It therefore seems as if EB miniatures are expressions of a new ideology that is heavily influenced by new technologies: crucibles and molds representing metallurgy and domestic donkeys for the new means of transport.

It is true that we do not know of a single item cast in lost-wax technique from the 4th millennium, but when keeping in mind the limited distribution of the standards and the opening of communication routes with the early 4th millennium BCE, one should also consider alternative explanations, such as lack of research, bad preservation or simply the end of hoarding. The regular contact with new cultures may also have

85 Amiran 1986; Joffe, Dessel, and Hallote 2001.
86 Cf. Milevski 2011, 177–192; 185 fig. 10.3.
87 Dayagi-Mendels and Rozenberg 2010, 39 fig. 4.

resulted in the adoption of social rules considered as superior: Thorstein Veblen's ideas of the spreading of innovations by imitation of people seen as superior come to mind. In that respect, it is striking that prestige goods of unequivocally Egyptian origin begin to appear in the Early Bronze Age.[88] In Egypt, large, ripple-flaked knives were in fashion, and these are also found in Levantine burials, for instance at Azor.[89]

6 Conclusion: what do these changes in material culture imply?

Interpreting the available data one can see drastic changes between the 5th millennium BCE Ghassulian complex on the one hand and the Chalcolithic/Early Bronze Age transition and Early Bronze Age I on the other hand. Fifth millennium copper production is located in the Wadi Beersheva relatively near to the copper mines of Feinan – although still on the other side of the Dead Sea and spread over various smaller sites. During the 4th millennium, larger sites are spread across all of the southern Levant.[90] The archaeological record shows that this is parallel to a raised production volume, which could reflect higher demand. However, the process is interwoven with a number of other changes and innovations. The domestication of donkeys, which happened in the first half of the 4th millennium BCE, made this much easier.[91] It allowed not only greater transport volumes but also faster transport, and therefore may be one of the factors that both enabled and caused the boom of metal in the 4th millennium.

These examples may be completed with reference to the many depictions of sailboats on Naqada ceramics.[92] Only around 3700 BCE is a greater boost of trade relations visible in the increasing numbers of imported prestige goods in the Levant, Levantine exports to adjacent regions as well as new means of transport, such as the mentioned donkey and greater use of sailboats. However, other prestige goods such as gold could already travel similar distances in the 5th millennium BCE, while the communication routes for copper items were still fairly limited.

The new amounts of copper available also result in changes in craft production that are not connected to it at first glance: while the means of production in the 5th millennium BCE are still mainly manufactured from stone, there is a shift to the usage of copper tools. Of the lithic tools, only sickles remain in use during the Early Bronze Age. Also, the beautifully decorated handmade pottery changes to more standardized, less decorated shapes. Lithic tools are socially and functionally replaced by copper objects but also erased from the chipping workshops with the new rule of efficiency that comes with the Canaanean blade. The influence on ceramics must have been different.

88 Veblen 1994 [1899].
89 Ben-Tor 1975, 46 fig. 13, 15.
90 Cf. Genz 2000; Genz and Hauptmann 2002.
91 Benecke 2009; Milevski 2011.
92 Teeter 2011, 178–179; 185.

Fig. 7 Cortex tools from Tall Hujayrat al-Ghuzlan, Aqaba.

It suggests that the *Ghassulian* pottery constituted a sign system that was also socially relevant. With the substitution for stone by copper, there must have been a rearrangement of social bonds, which in the long run also impinged on those connections that were responsible for the *Ghassulian* style. Technique ultimately destroyed social relations.[93]

The usage of copper for prestige goods and their use context in 'architecturally closed' spaces such as En Gedi implies a domination of a specific group in the communication with the gods. The access to copper enabled new restrictions in religious activity. In this way, social differentiation was enforced by the emergence of metal technologies.[94] In the 4th millennium BCE, this is not visible anymore. While rich graves and ritual specialists are apparent in the archaeological material of the 5th millennium, these are more difficult to grasp in the EBA. The ripple-flaked knife from Azor, however, shows that similar distinctions still existed, but the codification of status had changed. Ethnographic reports demonstrate that the introduction of new prestige goods that could not be obtained by everyone certainly caused drastic changes.[95]

While one could argue that all these changes resulted in enhanced trade that could be enjoyed by all those who consumed traded goods, there is also a downside:The smelting of copper required high amounts of fuel for which dung could only partially be used. There are also changes concerning the quality of living: settlement specialization caused not only noise, in a quality until then unknown, but also negative consequences such as pollution. Standardized tools such as Canaanean blades used as sickles or the cortex tools used for the shearing of sheep (Fig. 7) attest to the existence of far-reaching communication networks that were not only based on prestige goods but similar economic strategies.[96]

93 Ellul 1964 [1954], 126.
94 Levy 2007.
95 Sharp 1952; Sharp 1967; Klimscha 2011.
96 Schmidt 1984.

During the transition from the Chalcolithic to the Early Bronze Age in the southern Levant, there was a shift from personal exchange within elite groups to a more open trade with semi-finished products that were then melted into local forms. There was also a shift from the production of elaborate prestige goods made from copper, flint and ivory to a larger-scale production of copper tools. Creativity was eliminated from the sphere of handicraft and caused more efficient techniques with flint sickles and less decorated ceramics. While ideology is no longer dominated by prestige goods and warfare (standards, crowns and maceheads), both still exist in the 4th millennium BCE but are not stressed as much in cultic activities (hoards and graves) as during the *Ghassulian*.

Copper metallurgy did not change society by itself. However, understanding the complexity of the *châine opératoire* of metallurgy and its embedding into a dynamic social system allows us to see the multitude of connections metallurgy had to various social spheres. The change visible in the archaeological record is also reflected in the metal finds. Conversely, most metal finds derive from either graves or hoards. These are intentional depositions *sensu* Eggers.[97] The disappearance of a depositional act does not mean that the objects preserved through this ritual also ended. Within the transition from the Chalcolithic to the Early Bronze age, a successive transformation of the exchange relations between Egypt and the southern Levant causes a higher amount of exchange. Metallurgy is implanted in this transformation as well as lithic and ceramic finds, and a shift in settlement strategy, the use of new means of transport and an increasing efficiency within traditional crafts.

It is striking that no specific determinism is visible in the spreading of metal items in the southern Levant. There was neither a functional nor a social need. Consequently, it is probably too easy to just cite a former book title, "Metals make the *world* go round"[98]; but I would rather refer to Stanley's question, "What makes the world go round?"[99]. Various sociologists have stressed the importance of personal meetings and marriages for the coming together of human groups. Within such networks regulating marriage, feasting, elite relationships, etc., gift giving must have been an important factor. All preserved early metal items fall into categories of either very small tools, such as awls or needles, larger artefacts that are functionally inferior to flint tools, or such objects without a practical use. It could be argued that the latter two were ideally suited to substitute for traditional prestigious items in existing gift-giving networks. They were shiny and could be made heavier, larger and formed into yet unknown shapes. Groups exchanging this new shiny, heavy metal were special partners, because they could monopolize the production of these goods. Therefore, if another group shared the evaluation of metal, it

97 Eggers 1959.
98 Pare 2000.
99 Stanley 1980.

was either dependent on the gifts from metal producers or must have somehow tried to emulate or copy the technology.

This was not a quick process, but rather it may have taken several generations in which subtle changes in exchange circles happened. In the long run, however, once metal items became an important factor in gift giving, it was essential to acquire the technology of their production. Otherwise, alliances, trade relations, marriages, etc., were more difficult to forge and a group not able to produce copper goods could even become isolated. This seems to be a plausible model for the slow and regionally diverse spreading knowledge of 'advanced' metal technology (see above) developed in the western part of the southern Levant and its diffusion into neighboring zones. A higher production volume is reached in the 4th millennium BCE, even in regions where metal played only a small role in the depiction of elites.[100]

In the succeeding millennium, metal is for the first time used in large amounts for heavier tools and ingots, but this new efficiency does not need to be the result of metal itself (although it *is* still possible). Instead, a new *Zeitgeist* of efficiency can be traced in many areas. New transport technology and harvesting techniques result in better transportation and possibly also surplus. While alloying and lost-wax casting are invisible in the archaeological record from that time on, a continuous improvement in the casting process has to be assumed. Metal was, however, involved in a change of long-range contacts. The exchange, so to speak, was liberated from elite bonds and now also included goods for everyday use.

In the dialectics of ancient innovation, metal changed society but also was changed by society. Technical development caused unintended changes that destroyed social bonds and thus enabled the setting free of labor, new settlement strategies and caused a new simplicity in material culture. Progress means stepping forward but not necessarily a better life.

100 In Egypt, for instance, ingots arriving from the Aqaba region: Khalil and Schmidt 2009, 30 fig. 14.

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1 Florian Klimscha. **2** Irmard Wagner, Deutsches Archäologisches Institut Berlin Orient Department. **3** Florian Klimscha; data from Barkai 2005; Miron 1992. **4** Florian Klimscha; data from Rosen 1997. **5** Khalil and Schmidt 2009, 323 fig. 17. **6** Florian Klimscha; data from Klimscha, Notroff, and Siegel 2014, 168–169; Rizkana and Seeher 1988, 62. **7** Nico Becker, Deutsches Archäologisches Institut Berlin.

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