A Zebu-Shaped Weight from Tel Beth-Shemesh

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ABSTRACT: In 2007, a bronze zoomorphic weight, shaped as a humped bull or zebu, *Bos indicus*, was found in a Late Bronze Age context in the renewed excavations at Tel Beth-Shemesh. The similarity of this object to other figurines and balance weights not only demonstrates commercial and cultural ties among Late Bronze Age sites, but also indicates familiarity with this sub-species of cattle, usually associated with South Asia. Despite its excellent state of preservation, this weight does not reveal much about its particular position in the Beth-Shemesh economy because it was made with a hollow cavity used to modulate its mass. This zebu-shaped weight provides us with further evidence of the frontier status of Beth-Shemesh and points to the site’s connections with the Eastern Mediterranean trade network of the Late Bronze Age.

In the 2007 season of the renewed excavations at Tel Beth-Shemesh, a beautifully designed and well-preserved bronze weight in the shape of a crouching bull (fig. 1) was discovered in the ruins of a Late Bronze Age building.1 The object was identified as a weight since it is consistent with the basic criteria for identifying weights (Birney and Levine 2011: 473) and since it bears close affinity to bull-shaped weights in Ancient Near East weighing scenes and similar weights found in excavations elsewhere (see below). Of special interest is the fact that the weight depicts a humpback bull, known as zebu. While other zebu weights and figurines have been found in the eastern Mediterranean, mainly in Lebanon, Syria and Cyprus (see below), the image of this Indian-type bull is quite rare in the Land of Israel. In this article we shall discuss the zebu weight from Beth-Shemesh within its archaeological, metrological and cultural contexts.

ARCHAEOLOGICAL CONTEXT

The zebu weight (reg. no. 5449.01) was found in Area A, Square A20, layer

1 Since 1990, the renewed excavations at Tel Beth-Shemesh have been directed by Shlomo Bunimovitz and Zvi Lederman and are currently conducted under the auspices of the Institute of Archaeology in Tel Aviv University. Participating consortium institutions include Indiana University, Bloomington; Louisiana College; Harding University; Lethbridge University; and Brooklyn College. We deeply thank Marilyn and Norman Tayler (Bethesda MD) for their generous and continuous support of the excavations project. We would also like to extend our thanks to the Goldhirsh Foundation for their important support in recent years. The research was also supported by the Israel Science foundation (grants nos. 898/99, 980/03 and 1068/11).
L1413, near the corner of two walls — F862 and F843 (Bunimovitz and Lederman 2009: photos on pp. 120, 122). The two walls are remnants of a building that was destroyed in a heavy conflagration; layer L1413 consists of fallen mudbricks, apparently the superstructure of the walls. The stratigraphical position of the building is not easy to determine. Since Square A20 is situated on the steep northern slope of the mound, it suffered severe erosion that completely removed the upper debris layers down to the beginning of the Iron Age/Late Bronze Age. However, excavation in adjacent squares, where well-preserved remains of a ‘Patrician House’ from Level 6 were exposed, indicates that the archaeological context of the weight is earlier than Level 6 (mid-twelfth century BCE; for the stratigraphy of the Iron Age I remains in Area A, see Bunimovitz and Lederman 2009: 116, 120–124). Moreover, further excavations in Areas A and D, which revealed well-preserved remains from Levels 8 and 9 (thirteenth and fourteenth centuries BCE, respectively), lend support to the idea that the weight should be assigned to one of these levels. Of special interest are the remains of Level 9 — a large building, presumably a palace, full of rich assemblages of pottery and other unique finds (see, e.g., Ziffer, Bunimovitz and Lederman 2009); it was completely burned and sealed under a heavy mantle of fallen mudbrick walls. On the basis of its character and stratigraphical position, destruction layer L1413, in which the zebu weight was found, seems to be related to the eventful destruction of the fourteenth-century BCE palace of Beth-Shemesh and its environs. However, since Square A20 is disturbed, the possibility that the weight originated from Level 8 (the thirteenth century BCE) is also a viable option.
DESCRIPTION

The weight has the shape of a humpback bull, or zebu (figs. 2–3; maximum dimensions: 4.9 cm. in length; 2.5 cm. in width; 2.9 cm. in height). It is in a reclining position, with its three legs folded under and to its right; its tail swings around.

Fig. 2. Views of the zebu weight (photo by P. Shrago)

Fig. 3. Line drawings and cross sections of the zebu weight (drawing by R. Penchas)
to the right and up onto its back. The front legs fold backward, and the rear leg folds forward. The right legs have articulated hooves. The front left leg is much smaller and the hoof is not very clearly articulated, as if the leg and hoof were compressed while the metal was still soft. In addition, the bottom and front of that knee is more corroded and greener than the rest of the object. The lack of detail and poor preservation of this leg are likely due to the fact that it would have interfered with a flat bottom for this object. Between the front right leg and the torso there appears to be an extra piece of bronze that adhered during the molten phase.

The head of the bull is overall rather large in proportion to the body, measuring 1.9 cm. from the tip of its horns to its chin. Rather than showing a defined chin and distinct throat, the neck of the figurine begins at the tip of the snout and in one gentle curve connects to the underside of the animal between its front legs. The bull has short horns (1.4 cm. from tip to tip), which may indicate that this is a young and vigorous bull. The two horns project at different angles, the left more upright, causing the head to appear to tilt more to the right than it does in reality. The ears protrude further from the side of the head just below the horns, angled toward the back, and are approximately 0.3 cm. long, making the total width of the head 1.6 cm. The bull’s eyes, situated just anterior to the ears, are indicated by lines incised in the mold. They are shaped as inverted teardrops, with an additional line above signifying the brow line. A groove across the snout marks the mouth. There is no indication of nostrils.

In the underside of the bull there is an oblong hole (c. 1.0x0.8 cm., opening onto a cavity 1.4 cm. deep (fig. 4). The cavity extends more than a centimetre, toward the front of the bull. While the exterior surface of the figure reflects the colours of bronze in various states of corrosion — green, red-brown and black — inside the hole the colour is much closer to white or silver.\(^2\) This bull has only three legs because the hole is where the rear left leg would be folded.

The hump, which is quite prominent, accounting for approximately one-sixth of the total height of the figure, forms an arc over the shoulder and connects to both front legs, extending laterally far beyond the extent of a typical zebu’s hump.

**ZEBU CATTLE IN NATURE AND ICONOGRAPHY**

The zebu, *Bos indicus*, is a sub-species of common cattle (*Bos taurus*), usually associated with South Asia. In appearance, it is distinguished by narrower legs and face, the hump between its shoulders, and a pronounced dewlap, a flap of skin that hangs longitudinally along the front of the throat. The hump is a mass of muscle, fat and connective tissue (Grigson 1980: 3; Matthews 2002: 440). Skeletally, there are few ways to distinguish the zebu from taurine cattle, and most of

\(^2\) It is difficult to distinguish colours inside the bull given the necessity of artificial light to see inside.
these require comparison of several bones from each individual and are best understood in the context of whole populations (Grigson 1980). Otherwise, the primary identifying feature of Bos indicus is bifurcated spinous processes, present on most thoracic vertebrae (Clason 1978; Grigson 1984), which probably evolved to support the added weight of the hump (Matthews 2002: 440).

Like most cattle, zebu provides meat, milk, hides and power to their human cultivators. Zebu also tends to be heartier than taurine cattle in terms of draft power and endurance. They can pull more weight on less food and water (Matthews 2002: 440). As a sub-species of Bos taurus, zebu can interbreed productively with other varieties of cattle. In fact, many breeds of taurine cattle, in particular those from the Near East, demonstrate a marked admixture of zebu alleles (Loftus et al. 1999; Edwards, Baird and MacHugh 2007). As populations, however, due to their greater adaptability in the face of negative climatic and environmental factors, zebu have historically supplanted other established cattle populations.

Zebu are now common in the tropical and subtropical regions of Asia and Africa, although they are perhaps best known for their role as the primary variety of cattle in the Indian subcontinent. Genetic data for Bos indicus suggest, however, that the zebu evolved from the Bos namadicus in or around Baluchistan sometime in the Neolithic period (Meadow 1984; Edwards, Baird and MacHugh 2007: 520). The appearance of the zebu in the Near East is progressive. According to Matthews (2002: 440–444), the zebu’s appearance corresponds to periods of dryer climate that coincide with major declines in civilizations, corresponding to
the beginning and end of the Early Bronze Age (c. 3300 and 2200 BCE) and the end of the Late Bronze Age (c. 1200 BCE).

If the primary way to identify the presence of zebu in an ancient culture is through their remains, this is limited because only the bifurcated spinous processes of the vertebrae are distinctive. Osteological evidence, therefore, while relatively reliable for noting the presence of zebu, should not be understood as conclusive for specifying *Bos taurus*. It may be that zebu make up a larger proportion of the cattle assemblage than previously assumed (Hesse 1995: 214). Without relying too much on an argument from silence, the first clear evidence of zebu presence in the southern Levant is from the Late Bronze Age. Vertebrae with bifurcated spinous processes have been found at Deir ‘Alla and Tell Jemneh (Clason 1978; Hesse 1997: 442; Matthews 2002: 445).

Even if zooarchaeological data are insufficient, we may recognise that depictions of zebu in the art historical record indicate familiarity with this sub-species of cattle. Not surprisingly, the progression of artistic representations of zebu parallels the progression of zebu bones found in the archaeological record. No examples are found in the Levant or Egypt prior to the Late Bronze Age. While publishing an unprovenanced ivory handle from Egypt in the form of a humped bull, Hornblower notes that depictions of cattle from before the New Kingdom show only unhumped animals. Humped cattle first appear in the New Kingdom (Hornblower 1927: 222). Similarly, zebu figurines first appear at Tell el-‘Ajjul and Tell Jemneh in the Late Bronze Age (Matthews 2002: 444). A humped bull figurine was also discovered in the Stratum 1a ‘Orthostat Temple’ at Hazor (Yadin 1972: 94, pl. 20b; 1975: 83–85).

The depiction of zebu becomes much more common in the Iron Age. The famous relief of Sea Peoples in the funerary temple of Ramesses III at Medinet Habu shows some of them coming with their belongings and families in carts pulled by humpback oxen (Nelson 1929–31: pl. 32). At the Iron I cult site of Dhahrat et-Tawileh, a bull figurine was found and was identified as *Bos indicus* on the basis of its hump, its narrow legs and the shape of its horns (Mazar 1982: 29; Ahlström 1990). A standing humped bull was discovered among 20th-Dynasty artifacts at Beth Shean. This figurine stands out from the others in that it is not free-standing; instead, it appears to have been part of a bronze vessel (Mazar 1997: 71; Yahalom-Mack 2009: 575–576, fig. 10.15, photo 10:12). Petrie, in his 1926–1927 campaign to Tell Jemneh, discovered limestone altars on which the picture of a humped bull was incised (Hornblower 1927: 224). Zebu appear in

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3 On the other hand, there is the occasional zebu that does not have bifurcated spinous processes, and in rare cases taurine cattle display this property (Clason 1978: 92; Grigson 1984).

4 Hornblower relies upon Petrie’s dating of these artifacts to the seventh century BCE, but Petrie’s dates have been shown to be rather problematic.
clay figurines as well. Two recent examples are from Tel Beth-Shemesh (Iron I)\(^5\) and Tel Reḥov (early Iron II; Saarelainen and Kletter, forthcoming). There is also an unprovenanced figurine from the collection of the Ashmolean Museum, said to have come from Syria or Lebanon, that likely was made in the Iron Age (Moorey 1971).

The ritual nature of many of these bulls, the common image of the striding storm god on the back of a bull (e.g., Yadin 1975: 83–85; Ahlström 1990: 79–80, with additional bibliography), and the description of the storm deity as a young bull in biblical and Ugaritic texts lead to the almost automatic identification of bull figurines as attributes of one or another of the local storm gods. In this regard, there is no distinction between humped and non-humped bulls.\(^6\)

**BULL-SHAPED WEIGHTS**

Among zoomorphic balance weights, the bull is a common shape (Courtois 1983: 120). Among the Ulu Burun balance weights, which are a relatively complete collection of balance weights, 19 of the 149 weights are zoomorphic, and of those, six are in the form of bovines (Pulak 1996: 65). Similarly, four of the 14 weights found together at Kalavasos-Ayios Dhimitrios are bovines (Courtois 1983: 120–121; South and Todd 1985: 42). Unlike the typical bull-shaped figurine in a standing position,\(^7\) however, weights either depict reclining bulls, like the one discussed here, or just the heads. These are preferred because their shape allows for them to have a flat bottom, and they thus sit securely on the balance pan.

Focusing on the reclining bulls, an example is found from a Late Cypriote context at Kalavasos-Ayios Dhimitrios. This object (K-AD 451) is three times heavier than ours (despite its similar linear dimensions), because its cavity is filled with lead. The lead protrudes from the bottom of the bull because of expansion due to corrosion (Courtois 1983: 120–121; South and Todd 1985: 46; Lassen 2000: 239).

An even larger reclining bull was discovered at Ras Shamra with a mass of 437 gr. It is a very naturalistic and beautifully preserved figurine with a short

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\(^5\) The figurine was found in the summer of 2011 after completion of this article and will be discussed in a future publication.

\(^6\) Figural weights and figurines are discussed in similar ways in terms of craftsmanship. With regard to questions of meaning, however, they are treated quite differently. As quickly as figurines are often assigned to ritual contexts, weights are just as quickly and exclusively considered in light of their commercial use, even when found in a cultic setting. It may be worthwhile to ponder the choice of animals when it comes to zoomorphic weights, but such a study is well beyond the scope of the present article.

\(^7\) One exception is the pierced marble hump-backed bull from Ur, used as comparandum by Hornblower (1927: 223). Unfortunately, Hornblower provides only an outline of this object, and he worked from a drawing himself.
muzzle facing slightly to the right and a forked tail that swings up over the right haunch. A slight shrug of the shoulders — while not a hump — adds to the naturalism of the piece. Perhaps most important for the study of weights, this bull is inscribed on its right flank with two facing semi-circles (Schaeffer 1937: 147–149, pl. 23).

Of the six recumbent bovines found among the Ulu Burun weights, four were identified as bulls and two as calves. These weights are in varying states of preservation, and the calves are most heavily damaged. Among the four bulls (W135, W137, W144 and W146), various details can be ascertained. On three of the bulls, humps are noticeable at the shoulder, and at least two have a pronounced dewlap. One bull, the largest, has a large elliptical cavity in the base filled with lead, but several non-bovine weights also have cavities for such lead plugs (Pulak 1996: 477, 479, 486, 489).

Additional examples of bovine weights were published by Petrie in his catalogue of Egyptian weights (Petrie 1926). Of his bronze weights, Petrie identifies the form of five as that of a ‘bull head’ (Petrie 1926: nos. 4816, 4925, 4939, 5030 and 5073) and of two as that of a ‘calf’ (nos. 4749 and 5253), the latter indicating that they represent the entire animal; these two ‘calves’ are depicted reclining. The best illustrated of these weights is Petrie’s no. 5253 (Petrie 1926: pl. 9). The weight is a flat-backed recumbent bovine with short horns. One limestone weight was listed as having the form of a bull (no. 3182). Lastly, one bronze weight was incised with a humped bull on one side and a thunderbolt on the other (no. 4849; pl. 13). Another example of a crouching bull was discovered headless in the Late Bronze Age tomb C1 in the Persian Garden at Akko (Eran and Edelstein 1977: 62, no. 58; fig. 25:24, pl. 20:38).

As far as can be determined, all but one of the examples of recumbent bull-shaped weights show the animal resting on its left side so that its legs are visible, folded on its right side. In every case, the tail swirls around to the right. While similar in these ways, the weights all utilise different techniques for details such as the facial features, the shape of the hump and the musculature of the legs. There is no way to argue that all of these weights came from one source. Similarly, the standing zebu figurines and depictions are so varied that they must all come from different workshops. The zebu was a reasonably common sight among the cattle in the ancient Levant.

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8 Petrie collected thousands of weights for this volume, many of which were completely unprovenanced and many of which were from outside Egypt, but were included because he claimed they fitted his Egyptian weight systems. For arguments against Petrie’s system of assigning weights to one or more of these systems, see Levine 2008: 50–52, esp. n. 58).

9 This was probably from the Hellenistic period or later, when the two images were intended to represent the syncretism of a local deity with a Greek or Roman parallel.
Three of the 12 weights discussed above as comparanda are humped, and as such, represent the phenomenon described by Matthews. If the appearance of zebu-shaped weights indicates, as noted above, familiarity with the species, we may recognise again that familiarity with this species reached the Levant during the second half of the Late Bronze Age and then continued beyond, crossing the sea on a Canaanite merchant vessel.

METROLOGY

To understand the use of a balance weight, we must discuss its mass and its participation in a weight system. Our weight currently has a mass of 48.45 gr. This could correspond to five units\(^\text{10}\) of the widespread Canaanite shekel/Egyptian qdt.\(^\text{11}\) This unit is known from the Early Bronze Age IV at Ebla as one of several weight systems in use, though it becomes more prominent in the Middle Bronze levels (Archi 1987). It is the primary unit of mass at the two Late Bronze sites in the southern Levant with substantial published corpora of weights: Akko (based on remains from the tombs in the Persian Garden) and Tell el-\(^{\text{5}}\)Ajjul. On the basis of an analysis of Petrie’s work on Egyptian weights and subsequent studies (e.g., Cour-Marty 1985), we may recognise that this unit was imported into Egypt during the Second Intermediate Period. It became the most prominent unit of mass in the New Kingdom. This unit continues in use in Philistia and other regions of the Levant in the Iron Age and is the basis for Tyrian and Punic weights as well (M.P. García-Bellido García de Diego: personal communication).

Although it is slightly on the heavy side\(^\text{12}\) this zebu may have been used as six

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\(^{10}\) Dividing the total mass by the hypothesised number of units (i.e., its value) to attain the unit mass to several decimal places gives a false sense of precision. Because of what we now recognise as imperfections and imprecision in ancient weighing apparatuses, it is best to speak of acceptable ranges of mass or a clear approximation for that range of mass.

\(^{11}\) The identity of these two units is demonstrated by the equation in EA 369, a letter addressed to Milkišu at Gezer. Whether the average masses of a collection of qdt-weights and of Canaanite shekels is equal or whether any examples of the two weights are equal in mass is irrelevant (contra Pulak 1996: 39), the Egyptian royal court and the administration of Gezer used them as equals. The Egyptian qdt participated in a decimal weight system, with ten of these units comprising a tiban (dbn) (for the vocalization see 째-ba-an, EA 369: 12; Izre'el 1995: 109; cf. EA 368: 16, probably with the Akkadian nominative ending, Izre'el 1997: 77 and comment on p. 81) (cf. Panitz-Cohen, Yahalom-Mack and Mazar 2009: 749–750 with additional literature). The shekel, however, operated as part of a base-60 or base-50 system.

\(^{12}\) Copies of copies of weights checked on imprecise balances can vary quite significantly from their intended masses. Among the inscribed Judahite weights (Kletter 1998: 150–246), the 1-, 2- and 4-shekel weights vary in their masses with a standard deviation of 4.7% of the unit mass. We can expect other corpora to have similar vari-
units of approximately 7.8 gr. or four units of approximately 11.3–11.75 gr. The unit of approximately 7.8 gr. is the more common unit of mass at Ebla in the Early Bronze Age IVb (Archi 1987), is claimed at Byblos (Dunand 1939), and argued for at Horbat Rosh Zayit (Kletter 1994; 2000). The latter is equivalent to the mass of the Iron II Judahite shekel, though there is conclusive evidence that a unit of this mass was in use at least from the beginning of the Iron Age in Ekron (Levine 2008: 382). The simple arithmetic relationships between these units — noted in all phases of metrological research (Petrie 1926; Parise 1981; 1989; Ronen 1996; Castle 2000; Mederos and Lamberg-Karlovsky 2004) — allows for easy conversion between weight systems, but severely complicates the assignment of a weight to its unit of mass. In order to be sure that a particular weight participates in one or another of these systems, we must find weights with a conclusive value, such as 1 shekel, that does not correspond to a value in one of the other systems.

A more significant difficulty in placing this weight securely in a particular weight system is the cavity in the underside of the zebu. Similar cavities have been found in other weights, both of metal and stone, and are usually used for lead 'plugs' to adjust the mass. A lead plug in this object might have outweighed the

13 A unit of approximately this mass was identified by Petrie as a Philistine unit (1926: 23), a problematic assumption long repeated (Ben-David 1979: 29–36). Parise (1981; 1989) argued that this unit was used at Karkamish (based on a cuneiform text explaining the relationship between the minas of Karkamish, Hatti and Ugarit), but no physical evidence from Karkamish supports this assertion.

14 Petrie identified a unit of approximately 11.75 gr. as the Khoirine as a generalisation based upon the misunderstanding of the inscriptions on the Judahite shekel (Petrie 1926: 16–17). More recent analyses of the Judahite shekel have resulted in a mean mass of just over 11.3 gr. For the Late Bronze Age, Parise posited a unit around 11.75 gr. for the Hittites on the basis of texts describing a 40-shekel mina and assuming the same mina as at Ugarit (Parise 1970–71; 1981; 1989). Of the weights excavated at Boğazköy, however, none seems particularly suited to this unit mass (Boehmer 1972: 165, 214–216; Castle 2000: 158–161). The assumption has persisted, though, and has often been repeated as an accepted fact (Pulak 1996: 39; Lassen 2000: 239, etc.).

15 See several of the examples above. The presence of such a plug does not depend upon the shape of the weight. For example, from Tell el-‘Ajjul there is a hematite...
bronze object itself by a factor of two. As noted above, weight K-AD 451, the linear dimensions of which are similar to the weight under discussion here, is approximately three times as massive.

The addition of molten metal can be explained in several ways. It may have served to produce the weights more cheaply as the heavier bronze. It may, alternatively, have been used to correct the mass of a weight, especially as a piece of bronze, once cast, cannot be lightened if necessary. Similarly, if a stone weight is ground down past the target mass, it cannot easily be made heavier. Because there was little to no enforcement of standards of weights and measures, the addition or subtraction of molten metal may have allowed for adjustment as units of mass evolved. Another possible explanation is that it may have allowed the merchant to realign the weight with a different weight system. Finally, one should bear in mind that the same mechanism could be used to conceal cheating, although the large size of the cavity and the fact that it was part of the original object makes this an unlikely explanation.

As mentioned above, the cavity shows signs that it may once have contained lead. Even if we could have safely measured the volume of the cavity, we cannot be sure how much lead was ever in there. In order to know the original or intended mass of this weight, we need to know how much lead was in the cavity, and in

sphendonoid (sling bullet-shaped) weight with a cylindrical cavity with traces of lead (Petrie 1934: pl. 23). From Ashkelon there is a dome-shaped weight with a similar cavity (Birney and Levine 2011: 480). Not all of these plugs are lead; there is one example of a stone weight from Tell es-Safi with two small bronze plugs (Levine, forthcoming). For other stone weights with cavities for plugs, see Kletter (1998: 59–60).

In the ancient economic system as we have described, the possibilities for cheating are numerous. Quite apart from the obvious extra thumb on the balance pan, one could use a set of weights that does not conform to the agreed-upon weight system. This could be accomplished by underfilling or overfilling a cavity with lead. Cheating was certainly present in ancient economies, as we have several examples of texts condemning cheating, including several from the Bible (e.g., Deut. 25:13–14): if the biblical author was concerned with such conduct, it was likely practiced. Impacting this issue is the lack of precision of weighing apparatuses, leading to such variance among weights that likely spawned an informal culling process, and the lack of a central authority to check the weights of merchants.

Other methods of cheating involved disguising one metal by coating it with another. Examples include the silver chocolate bar ingot from Beth Shean with the copper core (Mazar 1997: 71; Thompson 2003: 74, fig. 6) and the bronze dome-shaped weight from Ashkelon with the lead core (Levine 2005).

Molten lead poured into an already formed, smooth-walled bronze cavity will not adhere very well to the bronze. Instead, as often happens, the lead, or much of it, falls out and is lost. This is indeed possible even though the cavity is larger than its opening, depending on the amount of lead. It is also possible that the lead was intentionally removed to further alter the mass.
order to know that, we need to know what the intended mass was: an obvious circular problem. Consequently, there is no way to determine the intended mass of the weight.

Even if we could tell how much lead had originally been in the cavity, the fact that this weight is cast in bronze means that its mass is a priori suspect for metrological study. Bronze is subject to corrosion, and the nature of the corrosion — whether the object loses or gains mass and how much — depends upon the conditions in archaeological deposition. In other words, notwithstanding Petrie’s suggestions with regard to the amount of mass his metal weights had lost (Petrie 1926: 22, pls. 43–46), it is nearly impossible to make any claims about their fitting into a system. The best guesses come from comparing bronze weights with other bronze weights, looking for clustering around certain masses (Birney and Levine 2011: 480–482).

All in all, our weight remains in excellent condition. Visible signs of corrosion — changes in colour or texture of the object — appear to be mostly superficial. Instead of being a dark, nearly black, lustrous bronze, as our object most likely was, it is mottled green, brown and black. Not only is its shape still recognisable, but all of the artistic details are still visible; only the front left leg, as mentioned above, shows any specifically corrosion-related damage.

We cannot be certain of the weight system at play here. We do know, however, that people living in Beth-Shemesh were engaged in trade.

CONCLUDING REMARKS

The presence of a balance weight at Beth-Shemesh should come as no surprise. Situated in the Sorek Valley, along an east–west trade route from the Coastal Plain into the central mountain ridge, Beth-Shemesh should have served in the Late Bronze Age as a commercial entrepôt. Indeed, recent excavations of the fourteenth-century BCE governmental building of Beth-Shemesh have brought to light two Late Minoan IIIA1 cups — a unique find in Canaan. The beautifully designed zebu weight may, therefore, be connected with commercial activity related to this building. The form of the weight, unknown in the Land of Israel prior to the Late Bronze Age, signals new connections within and beyond the greater Near East, and especially with the commercial web of the eastern

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18 Petrie notes that to reconstruct the original masses of his bronze weights, he sampled the patina and measured the specific gravity in order to calculate how much metal had turned into patina. This should be considered unreliable as corroded metal tends to flake off, destroying some of the evidence, and the specific gravity of the metal and the patina/corrosion hinges on knowledge of the precise chemical composition. It would also be necessary to know precisely how much of the object had corroded, something that is not possible without destroying the object.
Mediterranean. A lack of certainty of the weight system in which this object participated only eliminates one way of ascertaining Beth-Shemesh’s trading partners. The identification of balance weights is just one of several signs of participation in broader economic systems. In any event, the Beth-Shemesh zebu weight contributes to a more complete picture of zebu in Late Bronze Age Levantine contexts. As zebu become more common in the art historical record, we should reconsider their appearance among the faunal remains from Late Bronze Age–Iron Age I sites in the eastern Mediterranean.

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