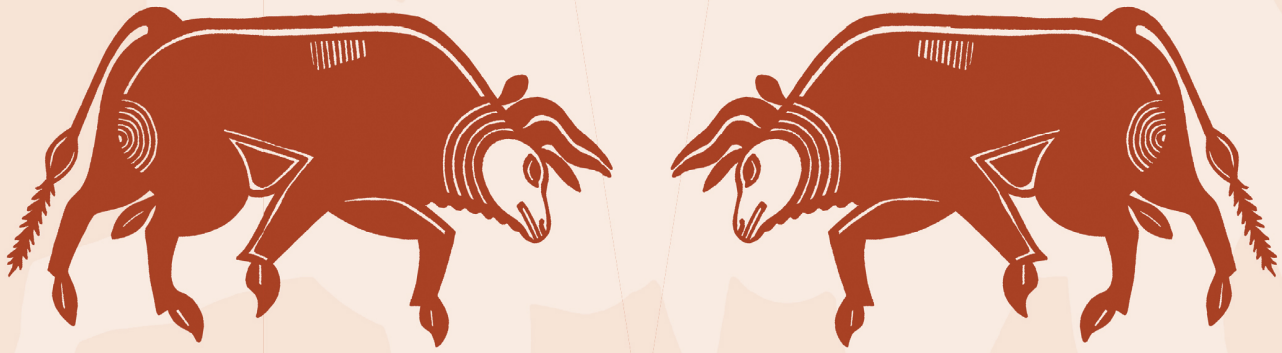
Archaeobiology 3

ARCHAEOZOOLOGY OF SOUTHWEST ASIA AND ADJACENT AREAS XIII



Proceedings of the Thirteenth International Symposium, University of Cyprus, Nicosia, Cyprus, June 7–10, 2017

edited by

Julie Daujat, Angelos Hadjikoumis, Rémi Berthon, Jwana Chahoud, Vasiliki Kassianidou, and Jean-Denis Vigne

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Group photo of the 13th ASWA[AA] meeting June 8th 2017
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CONTENTS

Part 2: Subsistence Economies of Early and Late Complex Societies in Southwest Asia and Adjacent Areas

Part 3: Beyond Subsistence: Animals in the Symbolic World of Southwest Asia and Adjacent Areas

FOREWORD

The 13th ASWA conference was hosted by the University of Cyprus, one of the youngest of Europe's universities. In 2019, it was only thirty years since its foundation. Nevertheless, this is a thriving academic institution, which currently consists of eight faculties, twenty-two departments, and eleven research units.

In 1991, and just two years after the university's foundation, the Archaeological Research Unit (ARU) was founded by decree from the Government of the Republic of Cyprus, following the issuance of the dependent legislation by the House of Representatives. The decision to establish the ARU was based on the recommendation of the Interim Steering Committee of the University of Cyprus, which stated the following:

1. Cyprus is offered for primary research in the field of archaeology thanks to its distinctive cultural signature and history, as well as due to the fact that Cypriot archaeology and archaeological research on the island already has a distinguished tradition and international reputation;

2. The subsequent international recognition of the importance of archaeological research in Cyprus should comprise one of the first incentives for choosing the University of Cyprus as a center for postgraduate studies, and will pave the way for the exchange of students and academics between the University of Cyprus and academic institutions overseas.

The faculty members of the ARU, who are also part of the Department of History and Archaeology academic staff, have contributed immensely over the past 28 years to the achievement of the aforementioned objectives for the study and promotion of Cypriot cultural heritage through their research, their teaching, and the practical training they have been providing to students at undergraduate and postgraduate levels. The active study of other regions of the Mediterranean world have not been overlooked either, as members of the ARU academic staff have been carrying out excavations and research projects in Greece, Turkey, and France.

The members of the ARU are actively carrying out research in Pre- and Protohistoric Archaeology, Classical and Byzantine Archaeology but also Archaeometry and Environmental Archaeology, Maritime Archaeology, and Western Art. In the course of the past 28 years, the ARU has laid very stable foundations in all aforementioned specialisations of the archaeological discipline, none of which existed at academic level in Cyprus before the unit's establishment. Through their teaching at undergraduate and postgraduate levels, all members of the ARU academic staff have been contributing to the formation of a new generation of Cypriot archaeologists, equipped with all the necessary knowledge and practical experience needed to excel in this scientific field.

Over the years, the ARU has been very active in organizing international conferences and workshops. The ARU has organized over 50 international conferences, while members of the academic staff have published the proceedings of over 20 scientific meetings held at the ARU.

Thus, when Jean-Denis Vigne came to my office several years ago with the suggestion to co-organize the 13th Archaeozoology of Southwest Asia and Adjacent Areas conference I gladly accepted. The meeting in Nicosia brought together colleagues from all over the world and offered a venue where new results from the field or the laboratory could be presented and discussed. The publication of the conference proceedings enables colleagues who were unable to attend the conference to read about the latest developments in the archaeozoology of this culturally important region.

I would like to close by thanking all the members of the 13th ASWA organizing committee for all the work they have put into bringing so many scholars to Cyprus, many of them for the first time. I would also like to thank the co-editors of this volume for all the work they have put into the publication of the proceedings.

Professor Vasiliki Kassianidou
Director of the Archaeological Research Unit,
University of Cyprus
Nicosia, August 2019

EDITORS' PREFACE

Due to their location at the meeting point of the three Old World's continents—Africa, Asia, and Europe—Southwest Asia and its adjacent areas played a pivotal role in the history of humanity. They received successive waves of our species—*Homo sapiens*—out of Africa. Different processes in several areas of this large region brought about the transition to the Neolithic, and later on the urban revolution, the emergence of empires bringing with them important subsequent religious, cultural, social, and political consequences. Southwest Asia also played a major role in the interactions between East (Asia) and West (Europe) during the last two millennia. The unique importance of Southwest Asia in the history of humanity is strengthened by the, also related to its location, fact that this area is a hotspot of biodiversity, especially in mammals, which were—as everywhere in the world—tightly associated to the history of civilizations in a diversity of roles: game, providers of meat and milk, traded raw material, symbol of prestige and wealth, pets, etc.

Everywhere in the world, the biological and cultural interactions between humans and animals often remain under-evaluated in their heuristic value for understanding complex social and biological interactions and trajectories. This is why, almost half a century ago, archaeologists who were carrying out research and reflecting on such themes founded a very active nonprofit world organization named the International Council for Archaeozoology (ICAZ). This is also why the ICAZ working group "Archaeozoology of Southwest Asia and Adjacent Areas" (ASWA[AA]) was one of the first ones created within ICAZ, constituting one of the largest and most active of ICAZ's working groups.

The ASWA[AA] was formed during the 1990 ICAZ International Conference in Washington, D.C. Its purpose is to promote communication between researchers working on archaeological faunal remains from sites in western Asia and adjacent areas (e.g., Northeast Africa, Eastern Europe, Central Asia, and South Asia). It carries out its mandate mainly through the sponsoring of biennial international conferences. Since 1998, these meetings have alternated in being hosted in Europe or in Southwest Asia: Paris (1998), Amman (2000), London (2002), Ankara (2004), Lyon (2006), Al Ain (2008), Brussels (2011), Haifa (2013), Groningen (2015).

Ongoing armed conflicts and political tensions in several countries of Southwest Asia made it difficult to locate a safe and convenient place that would enable the organizing the 13th ASWA[AA] meeting in within that region. Although Cyprus is currently a member of the European Union, in (pre-)history Cyprus was embedded in the eastern Mediterranean "world." Because of its location, Cyprus was indeed at the confluence of African, Levantine, Anatolian, and Greek cultural streams and, as is common for islands, recombined them in different but always original ways all along its history. Archaeozoology recently provided one of the most convincing illustrations of the tight connection between Cyprus and Southwest Asia, demonstrating that the earliest domesticated mammals, especially cats, pigs, cattle, sheep, and goats, were introduced to the island very shortly after their first incipient domestication on the near continent, that is, during the ninth millennium BC. For all these reasons, Cyprus represented an ideal place to host the 13th ASWA[AA] conference.

Despite the illegal military occupation of part of its territory by a foreign country, the option of hosting the meeting in Cyprus was enthusiastically embraced by all members of the working group, especially because it is open to all nationalities and maintains good diplomatic relationships with a large majority of countries in Southwest Asia. These facts contributed towards the 13th ASWA[AA] meeting in Cyprus (June 7–9, 2017) becoming one of the best-attended ASWA[AA] meetings. It brought together 80 scientists coming from 25 different countries: from Southwest Asia (6 countries), Europe (14 countries), North America (2 countries), and Japan.

They presented their results in 36 oral and 32 poster presentations. They debated the long-term interactions between humans and biodiversity, about the beginning of animal domestication and husbandry, the strategies of animal exploitation from the Paleolithic to modern times, and the symbolic and funeral use of animals through time. They also greatly enjoyed the numerous social events organized, in-

cluding a fantastic Cypriot mezze dinner, enhanced by a local folk-music band, and a nice excursion to the archaeological sites of Amathous, Kourion, and Khirokitia, and to the museums of Nicosia and Larnaca, which provided ample opportunities for scientific exchanges in a friendly atmosphere.

The hosting of the conference at the new campus of the University of Cyprus was another major reason to the meeting's success. This campus was a convenient and pleasant venue for such a conference, and the strong support of the University of Cyprus, as well as its valuable experience for the organization of such meetings were deeply appreciated by both the scientific organizers and the delegates. Several other partners contributed to the organization: the French archaeological mission "Neolithisation—Klimonas," which is itself strongly supported by the French School at Athens, the Cyprus Department of Antiquities, the French Institute of Cyprus, the French National Center for Scientific Research (Centre National de la Recherche Scientifique [CNRS]), and the French National Museum of Natural History (Muséum national d'Histoire naturelle [MNHN]).

The present volume brings together the texts of 18 of the 68 presentations of the meeting in Nicosia. The editorial board collected the papers and organized their review and editing. We are very grateful to Sarah Kansa (and Open Context), Justin Lev Tov, and Lockwood Press for their constant support in bringing this volume to fruition.

Julie Daujat
Angelos Hadjikoumis
Rémi Berthon, Jwana Chahoud
Vasiliki Kassianidou
Jean-Denis Vigne

3.1 | Emerging Bees

Identification and Possible Meanings of Insect Figures at Göbekli Tepe

Sebastian Walter* and Norbert Benecke†

Abstract

Wild animals occupy a central position in the pictorial cosmos of the earliest Neolithic (Pre-Pottery Neolithic A) in Upper Mesopotamia. Together with abstract signs, animal figures are part of a "system of symbols," which has so far only been rudimentarily analyzed. Besides relatively large representatives of mammals, birds, and reptiles, comparatively small animals are also depicted in PPNA artworks: at various sites probable representations of arthropods have been found. Often different suppositions exist on which arthropod taxa might be represented. At Göbekli Tepe, bas-reliefs on several pillars of Building D show very similar, insect-like animals. It has been proposed that at least some of them might depict spiders. We attempted to identify those represented insect-like animals based on arthropods' anatomical features. These figures appear to be closely related to similar ones found at Körtik Tepe. Detailed comparative analyses indicate that bee- or wasp-like insects are depicted, some probably emerging from brood cells. The insects and their development may be connected to early Neolithic ideas of death and postmortal existence.

Keywords

Pre-Pottery Neolithic A (PPNA), southeastern Turkey, Göbekli Tepe, Körtik Tepe, insect representations, hymenoptera, spider, wasp, bee, symbolism

Introduction

At the transition from Pleistocene to Holocene, humans in Southwest Asia developed a sedentary way of life in village communities. The first Neolithic culture of hunter-gatherers is called Pre-Pottery Neolithic A (PPNA, ca. 9600–8700 BC; e.g., Badisches Landesmuseum Karlsruhe 2007; Özdoğan et al. 2011; Peters et al. 2014).

A main characteristic of the PPNA is an "explosion" of images, dominated by representations of wild animals (Özdoğan et al. 2011; Watkins 2011). The artworks are supposed to be part of a symbolic communication system, used to store cultural knowledge, which has so far only been rudimentarily analyzed (Köksal-Schmidt and Schmidt 2007; Stordeur 2010; Watkins 2010). In most cases, powerful, venomous, predatory, and often dangerous animals are depicted: for example, aurochs, leopards, vultures, foxes, and snakes (Helmer et al. 2004; Stordeur 2010). In addition, representations of comparably small animals are found at several PPNA sites, especially of scorpions and other arthropods (Helmer et al. 2004). Most of the probable arthropod representations were discovered at Göbekli Tepe and Körtik Tepe, two key PPNA sites of Upper Mesopotamia in Southeast Turkey (see *Locations and Site Description*, below), with many figurative artworks (Özdoğan et al. 2011; Özkaya and Coşkun 2011; Schmidt 2012).

At Göbekli Tepe more than ten figures on stone pillars might show arthropods, five of which are possibly representing insects (Schmidt 2012). For these

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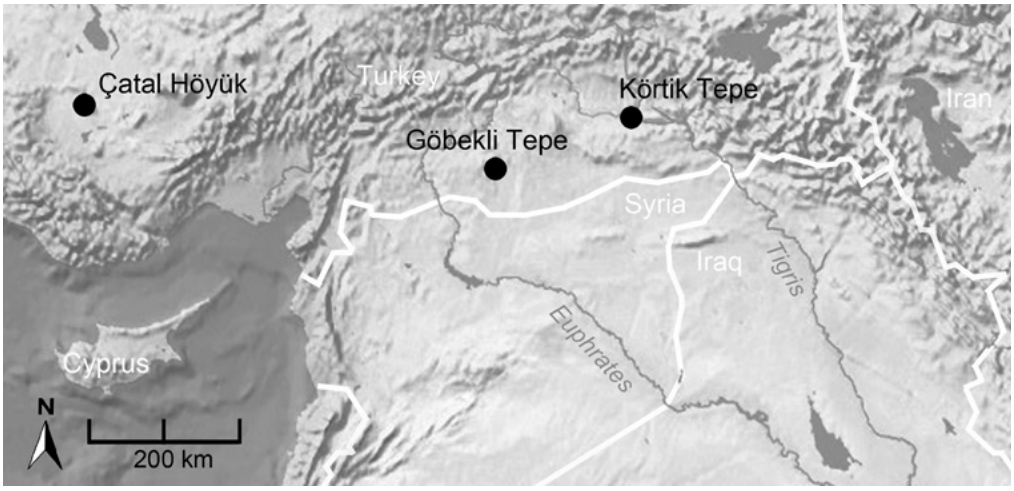

Figure 3.1.1. Map showing the location of archaeological sites mentioned in the text.

insect-like figures, there exist different suggestions on what kind(s) of animal(s) might be depicted. At Körtik Tepe very similar animal figures were found, which may help to identify the animal(s) represented at Göbekli Tepe.

Materials and Methods

Locations and Site Description

Göbekli Tepe (37° 13' N, 38° 55' E, ca. 770 m above sea level) is located in the Euphrates region, not far from the modern city of Şanlıurfa (Figure 3.1.1). Ongoing excavations since 1995 revealed an impressive megalithic architecture, probably used for ritual purposes: monolithic T-shaped pillars several meters high, decorated with reliefs and sculptures showing animals and abstract signs, were inserted into the walls of circular buildings (Notroff et al. 2016; Schmidt 2012).

Körtik Tepe (37° 48' N, 40° 59' E, ca. 520 m above sea level) is situated in the upper Tigris basin, near the junction of the Batman and Tigris Rivers, ca. 200 km northeast of Göbekli Tepe (Figure 3.1.1). All data indicate that during the PPNA Körtik Tepe was a permanent settlement. Many round buildings of 2.3–3 m in diameter were excavated. Such round buildings, probably single-family dwellings, are characteristic of the PPNA period. The excavations also revealed hundreds of skeletons, most of them (ca. 75 %) in hocker or semi-hocker position. A large proportion of burials were found beneath house floors and the majority of graves contained bone and/or stone artifacts, amongst them many decorated objects (Özkaya and Coşkun 2009, 2011).

Spiders or Insects of Building D at Göbekli Tepe

At Göbekli Tepe depictions of arthropods were until now only found in Building D, the oldest of the excavated probable cult buildings so far. It was radiocarbon-dated to the middle of the tenth millennium BC (Dietrich et al. 2013). Possible insect depictions are found on three pillars: Pillar 21, Pillar 33, and Pillar 43 (Figure 3.1.2). On Pillar 33 there are two figures, worked as bas-reliefs (Figure 3.1.2a). One of them is situated at the pillar's base. Its lower half—hind part—is covered by a stone bench, into which the pillar is inserted. In what follows, the upper figure will be designated as G33A (G stands for Göbekli Tepe, 33 for Pillar 33), the lower as G33B (Figures 3.1.2b, c). Also the figure on Pillar 43, designated as G43 (Figure 3.1.2d), is worked as bas-relief. The lower—hind—part, however, is only partially worked out. On Pillar 21 there are again two figures, designated as G21A, upper figure, and G21B, lower figure, of which only the outlines are picked into the stone (Figure 3.1.2e). The figures measure between around 20 cm and 36 cm. The close resemblance of all of these figures makes it very probable that it is always the same animal category that is depicted (Schmidt 2012:167, 177, 178, 244, 245). However, there exist different hypotheses about the motif: it was proposed that the figures might represent insects or insect-like animals (Schmidt 2007a, Schmidt 2012:167, 177, 178, 244, 245), but also spiders (Schmidt 2012:168, 177, 178), possibly camel spiders (Schmidt 2007a). The figures on Göbekli Tepe–P33 have also been described as beetles (Lewis-Williams and Pearce 2005).

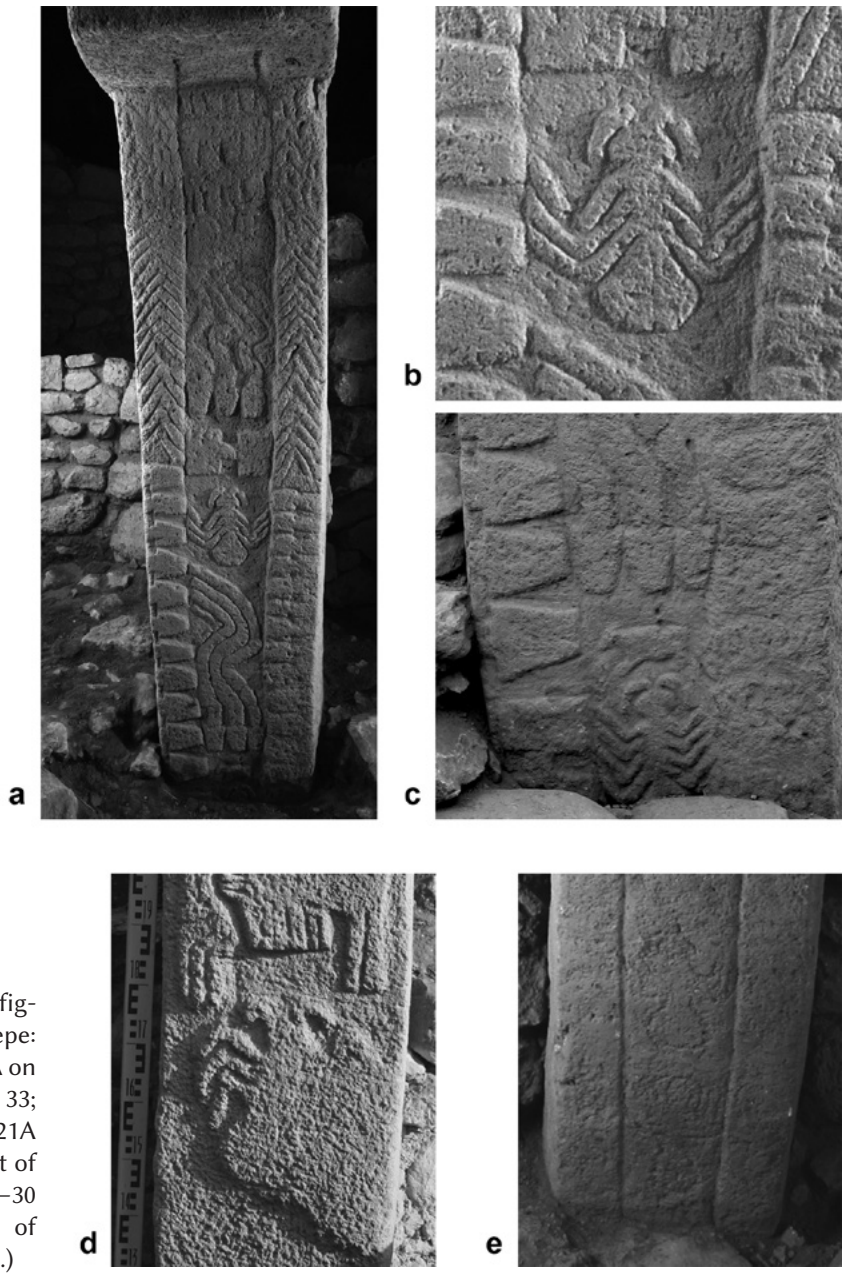

Figure 3.1.2. Possible insect figures in Building D, Göbekli Tepe: (a) Front of Pillar 33; (b) G33A on Pillar 33; (c) G33B on Pillar 33; (d) G43 on Pillar 43; (e) G21A and G21B on Pillar 21. Height of the figures is between ca. 20–30 cm. (Photographs courtesy of the DAI Göbekli Tepe Project.)

Probable Depictions of Insects at Körtik Tepe

For reasons of comparison, we included in our investigations similar figures from PPNA layers, from Körtik Tepe (Figure 3.1.3). According to ^{14}C dates of the respective layers, these figures out of burial contexts are of about the same age as those from Göbekli Tepe, between ca. 9600 and 9350 BC (Benz et al. 2012). Two of these figures are small bas-reliefs on stone plaques (K01 and K02; Figures 3.1.3a, b); another two are engraved on a bone plaque (K03 and K04; Figure 3.1.3c). For all of these figures it was suggested that they might represent insects (Coşkun et al. 2010; Özkaya 2004; Özkaya and Coşkun 2011).

Method of Analysis

In our investigations we aimed at a better taxonomic identification of these figures based on the represented morphology. In these artworks the animals are represented in a rather abstract way without many details that are usually available for identifi-

cation of real animals. We therefore could not apply the step-by-step procedure of an identification key. Furthermore, we did not aim at identifying at a species level. Of primary importance was to determine whether the animals represent insects or other arthropods, and if they are insects, which kind of insects. Identification was based on different sources, comparing morphological features of the depicted figures with the morphology of real animals: besides identification keys we used images of animals in question from literature on animal taxonomy (e.g., Bellmann 2017; Foelix 2011; Goulet and Huber 1993; Gullan and Cranston 2014; Klausnitzer 2002; Michener 2007; Punzo 1998; Weber 1966) and also web databases (e.g., BioLib [Zicha 1999–2019]; Fauna Europaea 2017). We also compared them with other, already identified, pictorial animal representations from the North Mesopotamian PPNA (e.g., Badisches Landesmuseum Karlsruhe 2007; Özdoğan et al. 2011; Peters and Schmidt 2004).

Results

Morphological Features of Göbekli Tepe's Figures Point to Bees or Wasps

In our description of the morphological analyses, we concentrate here on Göbekli Tepe figures G33A and B (Figures 3.1.2b, c), because these contain the most details in comparison with the other figures.

Figure G33A shows three pairs of legs, indicating an insect (Gullan and Cranston 2014; Snodgrass 1993 [1935]; Weber 1966). Yet, the second figure on Pillar 33 (G33B) clearly shows four pairs of legs, pointing to a spider (Foelix 2011). However, besides four pairs of walking legs, spiders are also characterized by a cephalothorax: head and thorax are fused together (Foelix 2011). The partitioning of the body into three main parts—head, thorax, and abdomen—that is found with both figures G33A and B supports their identification as insects (Gullan and Cranston 2014; Snodgrass 1993 [1935]; Weber 1966). The members of a specific order of arachnids, the solifuges (Solifugae, camel spiders) appear to be partitioned like insects. Yet, the form of the figures' heads and the number of legs makes a representation of solifuges improbable. The enormous chelicerae—claws in front of the mouth—of solifuges are missing, and their long, leg-like pedipalps should appear as a fifth pair of legs (Punzo 1998). The figures' head

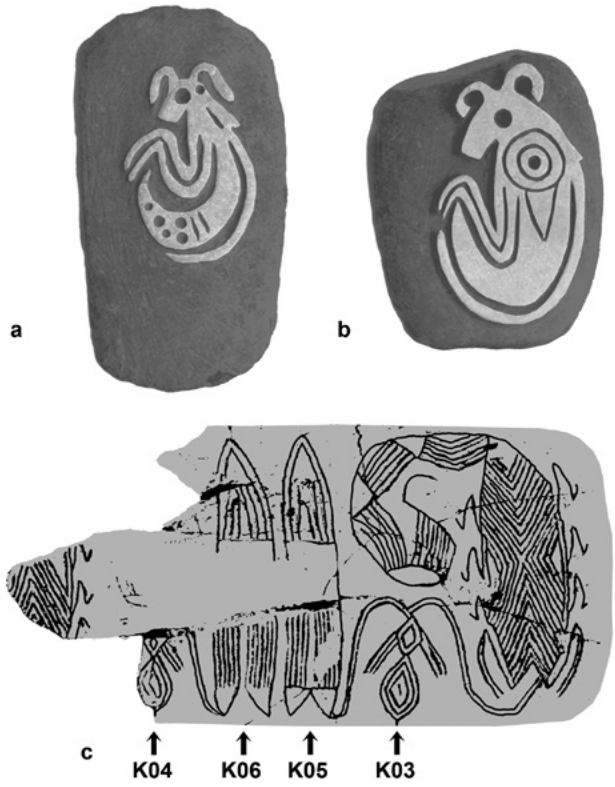

Figure 3.1.3. Probable insect figures from Körtik Tepe: (a) Stone plaque with K01 (height of the insect figure ca. 4 cm); (b) stone plaque with K02 (height of the insect figure ca. 5 cm); (c) incised bone plate with K03 (height of the insect figure ca. 3 cm), K04, K05, and K06. (All graphics are based on photographs by the Körtik Tepe excavation archive.)

extensions clearly look like antennae of insects, not like pedipalps or chelicerae. But what kind of insect might be depicted then?

The figures' legs apparently extend all from the same thorax-like body region. This is principally true for all insects, except however for a suggested beetle identification (Lewis-Williams and Pearce 2005): beetles are different from other insects in that they appear to be separated into head, "neck" with front legs, and the rest of the body with mid- and hind legs, usually covered by the wings (Gullan and Cranston 2014; Klausnitzer 2002).

Both figures show an important morphological feature: a narrow constriction between "thorax" and "abdomen," corresponding to a "wasp waist." This points to apocrite—wasp-waisted—hymenopterans, such as ants, bees, and various wasps (Goulet and Huber 1993; Gullan and Cranston 2014). There

are no wings depicted, which means that the insect might be wingless. It could then indicate an ant or a wingless wasp, for instance a mutillid (for a more detailed analysis of the possibility of a mutillid motif, see Walter 2014). The sidewise backward-curved antennae rather suggest a wasp or a bee than an ant (Hölldobler and Wilson 2013). If the represented insects are winged, the shape of the relatively broad and rounded abdomen rather points towards bees than wasps (Figure 3.1.4a; Goulet and Huber 1993). Very similar figures can be found in the "English Garden" at the Tiergarten in Berlin (Figure 3.1.4c). They are part of a fountain created in 1995 by the Austrian artist Gerald Matzner, depicting a central beehive surrounded by wingless—honey—bees (Senatsverwaltung für Stadtentwicklung und Wohnen [SSW] Berlin 2017).

The figures on Pillar 21 (G21A and B) and Pillar 43 (G43) are very similar to those on Pillar 33, most likely showing the same animal. All of them have three pairs of legs only.

The Figures from Körtik Tepe Probably Also Show Hymenopterans

For Körtik Tepe, figures K01 and K02 (Figures 3.1.3a, b), it has already been proposed that they might represent bees (Özkaya 2004; Özkaya and Coşkun 2011). It has also been noted that they resemble the figures from Göbekli Tepe (Köksal-Schmidt and Schmidt 2007; Schmidt 2007b).

In difference to Göbekli Tepe's figures, both figures from Körtik Tepe are represented in lateral view. There are several indications that indeed a bee-like insect is depicted: the line running along the figure's back most likely indicates wings. The curved head extensions look like bee or wasp antennae. The "snout" was formerly described as being reminiscent of a dog (Özkaya 2004); however, it also corresponds to the protruding mouthparts of bees/wasps. The protrusion on the back might be a prominent backshield—scutum and scutellum—that is characteristic for bees/wasps (Goulet and Huber 1993). A rather clear hint to a stinging insect is the sting-like abdominal extension of figure K01 (Schmidt 2007b). Two parallel lines in the center of K01's body may indicate the wasp waist or the banding pattern—or both—of bees/wasps. Similarly, the V structure of K02 may also indicate a wasp waist. The slim body, with a pointed abdomen, that in one case also shows

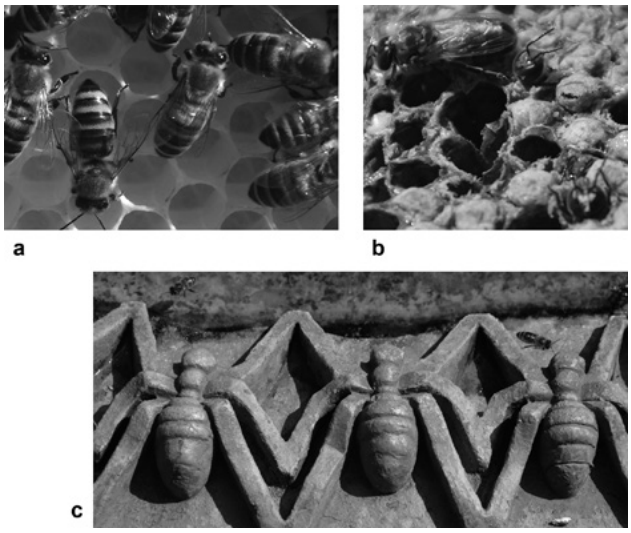

Figure 3.1.4. (a) Honey bees (*Apis mellifera*) on a new comb; (b) honey bees emerging from their brood cells; (c) detail of a fountain by Gerald Matzner at the Tiergarten in Berlin, depicting honey bees surrounding a beehive.

a dot pattern (K01) may rather suggest a wasp than a bee (for a more detailed analysis of the Körtik Tepe figures, see Walter 2015).

Due to the—probably—dorsal view in which the animals are represented, K03 and K04 show an even closer similarity to Göbekli Tepe's figures (Figure 3.1.3c). Only one of the probably originally identical figures is fully preserved (K03). Though a head seems to be missing, the six leg-like extensions at the thorax, which might also stand for two pairs of wings, together with the tripartite body structure clearly indicate an insect. The antennae are again curved backwards; yet, they are rather long for a bee or most wasps. However, the other depicted morphological features point again to a bee-like insect: this figure possesses six leg-like extensions at the thorax, a "wasp waist" between thorax and abdomen, and, in addition to the common features found with Göbekli Tepe's figures, a sting-like extension at the tip of the abdomen. Taken together, this strongly indicates the representation of a bee or wasp's imago.

The Figures May Represent Different Stages of Insect Life Cycles

Körtik Tepe–figures K03 and K04 are both associated with a suspicious structure: an elongated ovoid form that is pointed at one end, and apparently split open at the other (K05, K06, Figure 3.1.3c). It was

previously identified as a possible depiction of a fish (Coşkun et al. 2010). This structure next to the insect might, however, be the depiction of an opened brood cell—or cocoon—out of which the insect just emerged (Figure 3.1.4b). The insect's antennae might be unnaturally elongated to reach the brood cell's opening, to indicate a connection between insect and brood cell.

An interesting aspect of Körtik Tepe–figures K01 and K02 is their fetus-like crouched posture with bent legs. There are two possible explanations for this posture: the postures of K01 and K02 correspond to the crouched posture of dead wasps or bees, as well as to the hocker position in which humans were buried. Might the insect representation thus be understood as a representation of death? Or the postures of K01 and K02, especially the bent legs, could also correspond to that of a bee/wasp—pupa or imago—resting in the brood cell. The insect representations thus might also be understood as a symbol of new life.

Within this context, there might also be an explanation for the only partial visibility of two insect figures at Göbekli Tepe: of figures G33B and G43 only the frontal—upper—part of the body is visible (Figures 3.1.2c, d). The figure G33B seems to crawl out of the bench into which Pillar 33 is inserted, and the figure G43 looks like crawling out of the stone pillar itself. It was suggested that this partial visibility happened rather by accident (Schmidt 2012). It might, however, also be an intended parallel to the possible developmental aspects observed with Körtik Tepe's figures analyzed here. The only partially shown insects on Göbekli Tepe–Pillars 33 and 43 may depict bees, which are just about to emerge from their brood cell or brood chamber. Therefore, only the frontal part of the emerging insect is visible, the hind parts being still hidden in the cell.

At Körtik Tepe as well as at Göbekli Tepe there are, thus, indications that bees or wasps are depicted in different stages of their life cycle.

Discussion

Summary of the Results

The different analyzed figures from Göbekli Tepe as well as those from Körtik Tepe seem to all represent aculeate hymenopterans. While the Göbekli Tepe figures look more like bees, at least part of the Körtik Tepe figures look more like wasps. All depicted insects are most likely winged, even if no wings are shown, as is the case for figures in dorsal view. The insects seem to be represented in different developmental stages: inside the brood cell, emerging from the brood cell, and imago outside the brood cell.

In what follows, we will discuss the plausibility of wasp and bee depictions, especially their probable abundance during the PPNA and opportunities for Neolithic people to observe them and their life cycle, and whether bees and wasps might have been perceived as a common animal category. We will also discuss possible causes for the interest of early-Neolithic people in these insects, possible symbolic meanings, and relations to other possible depictions of bees during the Neolithic in Anatolia.

Environment and Probable Abundance of Aculeate Hymenopterans

Findings on past environment suggest that aculeate hymenopterans were abundant during the PPNA. This is supported by literature on the current occurrence of hymenopterans in Anatolia and our own field observations.

Past Environment. Most hymenopteran species are thermo-xerophile: they prefer warm, rather dry and open biotopes. Furthermore, the habitat must offer a sufficient supply of flowering plants for most immature wasps also of other insects or spiders (Bellmann 2017; Witt 2009).

According to pollen records and macrobotanical remains, the Early Neolithic landscape in the area of Göbekli Tepe and Körtik Tepe was characterized by a relatively open park woodland, dominated by widely spaced stands of pistachio, almond, and oak and covered with grasses, which formed a major component of the vegetation. Along the rivers, gallery forests occurred with tree species such as *Tamarix* ssp., *Populus* ssp. and/or *Salix* ssp., *Alnus* ssp., *Fraxinus* ssp. (Benz et al. 2015; Neef 2003; Riehl et al. 2012). This steppe forest was probably an optimal habitat for many different kinds of wasps and bees during the PPNA.

Hymenopteran Fauna Today. Many different aculeate hymenopterans are found today in the region, which are in part of impressive size, for example scoliids (length up to 5 cm) or the oriental hornet (2–3 cm; see Madl 1997; Özbek and Anlaş 2011; Tez-

Table 3.1.1. Results of experimental insect observations at Göbekli Tepe.

Order	Family		May	September
Diptera	Asilidae	(robber flies)	+++++	–
Diptera	Syrphidae	(hover flies)	+	++
Diptera	Calliphoridae	(blow flies)	–	+
Diptera	Muscidae	(houseflies)	++	+++++
Diptera	Trypetidae	(fruit flies)	–	+
Hymenoptera	Vespidae, *Vespa*	(hornets)	+++	+++++
Hymenoptera	Vespidae, *Vespula*	(yellow jackets)	++	+
Hymenoptera	Vespidae, Eumeninae	(potter wasps)	–	+
Hymenoptera	Sphecidae	(sand wasps)	+	++
Hymenoptera	Megachilidae	(mason bees)	++	–
Hymenoptera	Anthophoridae	(digger bees)	–	+++
Hymenoptera	Apidae, *Apis*	(honeybees)	+	++
Hymenoptera	Formicidae	(ants)	+++	+++++
Coleoptera	Tenebrionidae	(darkling beetles)	+	++++
Coleoptera	Cerambycidae	(longhorn beetles)	+	–
Coleoptera	Coccinellidae	(ladybird beetles)	–	++
Orthoptera	Caelifera	(short-horned grasshoppers)	++++	+++++
Orthoptera	Ensifera	(long-horned grasshoppers)	++	–
Mantodea	Mantidae	(mantids)	+	+
Mantodea	Empusidae	(empusids)	+	–
Neuroptera	Myrmeleonidae	(ant lions [imago])	+++	+
Odonata		(dragonflies)	–	++
Lepidoptera	Papilionidae	(swallowtails)	+	–
Lepidoptera	Sphingidae	(hawk moths)	+	–
Lepidoptera	Lycaenidae	(gossamer-winged butterflies)	–	+++
Lepidoptera	Pyralidae	(snout moths)	–	+

Frequency of observation: – = not observed, + = very rare, ++ = occasional, +++ = regular, ++++ = frequent, +++++ = very frequent.

can et al. 2004). The western honeybee is represented by the subspecies *Apis mellifera meda* Skorikov, 1929 (Özdil et al. 2012). Literature from antiquity describes social wasps and hornets as a real plague in the eastern Mediterranean (Keller 1913). Vespid wasps, which include social wasps and solitary potter wasps, are represented today by many different species (Yildirim 2012), and different species of mutillids also occur (Yildirim 2006).

This is supported by results from our own experimental observations at Göbekli Tepe. Within a transect of about 1 km length, roughly in northwest–southeast direction, we were investigating which insects are easily observable during slow walks along this transect. The frequency of observations was recorded during two days in late spring and two days in autumn. The results of this observation (Table 3.1.1) show that today aculeate hymenopterans—bees, wasps, and especially hornets—are among the most often observed arthropods.

Possibilities of an Observation of Insect Development

Many wasps, especially social wasps, and some bees are synanthropic: they build their nests on or in human houses, consume human food, and more (e.g., Fowler 1983; Mader 2000). They were likely present in Neolithic settlements. The constructions of some nests allow to watch how mature insects emerge from the brood cells and—as with the open combs of paper wasps (genus *Polistes*)—even to observe the development of larvae in the brood cells, without opening the nest (Fowler 1983; Witt 2009).

Also in the PPNA, foragers almost certainly opened bees' and possibly wasps' nests to collect honey as well as brood. Rock art depicting so-called honey-hunting scenes is known from different parts of the world (Crane 1999). A famous Neolithic or Mesolithic rock painting in the Cueva de la Araña in the Spanish Levant, for example, shows flying insects together with a human figure carrying a bag and standing on a ladder in front of a small dark "opening" in the rock face, apparently a nest of wild honeybees. Usually this scene is interpreted as depicting somebody collecting honey (Crane 1999; Hernández-Pacheco y Esteban 1924). However, in many different regions of the world not only honey, but also pupae and larvae of bees and wasps are collected and eaten (e.g., Crane 1999).

PPNA people, thus, probably had frequent opportunities to observe bees and wasps in different developmental stages.

Bees and Wasps as the Same Animal Category

Variations in the represented morphology suggest that different aculeate hymenopterans were depicted: bees at Göbekli Tepe and wasps at Körtik Tepe. Is it possible that the various representations were understood as depictions of the same kind of animal, that bees and wasps were perceived as a common category?

Different from modern English, German, or French, other languages group(ed) bees and wasps into a common category of animals. In modern Turkish, wasps are a kind of bee (Tureng 2017): *arı* = bee; *bal arısı* = honeybee; *sarı(ca) arı* = wasp or "yellow bee"; *eşek arısı* = hornet or "donkey bee." In ancient Sumerian—fourteenth tablet of the *Har-ra = Hubullu*, library of Assurbanipal (seventh century BC)—wasps and bees belonged to the same category of insects, together with flies. The Sumerian language grouped insects and other arthropods by denominative prefixes: for instance, *buru* = orthoptherous insects (locusts, grasshoppers, crickets, including mantids and possibly dragonflies); *girish* = butterflies. Together with flies, bees and wasps belonged to the same prefix group and ants to another: *num* = flies, bees, and wasps (such as *numlal* = honeybee or "honey fly") and *kishi* = ants (Bodenheimer 1960).

Treating bees and wasps as the same category of insect would be nothing extraordinary.

Biological Characteristics of Bees and Wasps That Might Have Caused the Interest of Neolithic People

Now it is one thing to observe something, and another to depict it. Why did the creators of Göbekli Tepe and the inhabitants of Körtik Tepe depict bees and possibly wasps? There are quite a number of biological characteristics of bees and wasps (Bellmann 2017; Gauld and Bolton 1988; Goulet and Huber 1993; Gullan and Cranston 2014; Witt 2009) that might have caused Neolithic people to be especially interested in these insects:

(1) Aculeate hymenopterans are foragers, similar to PPNA hunter-gatherers. Most likely people at Göbekli Tepe and Körtik Tepe could observe in their daily surroundings how wasps prey on insects and spiders, like they themselves were hunting wild sheep, gazelles, and other game (Peters et al. 2014). As humans collected, for example, seeds and fruits from plants (Riehl et al. 2012) and probably stored them in specific small round buildings (Özkaya and Coşkun 2011), bees carry pollen to their nest and store their food in special cells.
(2) Social hymenopterans, like honeybees, hornets, and yellow jackets, live in—partially very large—communities, comparable to human communities.
(3) They construct nests, consisting of more or less circular cells, similar to human villages and PPNA houses (Özkaya and Coşkun 2011).
(4) They care for and defend their young and each other, like humans do.
(5) Females of the Aculeata possess a sting to inject venom. Getting stung is painful and can even

be dangerous. Today, getting stung by bees and wasps happens frequently in Turkey and can be associated with very serious complications (Kalyoncu et al. 1997). Bees and wasps might have been regarded as "brave" and powerful "warriors," arousing human fear, and teaching respect.

(6) Many Aculeata show an aposematic coloration, often with stripes in black and yellow, or black and white, to warn predators. This might have elicited PPNA people's aesthetic attention and appealed to their sense of beauty.

(7) And finally, the ontogenetic development of bees and wasps is characterized by a holometabolous metamorphosis: during the pupal stage the insect transforms from a first "form of life," the worm-like larva, into a second, clearly different one, the winged imago, that emerges after several days from the pupal skin. Concealed in a cocoon, the pupa is neither feeding nor moving. The transformation of the insect body in a kind of sleep- or even death-like state might have been associated with beliefs about a continuation of human life after death, possibly—like the insect—in a changed form. That PPNA people believed in an afterlife is indicated by the high number of grave goods found at Körtik Tepe (Özkaya and Coşkun 2009, 2011). The symbolic association of insects with postmortal existence is, for example, well documented for Ancient Egypt, where the scarab beetle was regarded as a symbol of rebirth after death—in the context of funerary rites carved beetle figures were used since the third millennium BC (Cherry 1985; Levinson and Levinson 2001).

In sum, PPNA people could have perceived several parallels between themselves and bees, as well as wasps. The symbolic meaning of bees/wasps might have been based on their life cycle with a pupal stage before emerging as an imago from the brood cell, their ability to sting, and their "house-building" social communities.

Other Early Depictions of Aculeate Hymenopterans in Southwest Asia

In Southwest Asia, other early representations of bee-like insects are until now only known from a clearly later phase of the Neolithic (ca. 6600 BC): very abstract figures on wall paintings at Central Anatolian Çatal Höyük were interpreted as showing a comb with developing bees—but also as possible representations of butterflies with caterpillars on flowers. Another painting at Çatal Höyük may show a goddess with a beehive on top of her head, surrounded by flying bees (Crane 1999; Mellaart 1967, 1989). The paintings from Çatal Höyük are very reduced and have been regarded as representations of bees mainly because of the association with comb- or hive-like structures.

If the paintings at Çatal Höyük indeed show bees in different developmental stages, perhaps there existed a continuing Neolithic tradition of this motif, originating from Göbekli Tepe and Körtik Tepe.

Summary and Conclusions

Comparative morphological analyses of five animal figures represented on pillars at Göbekli Tepe and of four similar figures on artworks from Körtik Tepe suggest that all figures depict aculeate hymenopterans, that is, bees and/or wasps. Our results further substantiate previous suggestions that some of the investigated figures might depict bee-like insects (Özkaya and Coşkun 2011). Two figures from Körtik Tepe are probably associated with opened brood cells, two representations from Göbekli Tepe may depict the moment when the insect emerges from its brood cell, and two other figures from Körtik Tepe may show insects still resting inside the brood cell. They might, however, also depict dead insects or intentionally combine both aspects—dead and developing insect.

Aculeate hymenopterans were probably abundant during the PPNA, and early Neolithic people had many opportunities to observe them and their life cycle. They also could have perceived similarities between these insects and themselves. The symbolic importance of bees and/or wasps in Early Neolithic Upper Mesopotamia may have been based on their biological characteristics, especially also on certain aspects of their life cycle. At Göbekli Tepe as well as at Körtik Tepe the bee/wasp figures might have been associated with ideas of a connection between death and the emergence of new life. Findings from Çatal Höyük may indicate that the bee/wasp motif was passed down to later Neolithic cultures, in a perhaps continuous symbolic tradition.

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