The Apiary at Tel Reḥov
An Update

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General view of the apiary, looking east. The destruction layer that seals the apiary is seen in the section in the background. Photograph courtesy of Tel Reḥov Expedition.

The Tel Reḥov apiary was discovered in Area C, in the heart of a well-planned and densely built urban quarter of Stratum V.[1] *It was installed in an area that had been deliberately lowered and was surrounded by walls on at least three sides (fig. 1). About thirty beehives were uncovered, made of unfired clay mixed with straw, each shaped as a hollow cylinder measuring about 0.8 m in length, 0.4 m in diameter, and with a volume of around fifty-six liters. One end of the cylinder was closed by a clay wall with a small "flying hole" that allowed the bees to enter and exit the hive, while the opposite end was fitted with a portable clay lid that allowed for honey extraction (figs. 2–3). The hives were arranged in three parallel rows, with each having at least three tiers of hives (figs. 4–5). We reconstruct about 60 beehives in the bottom tier, and thus, 180 hives in all the three extant tiers (see reconstruction, fig. 6). The rows were separated by broad aisles (1.85 and 1.2 m wide); the two eastern rows were built so that the lids faced each other, thus facilitating the work. Soon after the discovery of the first hives in 2005, their identification was confirmed by residue analysis (Mazar et al. 2008; Namdar, Neuman, and Weiner 2020).*[2] *This efficiently planned apiary remains unparalleled elsewhere in the archaeology of the ancient Near East or Mediterranean world.*

The use of cylindrical beehives made of various materials is well known from pictorial evidence in ancient Egypt, as well as in traditional societies across the Near East and the Mediterranean basin (Crane 1983; Kritsky 2010). This subject, along with the use of honey and beeswax in the ancient Near East and their mention in biblical sources, were discussed in an earlier article in this journal (Mazar and Panitz-Cohen 2007; see also Mazar 2020). As to the economic value of the apiary, based on ethnographic evidence, we may assume that each hive of this type could yield 3–5 kg of honey and 0.5–0.7 kg of beeswax annually, depending on several factors. One hundred active hives would yield about 500 kg of honey and 50–70 kg of beeswax per year. This amount, which may fit the capacity of our apiary, exceeded the producers' private consumption, creating tradeable surplus that turned the apiary at Tel Reḥov into a profitable enterprise. It may be suggested that the beeswax, rather than the honey, was the more expensive and in-demand product, since, according to Egyptian and other sources, beeswax was crucial for medical purposes, sealing, writing boards, and the lost-wax metal-casting process. The latter function is of particular interest in light of our current knowledge of the large-scale copper production at Faynan and Timna in the Arabah, which reached an unprecedented scale during the tenth and first half of the ninth centuries BCE (Ben-Yosef et al. 2012; Levy, Najjar, and Ben-Yosef 2014). Could it be that beeswax from apiaries of the type found at Tel Reḥov served in a copper-based metallurgical industry in the kingdom of Israel? One branch of the Arabah copper trade may have passed through the Jordan Valley and Tel Reḥov, and the biblical reference in 1 Kgs 7:45–46 may echo a copper-based industry in the Jordan Valley. The significance of the apiary is also evident from the cultic rituals that were carried out within

its confines, as evidenced by a four-horned pottery altar decorated with two naked female figures flanking an incised tree (fig. 7), and an elaborately decorated, tall chalice found next to it.

One of the questions raised by this discovery is why the apiary was located within the confines of the densely built and populated city. Based on ethnographic evidence, one cylindrical hive may have contained ten to fifteen thousand bees at the peak of activity. One hundred active hives can be estimated as having reached a million to a million-and-a-half bees! How could urban life be maintained under these conditions? Written sources (particularly Roman and Talmudic ones), as well as ethnographic observations, show that bees have often been raised near dwellings and that their residents apparently grew accustomed to living in proximity to apiaries. Since the apiary produced valuable commodities, safeguarding and maintaining the hives must have been important enough to lead to their being positioned close to dwellings within the city limits. It appears that only a strong authority—either royal, municipal, or a powerful local family—could enforce the location of such an industry inside the city. In our case, it may be suggested that the Nimshi family was the initiator, owner, and operator of the apiary, as the inscription "belonging to Nimshi" was found incised on a jar in the apiary, and the same name is known from Stratum IV as well as from a contemporary context at Tel ʿAmal, six kilometers to the northwest of Tel Reḥov (Ahituv and Mazar 2016: 90, fig. 8; Mazar, "Tel Rehov in the Tenth and Ninth Centuries BCE," fig. 27 in this issue). It appears that the Nimshi family, of which King Jehu was a descendent, was one of the main elite families in the city, and perhaps it had the authority to impose the inner-city location of the apiary on the inhabitants. This has implications for our understanding of social and economic systems in this early stage of the Israelite monarchy.

The apiary was destroyed violently and abruptly at the end of Stratum V, dated by radiometric dates (eleven of them measured on grain found in the apiary itself) to the late tenth or early ninth centuries BCE (see Mazar, "Tel Reḥov in the Tenth and Ninth Centuries BCE" in this issue and references there). The hives were crushed under a 0.8 m-thick burnt destruction layer containing fallen mud bricks and charred wood beams, and went out of use in the subsequent Stratum IV, while other parts of the city continued to survive with some changes. As to the agent of destruction, a paleo-magnetic study raised the possibility that it was an earthquake that was responsible (Ben-Yosef and Ron 2020). We cannot say why the apiary was not rebuilt in Stratum IV; perhaps the owners decided to move it outside the city.

Two new studies have been conducted since the publication of our article in this journal in 2007

Figure 1. The apiary seen from the southwest. Photograph courtesy of Tel Reḥov Expedition.

Figure 2. The front side of a hive with a "flying hole." Photograph courtesy of Tel Reḥov Expedition.

Figure 3. The back side of a hive with a lid. Photograph courtesy of Tel Reḥov Expedition.

(Mazar and Panitz-Cohen 2007). The first is an analysis of pollen extracted from the soil found inside the beehives, which provided evidence of a variety of plants that do not differ from the modern-day flora in the Beth-Shean Valley. The representation of *Ziziphus* pollen and a variety of herbaceous plants that must have grown nearby is noteworthy (Weinstein-Evron and Chaim 2020).

The second and even more significant study focused on lumps of black, charred material found in one of the hives. Guy Bloch of the Institute of Life Sciences of the Hebrew University of Jerusalem, assisted by Ido Wachtel, used an Environmental Scanning Electron Microscope (ESEM) to establish that these were, indeed, the remains of honeycombs in which bee remains could be identified, including eyes, muscles, legs, and wings, as well as larvae and pupae (fig. 8 a–e). To date, these are the only ancient bee remains that have ever been discovered in the ancient Near East. In a joint study with Stefan Fuchs of Goethe University in Frankfurt and Tiago Francoy of the University of São Paulo in Brazil, the subspecies of the bee was investigated by measuring the size and shape of the wing's veins (Bloch et al. 2010). The evidence, though based on only a few samples, is statistically different from the morphology of most subspecies typical to the Middle East, including *Apis mellifera syriaca* (Syrian honeybee), which was typical of the southern Levant until modern times. On the other hand, all three samples statistically fit the morphology of *Apis mellifera anatoliaca* (Anatolian honeybee).

The Anatolian honeybee is particularly productive and easier to keep for commercial purposes than the more aggressive and less-productive Syrian bee. Indeed, presently this subspecies is at the base of the Turkish honey industry—the second largest in the world. This bee is well adjusted to the climatic conditions of Turkey: cold temperatures and high humidity in the mountainous areas and severe heat conditions in the Central Anatolian plateau during the summer. Could this honeybee have been indigenous in Israel in the Iron Age? This is not very probable, and therefore we raised the possibility that the beekeepers

Figure 4. Detail of the hives during excavation. Photograph courtesy of the Tel Reḥov Expedition.

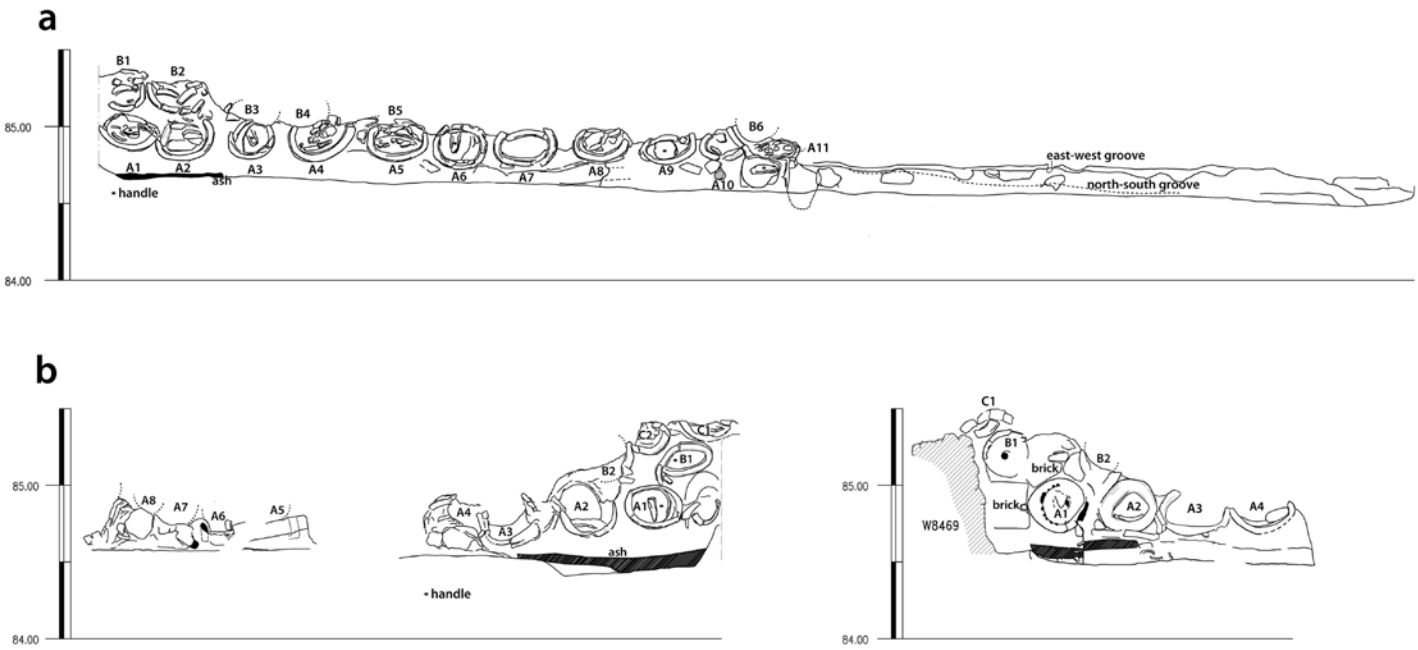

Figure 5. Drawing of three tiers of hives as found. Drawing by Ana Iamim; courtesy of the Tel Reḥov Expedition.

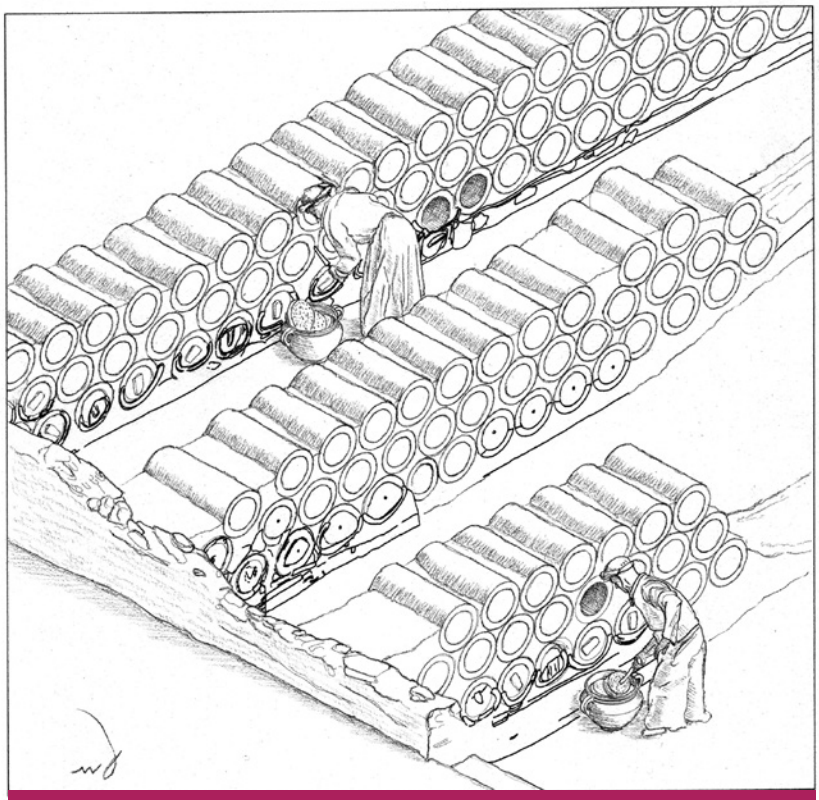

Figure 6. Isometric reconstruction of the apiary. Drawing by Ana Iamim; Photograph courtesy of the Tel Reḥov Expedition.

Figure 7. Pottery altar found in the apiary, decorated with two female figures flanking a tree. Photograph by Zeev Naikhin; courtesy of the Tel Reḥov Expedition.

of Tel Reḥov imported bee swarms from Anatolia, a minimal distance of about five hundred kilometers. While this would appear at first to be impossible, we do know that such an import of bee swarms was actually carried out in the eighth century BCE by Šamaš-rēša-uṣur, an Assyrian governor of Suhu on the mid-Euphrates region (Neufeld 1978: 238–39; Dalley 1984: 202–3; Na'aman 2007: 112–14). In his commemorative stele, he writes:

> Bees that collect honey, which none of my ancestors had ever seen or brought into the land of Suḫu, I brought down from the mountain of the men of Habha, and made them settle in the orchards of the town "Gabbar-built-it." They collect honey and wax—and I know how to melt the honey and wax—and the gardeners know too. (trans. Dalley 1984: 203)

Habha is identified in the Zagros Mountains or the eastern Taurus Mountains, about four hundred kilometers north of Suḫu. It is possible that in this case, too, the imported bees were Anatolian. This text sheds light on the plausibility of importing bees from faraway during the Iron Age. We therefore suggest that bee swarms were imported to the Beth-Shean Valley, directly or indirectly, from one of the Neo-Hittite/Luwian states in southern Turkey. The route of such a trade could be either along the Phoenician coast, perhaps by ships through port towns like Tyre or Akko, or through the Orontes Valley via inland Syria (perhaps via the kingdom of P/Walastin), as suggested by Zsolt Simon (2014). A single clue for the viability of the latter possibility is a Neo-Hittite seal impression found on jar handle in Hazor Stratum Xa (Ben-Tor, Cohen-Weinberger, and Weeden 2017). A trade system with southern Anatolia is also echoed in the biblical allusions to horse trade between Egypt and Que (Cilicia), involving Solomon's merchants (1 Kgs 10:28), though the historicity of this tradition remains questionable. Yet such a trade in bee swarms raises questions: Why and how would, or could, anyone take pains to import bee swarms of a particular subspecies over such a long distance? Economic activity of this sort required knowledge, skill, and far-reaching commercial ties. It would be essential to prevent the Anatolian queens from mating with the local Syrian honeybee drones. How was this done? Did the ancients have the necessary knowledge in bee biology to maintain Anatolian bees over a considerable time? Perhaps new swarms had to be brought annually. In any case, such a trade would have required vast knowledge and experience in beekeeping, as well as staunch, international economic ties.[3]

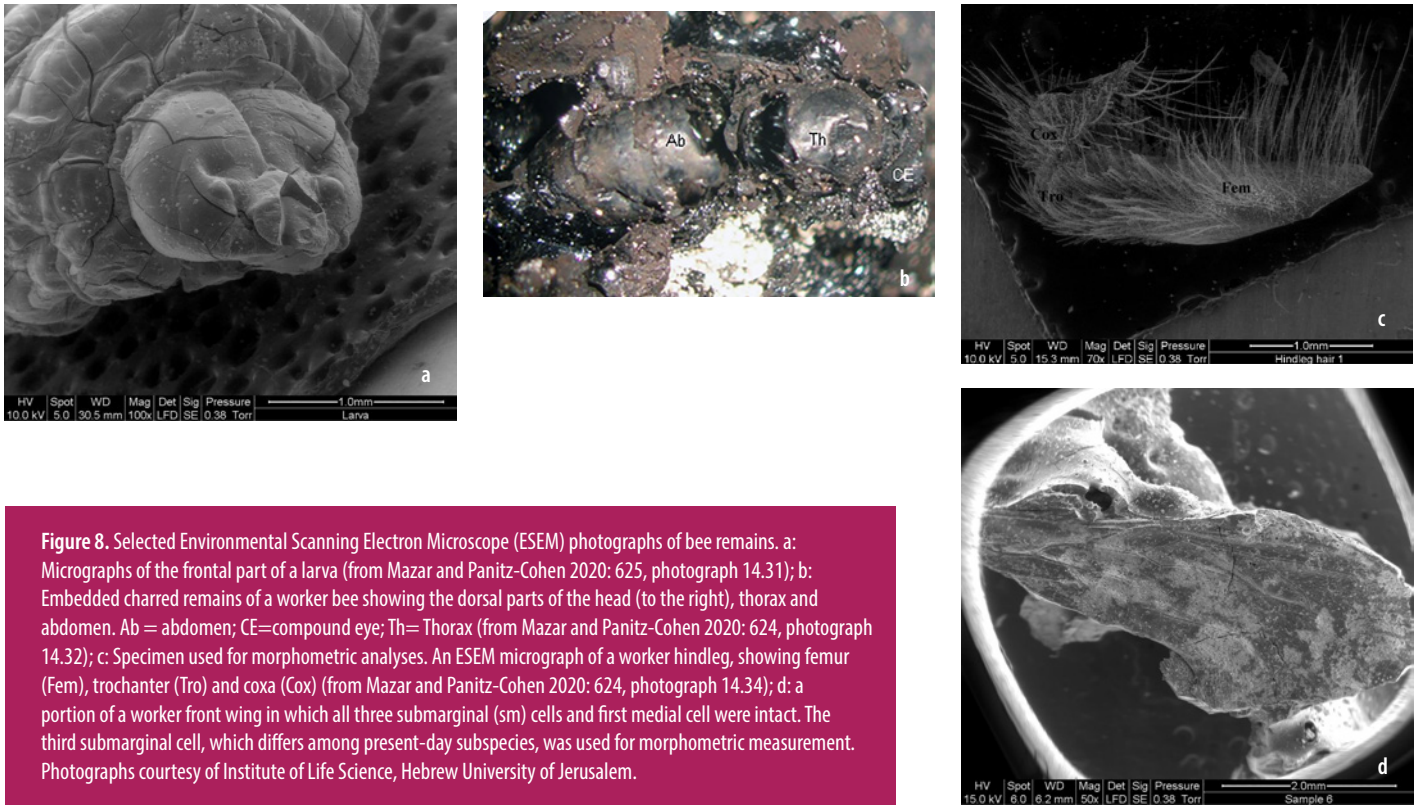

Figure 8. Selected Environmental Scanning Electron Microscope (ESEM) photographs of bee remains. a: Micrographs of the frontal part of a larva (from Mazar and Panitz-Cohen 2020: 625, photograph 14.31); b: Embedded charred remains of a worker bee showing the dorsal parts of the head (to the right), thorax and abdomen. Ab = abdomen; CE=compound eye; Th= Thorax (from Mazar and Panitz-Cohen 2020: 624, photograph 14.32); c: Specimen used for morphometric analyses. An ESEM micrograph of a worker hindleg, showing femur (Fem), trochanter (Tro) and coxa (Cox) (from Mazar and Panitz-Cohen 2020: 624, photograph 14.34); d: a portion of a worker front wing in which all three submarginal (sm) cells and first medial cell were intact. The third submarginal cell, which differs among present-day subspecies, was used for morphometric measurement. Photographs courtesy of Institute of Life Science, Hebrew University of Jerusalem.

The Tel Reḥov apiary is a unique archaeological find; its interdisciplinary exploration involves research in the fields of natural sciences and ethnography combined with the study of textual and iconographic sources from the ancient Near Eastern, as well as biblical sources. These intertwine to create a comprehensive picture, telling the tale of a hitherto unknown aspect of ancient economic and social systems in ancient Israel.

Notes

1. The unique apiary revealed at Tel Reḥov was previously presented in this journal (Mazar and Panitz-Cohen 2007). Here, we briefly summarize the former article and add new observations and conclusions based on subsequent research, particularly concerning the identification of the bees (for a detailed description and discussion, see Mazar 2018, 2020; Mazar and Panitz Cohen 2020).
2. The analysis was conducted by Dvory Namdar jointly with a team of researchers from the Weizmann Institute of Science, the Faculty of Agriculture of the Hebrew University in Reḥovot and the Volcani Institute.
3. Cammarosano et al. (2019: 127–29) questioned some of our conclusions, and conjectured that *A.m. anatoliaca* or a (unknown) close subspecies may have lived in the southern Levant during the Iron Age. Indeed, our conclusions were based on limited available data: only two wings and one leg were preserved well enough to be reliably analyzed, and these ancient samples were charred. However, we used the best available database (Ruttner's database, though based on a limited number of colonies), performed the most appropriate analysis, and based our conclusions on appropriate statistical analyses for this kind of inquiry.

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Figure 9. Modern experimental replicas of the Tel Reḥov hives, exhibited in the Eretz Israel Museum, Tel Aviv, 2015 (curator: Irit Ziffer; created by potter Irit Shochat and operated by the Kibbutz Yad Mordechai apiary team). Photograph by Amihai Mazar.

Figure 10. Honeycombs in the modern replicas of Tel Rehov hives. Photograph by Amihai Mazar.

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