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**Otherness and interaction in copper metallurgy  
in the Chalcolithic of the Southern Levant:  
the Transcaucasian connection**

**Alteridad e interacción en la metalurgia del cobre  
durante el Calcolítico del Levante meridional:  
la conexión transcaucásica**

*Bernardo Gandulla\* and Pablo Jaruf\*\**

**Resumen**

Los estudios sobre la metalurgia del cobre en el período Calcolítico del Levante meridional (ca. 4500-3800/3600 a.C.) han determinado que habrían coexistido dos técnicas de producción: una de molde abierto, localizada en el valle de Beersheba, que utilizaba cobre puro proveniente de las minas de Feinan, Jordania, y otra con la técnica de la cera perdida, que utilizaba cobre arsenical proveniente de la región del Transcaucaso o Anatolia oriental, cuyos sitios de producción todavía se desconocen, pero se sugiere que pudieron estar en la Sefelá o en el Desierto de Judea. Dos tercios del total de los objetos de cobre conocidos para este período corresponden a la segunda técnica, y fueron hallados en un solo sitio: una cueva en Nahal Mishmar, cerca del Mar Muerto. Nuestra hipótesis, considerando la falta de evidencias sobre intercambio entre el Levante meridional y el Transcaucaso o Anatolia oriental, es que los metalurgistas debieron provenir de esta última región, trayendo consigo los minerales. En su interacción con las poblaciones nativas, este grupo habría buscado su integración, copiando objetos y motivos iconográficos locales, pero sin perder por ello su identidad etnocultural, la cual expresaron por medio del empleo de un material foráneo y una tecnología novedosa.

**Palabras clave**

Levante meridional – período Calcolítico – metalurgia del cobre – alteridad – interacción

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**Abstract**

Studies in copper metallurgy during the Chalcolithic period in the Southern Levant (*ca.* 4500-3800/3600 B.C.E.) have determined that two production techniques seem to have coexisted: the open mould technique, located in Beersheba valley, which used pure copper from the Faynan mines, Jordan, and the lost wax technique, which used arsenical copper from the Transcaucasus region or Eastern Anatolia, whose production sites are still unknown. Two-thirds of the total amount of copper objects pertaining to this period were cast using the second technique and were found in a single site: a cave in Nahal Mishmar, near the Dead Sea. Our hypothesis, considering the lack of evidence regarding exchange between the Southern Levant and the Transcaucasus or Eastern Anatolia, is that metallurgists must have come from this last region bringing the minerals with them. In their interaction with native populations, the members of this group would have tried to achieve their integration by copying local objects and iconographic motifs but without losing their ethnocultural identity, which they expressed through the use of a foreign material and a new technology.

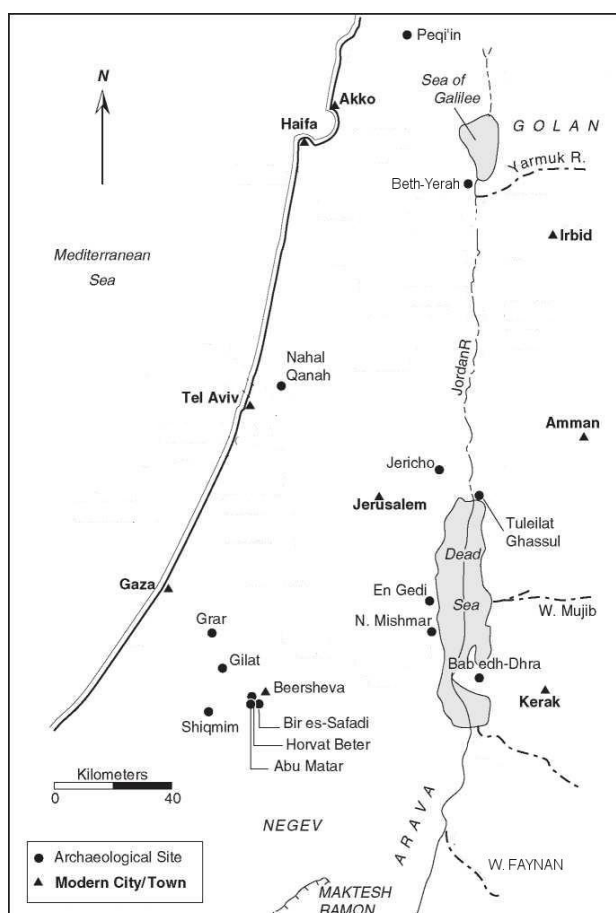
**Keywords**

Southern Levant – Chalcolithic period – copper metallurgy – otherness – interaction

***Introduction***

The Chalcolithic period of the Southern Levant (*ca.* 4500-3800/3600 B.C.E.) can be approached from many angles (e.g. Rowan & Golden 2009) that show the imprecise character of this period, typical of transition stages of socio-economic formations such as Neolithic village communities and Early Bronze proto-urban societies (Cf. Ben-Tor 1992; Levy 1995a; Mazar 1992; Steiner & Killebrew 2014) (**Fig. 1**). This vagueness envelops the whole period and its cultural production, and is the cause – from a neo-evolutionistic point of view – of controversial interpretations that attempt to provide precise definitions of matters that still cannot be explained clearly. This situation is particularly emphasized regarding the presumed social organization (e.g. Gilead 1988, 1993, 2002; Joffe 2003; Joffe et al. 2001; Levy 1995b, 2007). In this respect, we share Bourke's cautious remark when he states that it would be "...premature to do more than sketch the basest outline of Chalcolithic social organization, at present (...) We can do no more than describe changes from Neolithic norms, and (with

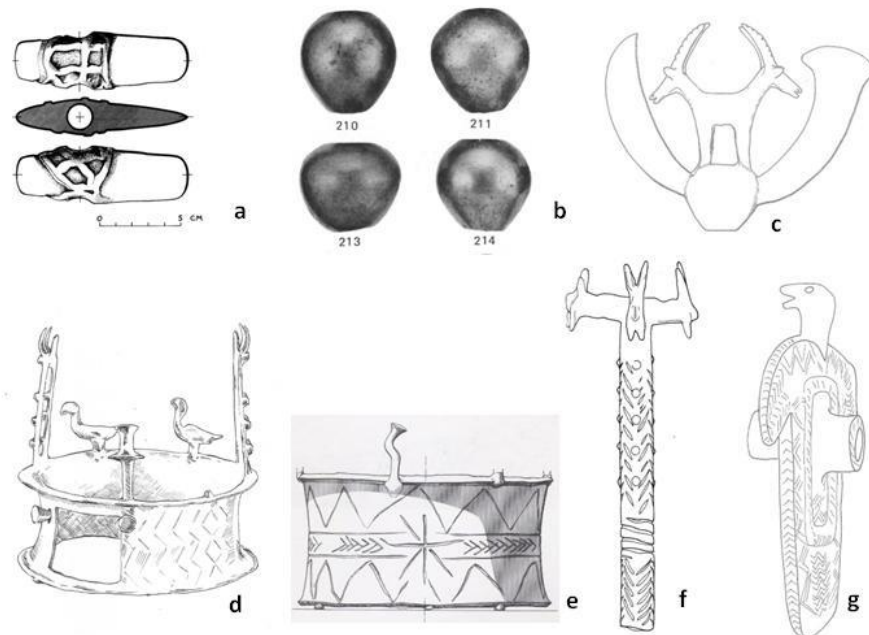
less confidence) begin to identify potential agencies in such change. Our ignorance of Early Chalcolithic norms is profound.” (Bourke 2008: 145).



**Fig. 1** Map of the Southern Levant with the main sites mentioned in the article (adapted from Rowan & Golden 2009: Fig. 1).

Aside from this general problem, there are other important aspects that must be given due consideration such as the artifacts manufactured in complex metals (**Fig. 2**), alongside artifacts in pure copper which suggest evidence of cultural diversity in the archaeological record. Our concern will be to offer an alternative approach regarding the so-called “hoard” of Nahal Mishmar (Bar-Adon 1980). With this aim we will try to answer two questions: a) Which could have been the most probable origin of the

“hoard” and its producers? and b) What could have been its sociocultural significance in the context of the Southern Levantine Chalcolithic?



**Fig. 2** Objects of arsenical copper from the “hoard” of Nahal Mishmar: a) axe n° 163 (adapted from Bar-Adon 1980: 112); b) mace-heads n° 210-211-213-214 (adapted from Bar-Adon 1980: 122); c) standard n° 153 (adapted from Beck 1989: Fig. 7.c); d) “crown” n° 7 (illustration by Sol Capilla); e) “crown” n° 9 (adapted from Bar-Adon 1980: 30); f) standard n° 19 (adapted from Moorey 1988: Fig. 6.a); g) eagle standard n° 154 (adapted from Beck 1989: Fig. 8.c).

### ***Otherness and cultural interaction***

As a methodological framework, we intend to use a holistic approach for otherness and cultural interaction problems as a possible way to produce an alternative – albeit conjectural - interpretation of the topic. To answer the above questions, we must appeal, on one hand, to the world of “pseudo-concretion” (Kosík 1967) and on the other hand to the ideological nature of signs (Voloshinov [Bakhtin] 1973).

The world of pseudo-concretion – as K. Kosík points out – is a chiaroscuro of truth and deceit. Its characteristic element is its twofold sense: “the phenomenon conceals the essence even as it reveals it. The

essence manifests itself in the phenomenon, but only to a certain extent, partially” (Kosík 1967: 2). Essence is mediatized by the phenomenon and it is shown, therefore, in something different from what it is.

The world of signs – says V. Voloshinov – coexists with the phenomena of nature, technical objects and consumption products. The sign not only exists as part of nature but also reflects and refracts it. “The domain of ideology coincides with the domain of signs [...] wherever a sign is present, ideology is present, too” (Voloshinov 1973: 10). “Signs emerge, after all, only in the process of interaction between one individual consciousness and another. And the individual consciousness itself is filled with signs” (Voloshinov 1973: 11).

A binary logic, an *us / them*, operates in the dialectics of otherness; an external *them* that is “opposed” to an internal *us*. In this way, the “cultural *us*” becomes a *negative* definition: the enunciation of what the other cultures *are not* (Severi 2010). But this binary logic – that appears as a dialectical contradiction – overcomes this opposition in a social interplay of reciprocal integration. Therefore, the function of the *other* in the building of identity does not boil down to opposition and contrast though this may be one of its primary functions (García 2006). Therefore, human relational and social aspects emanate directly from otherness, and this in turn explains the central role that human social environment plays in terms of promoting human development and modernization (Nuévalos Ruiz 2010: 388-389).

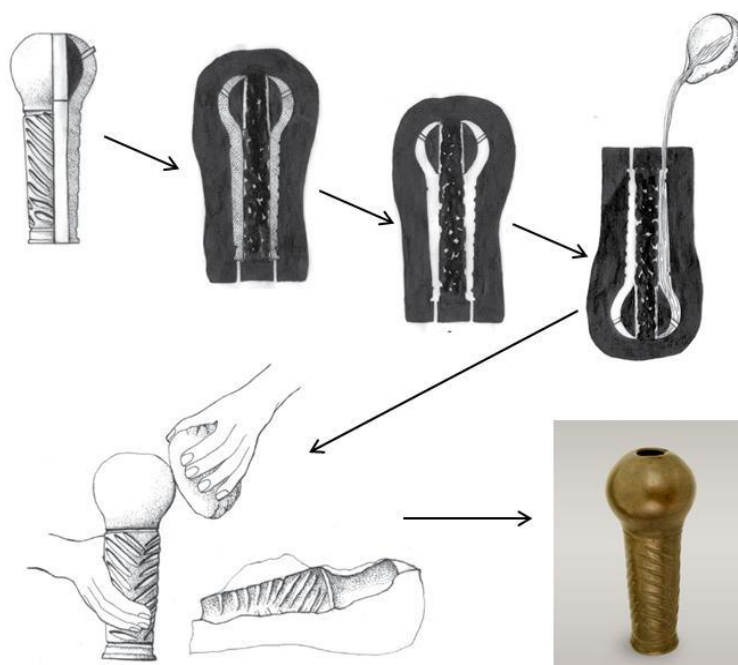
Since the discovery of more than 400 copper artifacts in the Nahal Mishmar cave by P. Bar-Adon (1980), and other sites (see below), these artifacts have been assigned religious or ritual functions, or interpreted as conferring power or prestige, or as having sumptuary value, all of which amount to speculations to give meaning to what we, in fact, ignore. However, in our opinion, and perhaps out of ignorance, no consideration has been given to their role as a marker of ethnocultural identity, in other words, the objectification of the phenomenon of otherness and its dialectical process. Although “there are no fixed cultural criteria or material

traits that define an ethnic marker, each community develops its own specific features, and these change over time. In our world, nations and ethnic groups often cling to overt symbols, such as flags and national anthems, which are often perishable or amaterial and therefore would not survive in the archaeological record. But ethnicity can also be embedded within culture, reflected in elements of which the ethnic group itself is not aware: dietary habits, a style of decoration on cooking pots, the way one moves a hand in greeting” (Kletter 2006: 575). In our case it would be a raw material and the technology employed in the production of artifacts.

Otherness is a social phenomenon that results from the encounter of different cultures. These encounters generate mutual movements that express diversity that is a result of cross-cultural processes. We believe it is possible to explain the issue involving the metal artifacts of the Nahal Mishmar cave by appealing to the concept of “cultural interaction spheres” introduced in *Archaeology* by J. R. Caldwell (1964), and applied to Near Eastern Prehistory by N. Yoffee (1993: 257): “The interaction sphere concept (...) describes the conditions in which those otherwise locally ‘autonomous’ societies were also connected on a regional basis – that is, local social systems could be identified by distinctive settlement patterns in specific ecological or geographical circumstances, the practice of appropriate subsistence techniques, and the maintenance and reproduction of historically determined cultural ways and associated material culture. Nevertheless, the circulation of certain goods ‘bounded’ these local systems within a large, regional or super-regional area. In order to perpetuate the flow of these goods, furthermore, a common code of values and beliefs, manifested in a shared corpus of symbols, was invented to facilitate the social interactions needed to exchange the goods. This common code, if not conceived by elites, soon became controlled by them”.

***Complex metals and the Anatolian/Transcaucasian connection:  
an alternative approach***

Amongst the different enigmas that emerged with Bar-Adon's discovery, the outcome of metallurgical analyses of the artifacts comprised in the Nahal Mishmar hoard is worth nothing, revealing the objects were manufactured with arsenical copper with variable proportions of nickel and antimony which enabled the use of the lost-wax technique (**Fig. 3**) (Key 1980).



**Fig. 3** Casting in the lost wax technique  
(adapted from Sebbane 2014: Fig. 6.2).

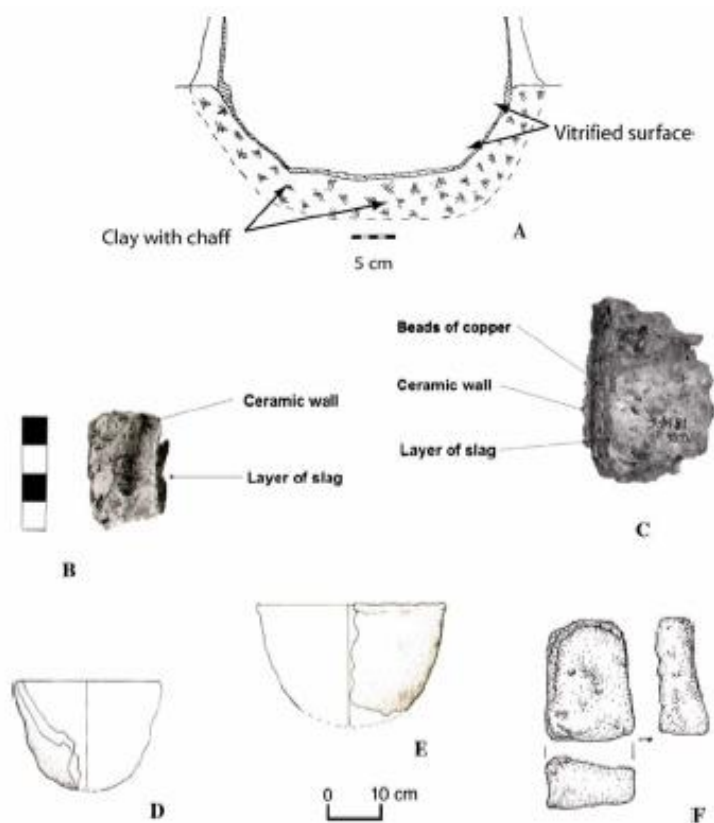
The exotic type of raw material gave rise to diverse opinions that coincided in a non-local origin. With regard to this issue A. Hauptmann (2007: 294-295) points out that no ore sources are known in Southern Levant or in Sinai that could have produced the matter for the copper-arsenic-antimony-nickel (natural?) alloys, and it is highly unlikely that they may be found in the future. Therefore, these alloys are of exogenous origin, and researchers have speculated that they may have come from Anatolia,



Armenia, Azerbaijan or the Caucasian region (Anfinset 2010: 121, 162, 166; Key 1980; Tadmor et al. 1995), where there are well-known mining deposits with these characteristics, although some are more inclined to trace their origin to Eastern Anatolia by analogy with the discovery of Anatolian obsidian in the Southern Levant (Yellin et al. 1996).

It is important to point out that archaeometallurgical studies have also confirmed the existence of a local pure copper metallurgy in the region of Nahal Beersheba in the sites of Abu Matar (Perrot 1955), Bir es-Safadi (Levy & Shalev 1989), Horvat Beter (Dothan 1959), Neve Noy (Eldar & Baumgarten 1985), and Shiqmim (Levy 1987). In these places all the steps of production were carried out ranging from the reduction of pure copper mineral to its casting (**Fig. 4**) (Shalev 1994). Archaeological evidence points to the origin of this pure copper manufactured in the Beersheba sites in the Wadi Faynan mines, and that the open-mould technique was used for the production of these artifacts.

However, what surprises and intrigues researchers is that in none of these sites nor in any other in the Southern Levant, at least up until the present, has a workshop been discovered in which the lost-wax technique of production may have taken place. Nonetheless, there is evidence that enables us to surmise that the manufacture of arsenical copper artifacts seems to be local. Firstly, the iconography of the objects is similar to that of the Ghassulian and Golanian local cultures (**Fig. 5**) (e.g. Beck 1989, Epstein 1978, 1982; Milevski 2010). Secondly, petrographic analyses of clay contained in mace-heads of the Nahal Mishmar hoard point to an origin in the Judean Desert (Goren 2008, 2014). Thirdly, it is possible that arsenic was brought separately and blended with the copper obtained in Wadi Faynan (Shugar 2001). Lastly, arsenical remains in human bones from cemetery V of Shiqmim give room for the possibility that the metallurgists in that region manipulated metals with these characteristics (Golden 2009: 293-294).



**Fig. 4** Artifacts related to copper production from the Northern Negev sites, open mould technique: a) reconstruction (section) of furnace; b-c) fragments of ceramic furnace walls from Abu Matar and Bir es-Safadi with slag and copper adhering to it; d-e) ceramic crucibles; f) block (ingot) of raw copper from Shiqmim (Rowan & Golden 2009; Fig. 12).

Therefore, we are in the presence of two different industries: one that used pure copper with the open-mould technique for the manufacture of utilitarian artifacts, and the other that used arsenical copper and the lost-wax technique to produce non-utilitarian objects. It is interesting to point out that the latter would apparently be unique to the Chalcolithic period, since it does not seem to have continued in the Early Bronze Age (Shalev 1994). However, there are researchers that doubt the existence of the two industries and question not only the use of these artifacts but also the variety of alloys (e.g. Golden 2009; Tadmor et al. 1995).

Over fifty years ago, the Ghassulian culture was considered to have a foreign origin not only on account of the presence of the copper in the artifacts but also due to the singularity of the assemblage (e.g. Kenyon 1965; de Vaux 1970). However, nowadays researchers are aware of the existence of pre-Ghassulian stages in Tuleilat Ghassul as well as Late Neolithic or Early Chalcolithic cultures like Besor or Qatifian (e.g. Garfinkel 1999: 189-197; Gilead 2011) that point to a local origin. However, in our opinion, the idea of a foreign influence should not be dismissed since it is possible that the hoard of Nahal Mishmar and the presence of arsenical copper metallurgy may have been the consequence of movement of people from the north (Ussishkin 1971, 1980, 2014). This hypothesis fell through because at the time researchers lacked the archaeological data that we have today on Transcaucasian Chalcolithic cultures [VI-III millennium B.C.E.] (Chataigner 1995; Lyonnet 2007a).

As A. Courcier (2007: 228-229) says: “En Transcaucasie, les premiers artefacts en métal ont été découverts dans les installations de la fin de la culture de Shulaveri-Shomu (niveaux IV et V), à la fin du VI<sup>e</sup>-début du V<sup>e</sup> millénaire, soit un peu plus tôt qu’au Nord Caucase. Le métal devient plus abondant lors de la phase suivante (culture de Sioni), qui reste cependant mal connue. Une métallurgie extractrice semble également être apparue à cette époque dans les gisements du Sud de la Géorgie et du Sud du Petit Caucase. Les objets en cuivre non allié coexistent avec quelques alliages à l’arsenic... Le métal apparaît comme un vecteur essentiel dans les relations entre le Caucase, les steppes, la Mésopotamie et l’Anatolie au cours du Chalcolithique et du début de l’Âge du Bronze”.

Therefore, if arsenical copper – or only arsenic – was an exotic mineral (originating in the Transcaucasian or Eastern Anatolia region?) and the artifacts were manufactured locally, this leads us to the first question we asked ourselves: how did this raw material arrive in the Southern Levant?

***DNA analyses and migrations of northern populations?***

In a recent lecture given by the geneticist Reich (2017), preliminary results of general analyses on humans remains of the mortuary cave of Peqi'in were presented. From a sample of 22 individuals it was detected that 20% – i.e 4 individuals – have relations with Anatolian Neolithic population and that another 20% with Iranian Chalcolithic population. It should be noted that on this site were found five copper objects similar to those of Nahal Mishmar, and that two of them were manufactured by the lost wax technique (Segal & Goren 2013: 381). Of course, DNA analyses do not tell us when they arrived. Anyway, if we take the whole of the evidence it is possible to consider as plausible the northern origin of certain Southern Levantine metallurgists. Moreover, recent excavations in Ashalim Cave have found a lead mace-head (Yahalom-Mack et al. 2015) and in Bet Shemesh a leaded copper mace-head (Ben-Yosef et al. 2016) which, in addition to being typologically linked to the Nahal Mishmar mace-heads, also indicate links with the north regions.

To attempt to offer a possible answer to the question – how did this raw material arrive? – it may be useful to make a comparison with the Kura-Araxes cultural phenomenon (or Early Transcaucasian Culture = ETC). Although it is chronologically later than the Chalcolithic period – because it is contemporary with the Early Bronze III of the Southern Levant – it is important to highlight that their migratory movements (Lyonnet 2007b; Rothman 2003) reached to the Beth Yerah region (Greenberg 2007; Greenberg & Goren 2009). This fact allows us to surmise if, by analogy, it could be a first Transcaucasian antecedent of the carriers of the Khirbet Kerak Ware. It is also possible that the likeness of these phenomena may respond to a similar economic strategy of risk administration of semi-nomadic peoples. In fact, these must have been relatively small human displacements, not monolithic waves of nomadic pastoralists (Greenberg 2007).

As Rothman (2003: 109) have suggested: “Each period migration was probably of a different scale and resulted from a different set of pushes and

pulls. The Kura-Araks III migration seems most likely a search for new lands for pasture, perhaps because of climatic change, perhaps of new adaptations favoring a different mix of food resources”.

In sum, the possibility of some migrations from Anatolia into the Levant as registered in the DNA analyses of the population of Peqi'in (Reich 2017) may suggest that before the Early Bronze Age, early in the Neolithic or beginning of the Chalcolithic some part of the population in the Southern Levant had common northern origins with Anatolians.

It has been suggested that several of the iconographical motifs found in sites of the called Late Pottery Neolithic / Early Chalcolithic in the Southern Levant has strong influences from the Caucasus, North Mesopotamia and Anatolia (Milevski et al. 2016a, b). This phenomenon has been interpreted as the existence of an interaction sphere (in the sense utilized by Caldwell 1964) in which separated regions have a common ideological and religious background, but also as the existence of cultural contacts between these regions, and the possibility of certain techno-cultural exchanges.

### ***Otherness-Interaction / Segregation-Integration***

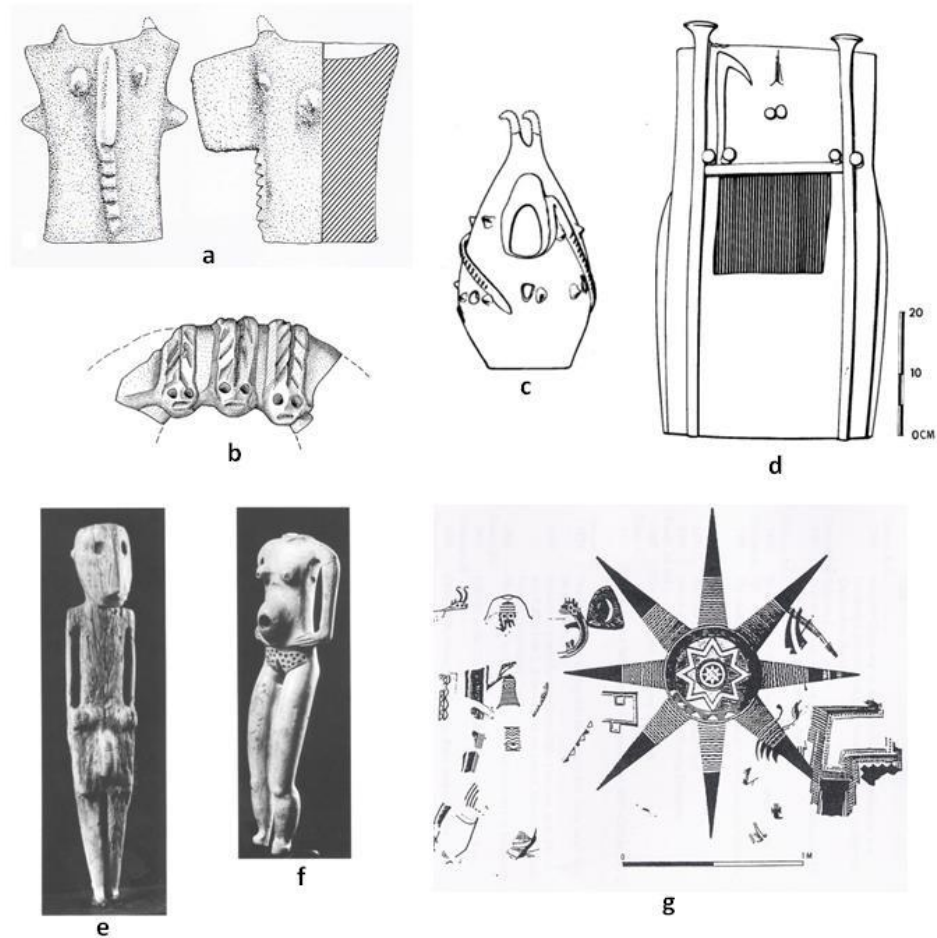
If we accept the possibility of the Anatolian or even Transcaucasian origin of those who produced the arsenical copper artifacts, this would allow us to try to provide an alternative interpretation of the sociocultural role played by these people in their interaction with the remaining local communities in the Southern Levant.

In the case of the artifacts of Nahal Mishmar the decisive factor of an *us* would be the raw material – arsenical copper – reinforced by a special technique – lost wax – because “technology is not merely a set of mechanical activities applied to produce an artifact or to solve a functional problem: technology is knowledge, developed and employed to attain cultural and social ends” (Iserlis 2009: 182). This combination of raw material and an exotic technique is what creates self-segregated identity, a virtual limit that separates it from the local, that is to say a *them*.

The great accumulation of this kind of artifacts in a cave in Nahal Mishmar should not make us lose sight of the find, although very reduced, of similar objects in other sites, as Peqi'in (Segal & Goren 2013), Horbat 'Illit (Milevski et al. 2013), Nahal Ha-Oranim (Scheftelowitz & Oren 2004), Nahal Shalva (Israel et al. 2014), Shiqmim (Levy 1987), and Nahal Qanah (Gopher & Tsuk 1996). However, its greater presence in the Dead Sea basin leads us to think of a closer link with the inhabitants of semiarid regions, near the Judean Desert (Goren 2014).

In our opinion, it would be possible to reconstruct a similar autoidentification / segregation process among the Southern Levantine local communities. Through certain crafts and techniques they developed binary logics similar to an *us / them*, for example: a) the Golanian assemblage with its basalt pillars (**Fig. 5.a**) and ceramic vessels decorated with applications (e.g. Epstein 1998); b) the coastal plain assemblage with its ossuaries of different forms and decorations (**Fig. 5.b-d**) (e.g. Perrot & Ladiray 1980); c) the sites in the Negev with their ivory figurines, of possible Egyptian origin (**Fig. 5.e-f**) (Milevski 2010); and d) the site of Tuleilat Ghassul with its mural paintings (**Fig. 5.g**) (Cameron 1981).

All these regions – although it is possible to identify differences in both the materials and techniques employed – shared a common iconographic repertoire composed of prominent noses, eyes, stars, breasts, birds, horned animals, and decorations with knobs (Beck 1989), that can also be detected roughly in the Nahal Mishmar artifacts (Bar-Adon 1980). As we pointed out above, it is possible that these iconographic motifs formed the basis of the cultural interaction, acting as “unifiers” of the local systems in wider networks. This shared corpus of symbols was created in order to preserve this integrative circulation.



**Fig. 5** Some iconographic objects from Ghassulian and Golanian cultures: a) basalt pylon, Golan Heights (adapted from Epstein 1988: Pl. XXX.1); b) fragment of an ossuary fronton, Quleh (courtesy of Milevski and Israel Antiquities Authority); c) mortuary jar model, Ben Shemen (adapted from Perrot & Ladiray 1980: Fig. 121.1); d) ossuary, Azor (adapted from Perrot & Ladiray 1980: Fig. 55); e) ivory male figurine, Bir es-Safadi (adapted from Levy 1986: 93); f) ivory female figurine, Abu Matar (adapted from Levy 1986: 93); g) “The Star” fresco, Tuleilat Ghassul (adapted from Cameron 1981: Fig. 2).

### ***Conclusions***

We have addressed in this work the topic of the objects of the “hoard” of Nahal Mishmar and the arsenical copper metallurgy with a holistic approach in order to offer an alternative interpretation of their significance as a phenomenon, thus providing possible answers to the two questions that we considered fundamental.

The first question regarding the origin of the producers of the “hoard” leads us to consider - in the light of archaeometallurgical studies (Hauptmann 2007), recent archaeological researches in the Caucasian region (Lyonnet 2007a; Rothman 2003) and, by analogy, the movements of populations of the Early Transcaucasian Culture (Greenberg 2007) - the probable existence of a migratory movement from northernmost regions which introduced arsenical copper ores in the Southern Levant, or part of their elements such as arsenic or antimony, in addition to the technological expertise of these peoples.

The second question, concerning the sociocultural significance of the “hoard”, has forced us to expand our hermeneutic approach by resorting to theoretical questions that are addressed by dialectical materialism such as the issue of pseudo-concretion (Kosik 1967), the ideological nature of signs (Vološinov 1973) and the cultural interaction sphere hypothesis (Caldwell 1964; Yoffee 1993).

In our view, the otherness (*us / them*) is enrolled in the set of objects of Nahal Mishmar and in its iconographical repertoire as a *chiaroscuro* between the apparent (the formal, the phenomenal) and the hidden (the identity, the essential). This is the double meaning that operates in otherness: on the one hand, it reflects a difference (raw material and technique), while on the other it shows adaptation and integration to the regional context (horned animals, birds, prominent noses, etc.). It is in that pseudo-concretion that the sociocultural significance of the “hoard” of Nahal Mishmar is embedded like an ideological sign.



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