Archers, Antiochos VII Sidetes, and the 𐅂 Arrowheads*

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Bronze arrowheads featuring barbs, a tang, and a nodule at the base of the head were widespread throughout the Mediterranean region from the 6th century B.C.E. to the end of the Hellenistic period. This article investigates a variant of the main type bearing a stamped device in the form 𐅂. The general arrowhead form is often called "Cretan," and previous studies have specifically associated the stamped type with Cretan archers in the service of the Ptolemaic queen, Berenike II.

By looking at the distribution and physical attributes (including through X-ray fluorescence analysis) of the stamped arrowheads, this article provides fresh insight into the social organization of bow-armed fighting units in the Levant during the late Hellenistic period. In doing so, the authors challenge some long-held assumptions and interpretations about the arrowhead type. Relying on a mix of literary, iconographic, and archaeological evidence, the article demonstrates that the stamped arrowhead type should be associated with a body of archers involved in the campaigns of the Seleukid king Antiochos VII Sidetes (138–129 B.C.E.).

Keywords: Hellenistic; Seleukid; Cretan archers; military history; Antiochos VII Sidetes; Jebel Khalid; Ashdod-Yam; Jerusalem

Bronze arrowheads with distinctive barbs, a tang, and a nodule at the base of the head were distributed widely throughout the Mediterranean and Near East, including on the Greek mainland and Aegean islands, and in northern Africa, western Asia, and the Levant.[1] The type was particularly prevalent in the Hellenistic period and has come to be closely linked with Crete, which was famous throughout antiquity for its mercenary fighters and archers who were exemplary in ambuscades and skirmishes. This is a tantalizing scenario for those who would correlate the wide distribution of the arrowhead type with the diverse deployment of ethnic Cretan mercenary archers, particularly in the Hellenistic period.

Although William Flinders Petrie (1917: 35) believed that the arrowhead formed part of a pre-classical (1200–800 B.C.E.) group most researchers would agree that early forms of the arrowhead date from the 6th century B.C.E., and that they remained widespread throughout the Mediterranean region with few variations in form during the Hellenistic period (Baitinger 2001: 10–11). In respect

[1] Holger Baitinger (2001: 10–11, nn. 59–83) and Elisabeth Erdmann (1973: 36–39) list many examples of the type. We add the following to the record: Alexandria (Cricket Ground Site): Pichot 2007; Amphipolis: Kosmidou and Malamidou 2004–2005: 138, fig. 20; Antikythera: Tsaravopoulos 2004–2009: 329–30; Ashdod-Yam: Ashkenazi and Fantalkin 2017; Hierapolis (Turkey): British Museum no. BM1883,0725.11; Jebel Khalid: McConchie 2011: 131–34, pl. XIII:1.1–5; Jerusalem (Tower of David): Sivan and Solar 2000: 174, figs. on top; Jerusalem (Givati Parking Lot): Doron Ben-Ami, pers. comm., 2016; and several online news reports from November 3, 2015 (e.g., i24News 2015); Kalapodi: Schmitt 2007: 423–551; Lindos: Blinkenberg 1931: 194, no. 606; Naukratis: British Museum nos. 1866,1228.46; 1886,0401.1735; 1888,0601.6.a; 1920,0214.37; 1920,0214.38; Ramat Raḥel: Jacob Wright, pers. comm., 2012; Salamis: Chavane 1975: 108, pl. 31:329–30; Stymphalos: Hagerman 2014: 86–87, 100; Tel Anafa: Merker 2012: 255–56, pl. 37, no. M178; and Tell Michal: Muhly and Muhly 1989: 270–71, fig. 25:1.26. One stray example in the British Museum was discovered in the River Kennet near Reading, England, but this is dismissed as a modern loss, according to Anthony Snodgrass (1999: 124).

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to typology, Baitinger's Type IA5 group from Olympia best represents the arrowheads in question—namely, "*Dornpfeilspitzen mit rhombischem oder linsenförmigem Blattquerschnitt*" (tanged arrowhead with rhombic or lenticular blade profile) (Baitinger 2001: 10–11, pls. 2:31–40, 3:42–46).

Some Baitinger Type IA5 arrowheads are stamped with a particular device in the form 𐤁 (see, e.g., **Figs. 1–6**). For over a century, the stamp has attracted various interpretations. The earliest were made in the context of reported finds in Egypt, Kyrene (Libya), and Knossos (Crete), and involve two elements: First, the *style* of the stamped arrowhead is Cretan, and second, the *stamped device* represents the Ptolemaic queen Berenike II (Petrie 1917: pl. xliii:200–202; Forsdyke 1919–1920: 146–57, fig. 7:5; Haynes 1951: 45–46).

However, in this article, we argue that an ethnic Cretan origin is not proven, and we find compelling new information from clusters of comparatively well-provenanced stamped arrowheads in Judaea and Syria dating to the late 2nd century B.C.E., evidence that challenges the dominant Ptolemaic interpretation (Sivan and Solar 2000: 173–74; McConchie 2011: pl. XIII:1.1–3, 5; Ben-Ami 2016; Ashkenazi and Fantalkin 2017). We contend that the precise meaning of the 𐤁 device remains unknown, and that, contra the theory of a Ptolemaic connection, the stamped arrowhead is associated with a body of archers involved in the Levantine campaigns of the Seleukid king Antiochos VII Sidetes (138–129 B.C.E.).

By considering new sources of information from the Levant, including iconographic and archaeological evidence, as well as X-ray fluorescence analysis (XRF), we not only question some long-held assumptions about the arrowheads, but find they afford unique insights into the challenges of logistics and performance of military service in the late Hellenistic period, including the cohesion of auxiliary fighters and the physical production and supply of weapons.

This discussion is structured in three main parts: First, we consider the "received wisdom" concerning Cretan archers and interpretations of the 𐤁 device. Second, we make observations based on new contexts in Judaea and Syria. Third, we consider the significance of 𐤁 arrowheads based on the range of available literary, contextual, and physical evidence.

Received Wisdom

A Cretan Connection

Arrowheads of Baitinger Type IA5, whether stamped or not, have long been called "Cretan." The main reason for this is that certain Cretan coins feature this particular type of arrowhead. Specifically, the arrowheads appear as subtypes or controls on the coinage of numerous Cretan cities, including Elyros (Elyrus), Gortyn (Gortyna), Hyrtakina (Hyrtacina), Knossos (Cnossus) (**Fig. 7**), Polyrhenion (Polyrhenium), and Praisos (Praesus) (Wroth 1886: Cnossus nos. 24–27, pl. v:11, 12; Elyrus no. 1, pl. viii:15; Gortyna no. 47, pl. xi:6; Hyrtacina nos. 1, 2, pl. xii:5; Polyrhenium nos. 4–11, 13–17, pl. xvi:13–17; Praesus no. 7, pl. xvii:10; Snodgrass 1964: 147; 1999: 40). John Forsdyke states that the arrowhead symbol on coins is "never found elsewhere [other than Crete], nor does any other arrowhead commonly occur on Greek coins" (1919–1920: 155). The early Hellenistic coinage of Kydonia depicts a warrior—probably the eponymous hero Kydon—stringing a wooden self-bow (**Fig. 8**). Wallace McLeod posits that the numismatic iconography was based on the historical use of the self-bow among the Cretans (1965: 14; 1968). While some have argued that Cretans may have adopted the Scythian-style composite bow sometime in the late 3rd century B.C.E. (Launey 1949: 282, no. 2), there appears to be an undeniable link between archery, arrowheads, and the numismatic iconography of Crete. Regarding the rest of their equipment, ancient sources suggest that Cretan archers may have been habitually armed with a *peltē* and some form of sidearm (Xenophon, *Anab.* 5.2.28–32; Polybius 10.29.6).

Snodgrass saw the antecedent of the "classical arrowhead form" being brought to Crete and the wider Aegean in the late Bronze Age, introduced either directly from Anatolia or indirectly through Egypt (1964: 146; 1999: 129–30). Once introduced, he argues, arrowheads of this type, and archery more generally, continued to be popular in Crete throughout the Iron Age, despite dying out on the Greek mainland, so that from the 6th century B.C.E. onward, Crete came to be associated directly with the best archers in Greece (Snodgrass 1964: 147; 1999: 40). It is argued that Cretans were the most prominent Greek mercenaries throughout the Hellenistic period (Griffith 1935: 245), and mercenary service was the most viable and popular career path for Cretan men (Chaniotis 2005: 80–82).

This is by no means trivial: Numerous literary accounts herald the fame of Cretans as archers, especially those serving as mercenaries in the armies of the major Hellenistic powers, from Sicily in the west to the Seleukids in the east.[2] It is not surprising, therefore, that

[2] See, e.g., Syracuse: Polybius 3.75.7; Livy 24.30.13; Macedonia: Polybius 4.61.1, 4.67.6, 5.66.6; Livy 31.35.1, 33.14.3, 33.18.9, 42.12.7, 43.7.1, 44.43.8; Plutarch, *Aem*. 23.3, 166.1; Achaian League: Polybius 16.37.3, 33.16.5; Livy 35.28–29, 39.49; Sparta: Plutarch, *Pyrrh*. 32.2; *Cleom.* 6.3, 21.3; Polybius 4.84, 13.6.86; Pergamon: Livy 28.7, 34.35.8–9, 37.39.10, 38.21.2; *OGIS* 1.270; Ptolemies: Polybius 5.36, 5.65.7; *OGIS*

Fig. 1. (a) Stamped arrowhead from Knossos, currently housed at the British Museum (BM 1907,0119.223). (Courtesy of the Trustees of the British Museum [https://creativecommons.org/licenses/by-nc-sa/4.0]). (b) Stamped arrowhead UC63219, currently housed at The Petrie Museum of Egyptian Archaeology. (c) Stamped arrowhead UC63220, currently housed at The Petrie Museum of Egyptian Archaeology. (d) Stamped iron arrowhead UC63221, currently housed at The Petrie Museum of Egyptian Archaeology. (b–d, courtesy of The Petrie Museum of Egyptian Archaeology, University College London [photo cropped; https://creativecommons.org/licenses/by-nc-sa/3.0/deed.en_GB])

Fig. 2. Stamped arrowheads from Jebel Khalid. Arrowhead 89.653 (e) is the only arrowhead in the group not clearly stamped with the device. (Photo by B. Miller)

an arrowhead such as Baitinger Type IA5, depicted on Cretan coins and found in so many contexts across the Mediterranean basin, might be associated with the diverse deployment of Cretan mercenaries.

The literary record tells us that a unit of Cretan archers was in Alexander the Great's campaigns, taking part in each of the great pitched battles and serving as part of Alexander's elite strike force for special missions, particularly over rough terrain. They continued to appear in the armies of all of the major Hellenistic powers and were still prolific in the 1st century B.C.E., serving in the armies of Mithridates VI of Pontos (Strabo, *Geogr.* 10.4.10). Individual Cretan archers were also employed as instructors and officers. For example, an Athenian civic inscription from 266/265 B.C.E. honors one Sondros of Crete, who is identified as an archery instructor (*toxotēs*) (*IG* 2.665.28–9). Cretan archers were also among the heroic deceased honored with memorials in Athens alongside Athenian war dead (Pausanias, *Descr.* 1.29.5). During the Seleukid siege of Sardes in 213 B.C.E., the assault of the citadel was devised and led by the Cretan officer Lagoras (Polybius 7.15–18).

For the Seleukids, as for other major states, at least some units of Cretan archers were recruited as *symachoi*, state-maintained foreign soldiers recruited under treaty with individual Cretan cities.[3] Such treaties ensured

1.153; Seleukids: Polybius 5.53.3, 5.79.10, 5.82.8, 10.29.6, 10.30.9; Appian, *Syr.* 32; Livy 37.40; Justin, *Epit.* 35.2; Josephus, *A.J.* 13.86; and Pontos: Strabo, *Geogr.* 10.4.10.

[3] Polybius (5.53.3) makes a clear distinction between the "allied" Cretans (συμμαχικούς Κρῆτας) and the rest of the Greek mercenaries (Ἑλλάδος ξένους και μισθοφόρους) in the Seleukid forces facing the

Fig. 3. Stamped arrowhead from Ashdod-Yam (from Ashkenazi and Fantalkin 2017: fig. 8c). (Courtesy of the Ashdod-Yam Archaeological Project)

Fig. 4. Unprovenanced stamped arrowhead in the Manchester Museum Collection (inv. no. 1981.615). (Courtesy of the Manchester Museum)

Fig. 5. Unprovenanced stamped arrowhead from the D. Artemis Private Collection. (Courtesy of A. Tsaravopoulos)

Fig. 6. Unprovenanced stamped arrowhead from a private Irish collection. (Photo by M. Mazis)

ongoing employment opportunities for their young men, while their recruitment secured first-class units of light infantry for the Hellenistic kingdoms. On an unquantifiable personal level, it also led to the permanent relocation of individual Cretans to other states; more than 1,000 Cretan mercenaries and their families, for example, were granted citizenship at Miletos in 234/233 and 229/228 B.C.E. (Wiegand 1914: 38; Rehm and Herrmann 1997: 160–64; Wörrle 2004).

usurper Molon (see also Bar-Kochva 1976: 48; and Spyridakis 1977: 299–307).

Fig. 7. AR (silver) stater from Knossos (ca. 350–300 B.C.E.), showing the arrowhead control in the left field of the reverse (G.2022). Approximate dimensions: 22–25 mm. (Courtesy of the Trustees of the British Museum [https://creativecommons.org/licenses/by-nc-sa/4.0/])

Fig. 8. AR (silver) stater from Kydonia (ca. 320–270 B.C.E.), showing the Cretan hero Kydon stringing a self-bow; approximate dimensions: 22–25 mm (from Gemini, LLC sale catalog, January 13, 2013, auction X, lot 61). (Courtesy of Gemini, LLC)

In 145 B.C.E., the Seleukid royal claimant Demetrios II overthrew his cousin Alexander I Balas and seized power in Syria with Ptolemaic backing and the support of an entire army of Cretan mercenaries (Diodorus Siculus 32.9c; Josephus, *A.J.* 13.86, 13.10003–10; Justin, *Epit.* 35.2.2–3; 1 Macc 10:67). Following his coup, Demetrios II disbanded the Seleukid army as an unreliable entity, maintaining in its stead his Cretan army and installing Cretan officers in positions of power across the kingdom. The resulting "Cretan Tyranny" was faced with multiple riots in Antioch, unrest across the kingdom, and ultimately proved unsuccessful.[4] Nevertheless, the mid–late 140s B.C.E. saw the temporary advancement of Cretan mercenaries as the only permanent armed force in Syria (Diodorus Siculus 33.4; Josephus, *A.J.* 13.129–30, 13.135–41; 1 Macc 11:38, 45–51; Griffith 1935: 168–69).

However, certainly by the 2nd century B.C.E., the use of ethnic labels to describe units had broadened to refer to the equipment and style of fighting rather than the place of recruitment or origin. Thus, a "Macedonian" could be any soldier equipped in the Macedonian fashion and fighting as part of a phalanx; a "Tarantine" could be any javelin-armed light cavalryman; and a "Cretan" might be any specialist light infantryman with a bow and shield (Lesquier 1911: 123; Griffith 1935: 241–51; Houle 2015: 19–34).[5] Polybius and Livy both refer to a subset of Cretan soldiery, the Neocretans, who could be found in the service of both the Ptolemies and the Seleukids (Polybius 5.3.1, 5.65.7, 5.79.10; Livy 37.40.8, 13). According to Stylianos Spyridakis (1977: 299–307), the Neocretans should be seen as newly enfranchised non-Dorians from Crete, comparable to Spartan Neodamodes. Therefore, even where Cretan soldiers or mercenaries are explicitly named in textual sources, it cannot be taken as fact that the soldiers came from the island of Crete.

Where does this leave the so-called Cretan arrowhead? Snodgrass concedes that the presence of this type of arrowhead does not necessarily demonstrate the presence of archers from Crete (1964: 146–48; 1999: 81). We note that relatively few arrowheads of Baitinger Type IA5 have been published from formal excavations on Crete itself.[6] Certainly, some arrowheads have been found on Crete, but, as outlined earlier, they are also found across the Greek world. There are no primary or epigraphic sources that support a Cretan origin for the arrowhead type, and physical evidence is confined to the aforementioned iconography on Cretan coins, which is the only unique link of which we are aware. One might expect evidence of the type's growth and development on the island, but its earliest appearances in the archaeological record are in fact not from Crete (Erdmann 1973: 39). For example, two casting molds of the arrowhead type were found in the Heraion on Samos dating to the Geometric period (Jantzen 1955: 58, pl. 64:1, 2). The interpretation that the Baitinger Type IA5 arrowhead belonged to Cretan archers is not fixed, and the labeling of the arrowhead type as "Cretan" is not wholly justified.

[4] The nomenclature was coined by Edwyn Bevan (1902 2: 223–35).

[5] As an exemplar of the use of pseudo-ethnics, see the "Macedonian" phalangites in the army of Antiochos IV of Kommagene during the Jewish Revolt (Josephus, *B.J.* 5.11.3).

[6] Two stamped examples are at the British Museum (BM 1907,0119.223) and Agios Nikoloas Museum (inv. no. 4685). Five unstamped examples are from Azoria (Melissa Eaby, pers. comm., 2016) and elsewhere on the island (see Niniou-Kindeli 1991: 426, pl. 62a); Erdmann (1973: 38, n. 16) lists several examples. Many local Cretan museums, such as the Sitia Museum, have examples on display, and it is possible that more exist than are represented in the published archaeological record.

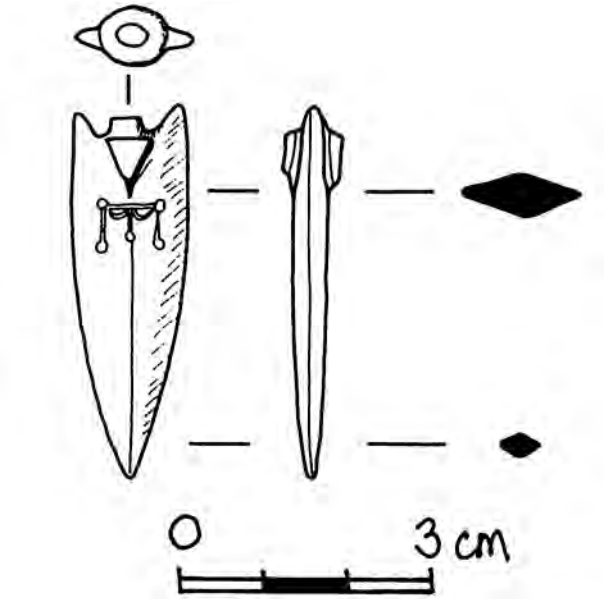

Fig. 9. Detail of Jebel Khalid Arrowhead 02.341 (after Jackson 2014: 593, fig. 14:17.2). (Drawing by J. Sellers)

Fig. 10. EL (electrum) hekte from Mytilene (ca. 377–326 B.C.E.), showing a typical Greek depiction of a tripod on the reverse; approximate dimensions: 9–11 mm (from SINCONA AG, May 27, 2013, auction 10, lot 168). (Courtesy of SINCONA AG)

Previous Interpretations of the 𐤁 Device

Challenging the "Cretan" assumption is important, as it affects long-held interpretations of the 𐤁 device on stamped versions of the arrowhead type. Considering first the form of the stamp, the 𐤁 device appears on only one side of a Baitinger Type IA5 arrowhead, at the widest part of the blade, near the nodule.[7] The device comprises three parallel bars, joined at one end by a single upright stem. In nearly all cases, curved strokes link the bars at or near the upright stem, forming two distinct lobes. On some examples, the corner vertices and pendant lines are finished with a small dot (see, e.g., **Fig. 2:a–d;** and **Fig. 9**).

Scholars have interpreted the 𐤁 device as a trident;[8] a ligature or monogram, representing a name or place (Haynes 1951; McConchie 2011; Reynolds and Kenrick 2015: 75–101; Sekunda 2017); an emblem of a military unit; or even the shooting range of particular arrows (Sivan and Solar 2000). In the first published exploration of arrowheads bearing the 𐤁 device, Forsdyke preferred to view it as a tripod symbol, an allusion to Apollo as the inventor of the bow and the patron of archery (1919–1920: 155; Diodorus Siculus 5.74.5).

The trident and tripod interpretations can be quickly addressed. Most of the stamps clearly depict two curved lobes of a *beta* rather than the single bowl of a tripod as the latter occurs in other contemporary iconography. Furthermore, the band that is generally shown to connect the three legs of a tripod toward the feet is absent in the arrowhead device (see, e.g., **Fig. 10**). Similarly, while there is some semblance of a trident-like form to the device, the middle arm of the *epsilon* never extends beyond the ligature to form a trident "handle," as more commonly represented on items such as sling bullets (Kelly 2012: 280, fig. 5). With respect to the shooting range proposal, we argue in the section on ballistic marks (see below) that the evidence for this is comparatively weak. The supposition that the stamp represents a name is perhaps the idea that has found the most acceptance to date.

In the middle of last century, D. E. L. Haynes, working with two well-preserved British Museum examples, was of the firm view that the device was indeed a ligature of *beta* and *epsilon* and posited two different suggestions based on the provenance information he had at hand—namely, that the mark on the arrowheads represented the name of a place or that of a ruler (Haynes 1951, with reference to BM 1948,11-11.1 and BM 1907,0119.223).

Arrowhead BM 1948,11-11.1, the focus of Haynes's study, was "credibly reported to have been found at Cyrene" (1951: 45), although we were not able to confirm the provenance of this piece or its contextual data. At the date of Haynes's publication, four other arrowheads with the same device were already known. A second example from the British Museum (BM 1907,0119.223) was likely found during Hogarth's excavations at Knossos (see **Fig. 1**). However, the possibility also exists that

[7] The nodule is a thickening at the base of the blade where it attaches to the tang. It may have prevented the arrow shaft from splitting on impact or provided a seat for the shaft (McLeod 1968: 30; Hagerman 2014: 86).

[8] Popular media articles for the Givati Parking Lot excavations (e.g., Lo Paro 2015) reported arrowheads and sling bullets bearing the curiously identified "trident of Antiochos IV."

it came from contemporary excavations at Palaikastro or Psychro.[9] Three other examples were also known—all allegedly from Egypt (two of copper alloy [Petrie 1917: 35, pl. xlii:200, 201] and a third of iron [Petrie 1917: 35, pl. xlii:202]); they are currently housed in The Petrie Museum of Egyptian Archaeology's collection at University College London (see **Fig 1:b–d**).

Haynes's first hypothesis was that the BE monogram represented a mintmark locating the center of production for the arrowheads at Berenike-Euhesperides (modern Benghazi) in Ptolemaic Kyrene. However, he dismissed the suggestion as unlikely, given the lack of prominence of the city and what he saw as the inherent implication that the very existence of such a mintmark necessitated that Berenike-Euhesperides had a civic army—of which there is no evidence (Haynes 1951: 46).[10]

The second position, favored by Haynes, was to view BE as the personal mark of the Ptolemaic queen Berenike II. Haynes noted that Berenike II exercised vice-regal power during Ptolemy III's Syrian campaign (246–ca. 241 B.C.E.) and supposed that she may have had her own personal bodyguard during this period, which could have included a unit of Cretan archers bearing the personalized stamp of the queen on their weapons. This would account for the Libyan and Egyptian provenances of those arrowheads with the BE device known to Haynes at that time. This interpretation has remained relatively unchallenged and has been repeated in later publications, including the seminal work of Snodgrass (1964: 147) as well as more recent work (Murray 1991: 53–54; Reynolds and Kenrick 2015: 75–76; Sekunda 2017; note, however, the inherent doubt in McConchie 2011).

Putting aside the problem of ethnic labeling of arrowheads, Haynes's interpretation faces a more fundamental obstacle. Upon investigation, it appears that the Egyptian provenance of the Petrie Museum specimens is open to serious question. Petrie's three arrowheads were only formally accessioned by the museum in 2002, and there are no records relating to them before then, other than their publication by Petrie in *Tools and Weapons* in 1917. While Petrie defines specific provenances for some of his arrowheads (see, e.g., nos. 124, 125, 128 from Mycenae, 130 from Bologna, or 126 from Abydos in Upper Egypt), he states only that the three inscribed examples were Egyptian (Petrie 1917: 35).

Petrie is known to have purchased objects to fill in gaps in his typologies. Purchases were often made in Egypt, but objects were also bought in London and elsewhere (Alice Stevenson, pers. comm., 2016). The lack of a more precise provenance likely indicates that Petrie was unaware of where the pieces were found. Furthermore, his ascribed date of 1200–800 B.C.E. is up to a millennium earlier than the dates of all known provenanced examples of BE-stamped arrowheads and further highlights Petrie's ignorance of their original context. The lack of certainty in Petrie's provenances can no more rule out an Egyptian context than it can confirm one; however, it does remove the necessity that the arrowheads must have an Egyptian episode in their history.

By comparison, a stamped BE arrowhead recovered from excavations in the 1970s at Sidi Khrebish, Benghazi (ancient Berenike-Euhesperides), close to the city walls, has a certain Libyan provenance (Lloyd and Kenrick 2014: 137–38, no. H387). In terms of a secure date for the arrowhead, however, contextual finds consist mainly of material from the 1st century B.C.E., some of the 3rd century B.C.E., and also some "markedly later" (Reynolds and Kenrick 2015: 76). Joyce Reynolds and Philip Kenrick essentially accept Haynes's interpretation of the BE device with reference to Queen Berenike II, arguing that Cretan bowmen are known from 3rd-century B.C.E epigraphic evidence to have served in Kyrenaika during the Hellenistic period.[11] We caution against the assumption that the stamped arrowhead found at Sidi Khrebish is Cretan and note that the authors themselves concede they are not confident of a 3rd-century B.C.E. date for the stamped arrowhead.

There are several other individual stamped arrowhead finds in the published record, most with provenance issues and all with problematic dates. For the sake of completeness, we summarize them as follows: One in the Karlsruhe Museum allegedly from the battle of Marathon is of doubtful provenance and date, according to Erdmann; an example from Delos is one of several items in Waldemar Deonna's inventory that do not have a certain contextual date; one from Byblos has a general attribution; the example from Lato in Crete was a chance find handed into the museum by a local; and an example from Eretria in Euboea also appears to be a chance find, with context described as associated with classical and Hellenistic pottery (**Table 1**).[12]

[9] The Cretan provenance is certain (Judith Swaddling, pers. comm., 2016). There is a Baitinger Type IA5 example from Palaikastro, although not stamped (Erdmann 1973: 38, n. 67).

[10] See also Asolati 2011: 28.

[11] Reynolds and Kenrick (2015: 76) and Nick Sekunda (2017) cite Epigram 37 of Kallimachos of Kyrene—a dedication by the Cretan archer Menitas to Sarapis, having left his arrows with the Hesperitai (the citizens of Euhesperides-Berenike).

[12] Byblos: Dunand 1938: 137, pl. 141:1996; Delos: Deonna 1938: 209, fig. 239, pl. XXXV; Eretria in Euboea: *Archaiologikon Deltion* 30 (1975): Chron. 161, pl. 88b; Karlsruhe Museum: Erdmann 1973: 35, fig. 1:B1; and Lato (now at the Agios Nikolaos Museum [inv. no. 4685]): *Archaiologikon Deltion* 28 (1973): Chron. 592, pl. 559b, republished in Aupert 1978: 752–53, fig. 235. We thank Nick Sekunda for alerting us to the Agios Nikolaos Museum and Eretria stamped arrowheads.

Table 1. Distribution and Context of Known Stamped Arrowheads

Provenance	*Number*	*Contextual Date*	*Image*
Crete	**2 (Total)**		
Knossos or other (see n. 40)	1	Not known	**Fig. 1a**
Agios Nikolaos Museum (purportedly from Lato)	1	Chance find. Unknown date (see n. 12)	
Levant	**18 (Total)**		
Byblos	1	Not known (see n. 12)	
Jebel Khalid Housing Insula	3	Stratified finds. 2nd century B.C.E.; one example dated to second half of the 2nd century B.C.E.	**Fig. 2:** 06.029, 02.341, 91.678 91.278
Acropolis	1	Stratified find. Late second century B.C.E.–early 1st century B.C.E.	
Jerusalem, Tower of David	9	Stratified finds. 130s B.C.E.	
Jerusalem, Givati Parking Lot	3	Stratified finds. 130s B.C.E.	
Ashdod-Yam (Azotos Paralios)	1	Survey find. 2nd century B.C.E.	**Fig. 3**
North Africa	**5 (Total)**		
Sidi Khrebish (Berenike-Euhesperides), Libya	1	Stratified find. Context described as associated with material mainly from 1st century B.C.E.; some from 3rd century B.C.E.; and some markedly later (see n. 12)	
Egypt (questionable provenance), now at University College London	3	Not known	**Fig. 1b–d**
Kyrene, Libya	1	Not known	
Other	**6+ (Total)**		
Delos	1	Not known (see n. 12)	
Eretria, Euboea	1	Chance find. Context described as associated with classical and Hellenistic pottery (see n. 12)	
Marathon (questionable provenance), now at Karlsruhe Museum	1	Not known (see n. 12)	
Unprovenanced examples in collections	At least 3, total uncertain	Not known (see n. 12)	**Figs. 4–6**

By contrast, we show that evidence from several Levantine contexts dating to the late 2nd century B.C.E.—over a century after the reign of Berenike II—contradicts the Haynes interpretation and the established position.

New Contexts in the Levant—Judaea and Syria

In recent years, Baitinger Type IA5 arrowheads stamped with the 𐅂 device have been recovered from comparatively secure contexts in Judaea and Syria. These finds embody information that challenges several long-held views about the device and create new possibilities for interpreting the logistics and performance of auxiliary troops.

Jebel Khalid, Syria

Jebel Khalid is a Seleukid settlement on the west bank of the Euphrates River, built on a 50 ha rocky outcrop south of the modern Tishrin Dam. Established around 300 B.C.E. by Seleukos I Nicator, the settlement was heavily fortified in antiquity and probably served as a garrison, as well as for monitoring river traffic, until its abandonment in the 1st century B.C.E. (Clarke and Connor 2002: 298–300). Five arrowheads of Baitinger Type IA5 were excavated at the site. Four are clearly marked with the 𐅂 device (see **Fig. 2**).

At least three further unprovenanced examples are known, one in the Manchester Museum (inv. no. 1981.615); one in the private collection of D. Artemis, Athens; and one in a private Irish collection. The last was found to be a leaded tin-bronze arrowhead of 78 wt% copper (Cu); 10 wt% tin (Sn); and 10 wt% lead (Pb) (for details, see the **Appendix** at the end of this article).

Table 2. Comparative Size, Weight, and Chemical Composition of Jebel Khalid Arrowheads

Inventory Number	*Head Length (cm)*	*Tang Length (cm)*	*Blade Width (above Nodule) (cm)*	*Nodule Thickness (Transect) (cm)*	*Weight (g)*	*Main Elements (wt%)**
02.341	4.4	—	1.4	0.72	9.8	59 Cu, 7 Sn, 30 Pb
91.678	3.5	4.0	1.2	0.80	10.7	93 Cu, 6 Sn
91.278	2.5	1.8	1.4	0.95	8.1	87 Cu, 1 Sn, 10 Pb
06.029	3.3	1.3	1.2	0.70	7.9	59 Cu, 5 Sn, 31 Pb
89.653	4.1	2.2	1.3	0.70	8.3	92 Cu, 5 Sn, 3 Pb

* Wt% numbers are rounded (see **Table 3** for details).

One of the stamped arrowheads (inv. no. 91.678) was recovered from the Housing Insula, Area 16, in which a contiguous worn coin of Seleukos III Keraunos or Antiochos III the Great (225–187 B.C.E.) provides a terminus post quem. In addition to the coin, two associated lamp fragments dated to the late 3rd–early 2nd centuries B.C.E. and the 2nd century B.C.E., respectively, provide a probable 2nd-century B.C.E. date (Jackson 2014: 91, table 3.42). A second stamped arrowhead (inv. no. 06.029) was recovered from the Housing Insula, Area 77, in a floor deposit alongside a terra-cotta lamp fragment, which likewise is dated to the 2nd century B.C.E. (Jackson 2014: 592–93, fig. 14). A third stamped arrowhead (inv. no. 02.341) also was recovered from the Housing Insula, Area 95. It came from a floor deposit dominated by Eastern Sigillata A ceramics, providing a clear terminus post quem of ca. 150 B.C.E. (Jackson 2014: 592–93, fig. 17). The fourth stamped arrowhead (inv. no. 91.278) was found in T30, a storage room in the acropolis palace, in a stratified deposit, nominally dated to the late 2nd century to the early 1st century B.C.E. It was found beneath a layer of fallen masonry that relates to or postdates the deliberate and sudden abandonment of the site around 75/74 B.C.E. (Wright 2012: 120–21). A fifth tanged bi-lobed bronze arrowhead (inv. no. 89.653) was found during the excavations of the main (west) gate of the settlement. It was recovered in a badly corroded state with obvious loss of material; however, it appears unlikely to have been stamped. The five arrowheads, taken as a group, are distinct from other local arrowheads, which are commonly made of iron and trilobate (McConchie 2011: 131–35).

Furthermore, the group is an interesting source of comparative information. While all five arrowheads are Baitinger Type IA5 in form, they obviously differ in size. For example, in respect to length, the blades vary from 2.5 to 4.4 cm, with a median measurement of 3.5 cm.[13] Nodule sizes, measured at the transect, also vary, with the shortest blade having the thickest nodule. Although all the objects were confirmed as copper alloy (see the **Appendix** at the end of this article), even within the group there was significant variability in chemical composition. It was clear that no two objects could be from the same production batch. One object (inv. no. 91.678) is a mild (< 5.9 wt% tin) tin-bronze. The remaining four arrowheads are leaded tin-bronzes (inv. nos. 89.653,[14] 91.278, 06.029, 02.341), two of which (06.029, 02.341) are made of very high-leaded tin-bronze (ca. 30 wt% tin) (**Table 2**).

With respect to the two high-leaded tin-bronzes, assuming a uniform distribution of lead,[15] it is likely that a lead content of around 30 wt% would have a significant effect on the performance of a bronze arrowhead. Leaded tin-bronzes are common in the Hellenistic period, particularly as decorative pieces (Craddock 1977: 107). This is because lead has benefits in the alloying mix: at about 2 to 4 wt%, it can lower the melting point of the cast (requiring fewer resources to achieve a liquid state), facilitate fluidity and castability, as well as improve machinability once the metal freezes. Arguably, intricate or complex arrowhead design may account for the use of high-leaded tin-bronze in socketed trefoil arrowheads of the Persian type in the eastern Mediterranean (Muhly and Muhly 1989: 271).[16] However, the drawbacks of high levels of lead in an arrowhead would seem to outweigh castability and machinability advantages. Thirty percent or more weight of lead would be almost com-

[13] The measurement was taken from the base of the nodule to the point of the blade.

[14] Arrowhead 89.653 from Jebel Khalid is probably unstamped. Its chemical composition is a leaded tin-bronze of approximately 91.5 wt% Cu, 4.6 wt% Sn, and 3 wt% Pb. Cf. Arrowhead 47 M67.3:7278 from Sardis (unstamped) with 92 wt% Cu, 3.1 wt% Sn, and 5.0 wt% Pb (Waldbaum 1983: 36, part V, table V.3).

[15] On gravity segregation of lead in bronze artifacts, see Tylecote 1962: 119; and Hughes, Northover, and Staniaszek 1982.

[16] The arrowhead from Tel Michal (analyzed in Lupu 1989: 312, table 25.12, reg. no. 8920/60, pl. 70:26) appears to be of Baitinger IA5 form and has high lead content at 61 wt% Cu, 7 wt% Sn, and 20 wt% Pb.

pletely rejected by the copper lattice as it freezes, leading to severe lead segregation in the copper matrix and a comparatively high-volume fraction of voids—increasing the porosity and therefore brittleness of the object. This outcome would significantly affect the arrowheads' mechanical properties and result in compromised hardness and toughness.

In essence, such a high lead content could, in theory, reduce the lethal proficiency of the arrowhead. Efficiency and effectiveness of an arrow depend on a number of factors: the draw weight of the bow, the weight of the arrow, and the amount of drag through the air. Similarly, the shape and composition of the arrowhead, as well as the composition of the target, can affect how successfully the missile will penetrate and cause harm (Conyard 2013: 535). One reason for significant additions of lead in an arrowhead may be a deliberate attempt to increase its weight (Rothenberg 1975: 78–80). Differently weighted arrows could give archers options in terms of dealing with the target—for example, by controlling velocity at close range with a heavy arrow, or peppering the enemy from a distance with a light one (Conyard 2013: 537). Generally speaking, the Jebel Khalid arrowheads with elevated levels of lead have a higher weight-to-size ratio than samples with low or no appreciable lead levels. However, the weight differences are marginal, and a more significant difference would need to be achieved through the type of arrow shaft used. There is another, perhaps more obvious, reason for high levels of lead in a bronze arrowhead: Scrap metal, including lead, was used to bulk out the alloy. Wide compositional variations in the same type of artifact, especially when the elemental composition does not appear to suit the function of the object, are most likely due to recycling (Fernandes, van Os, and Huisman 2013: 4).

Jaffa Gate, Tower of David Citadel, Jerusalem

Nine 𐤁𐤄 stamped arrowheads of Baitinger Type IA5 were found during excavations of the Jaffa Gate at the Tower of David Citadel along the western fortification line of Jerusalem. In a short summary of the excavation, the directors write: "Dozens of typical Hellenistic arrowheads were found together with ballista stones. . . . All the arrowheads are of bronze and *most are marked with the device*" (Sivan and Solar 2000: 173 [emphasis added]). The arrowheads from the Jaffa Gate excavations have unfortunately never been fully published, but a photo of two of the excavated arrowheads was included in the short report showing their 𐤁𐤄 monogram (Sivan and Solar 2000: 174). A separate photograph provided by Renee Sivan (pers. comm., 2012) to the authors confirms the presence of at least 22 bronze arrowheads of Baitinger Type IA5, of which 4 visibly bear the 𐤁𐤄 monogram.[17] A recent examination of Sivan and Solar's small finds by Donald Ariel of the Israel Antiquities Authority has confirmed the presence of 9 stamped arrowheads within an assemblage of 33 Baitinger Type IA5 arrowheads and 26 arrowheads of other types.[18] Sivan and Solar suggest that the arrowheads and ballista stones belonged to an attacking army and probably relate to Antiochos VII Sidetes' siege of Jerusalem during the reign of John Hyrkanos in the latter half of the 130s B.C.E. (Sivan and Solar 2000: 173–74).

Givati Parking Lot, Jerusalem

Three more Baitinger Type IA5 arrowheads bearing the 𐤁𐤄 stamp came to light during the 2015 Givati Parking Lot excavations, which focused on investigating parts of the 2nd-century B.C.E. western city wall around the lower city of Jerusalem (Ayala Zilberstein, pers. comm., 2018).[19] There is photographic evidence of at least two stamped arrowheads.[20] Area G of the neighboring City of David excavation (1978–1985) revealed a comparable fortification line on what would have been the eastern wall around the lower city (Donald T. Ariel, pers. comm., 2016).

The fortifications uncovered in both the Givati Parking Lot and the City of David Area G excavations included a glacis which consisted of multiple well-sealed strata, producing a pitched incline at about 30° along the base of the wall, presumably designed to inhibit attack by siege engines. Coins associated with the foundation levels of the glacis were produced during the reign of Antiochos IV Epiphanes (175–164 B.C.E.). The upper surface of the glacis at both sites revealed coins of Antiochos VII Sidetes, usually dated to the period 132–130 B.C.E. (Ariel, pers. comm., 2016).[21] According to Ben-Ami, "the spatial distribution of the arrowheads shows they mostly come from the glacis. Some originated in later fills (pers. comm., 2016)."

[17] Renee Sivan and Giora Solar were approached for more detailed information.

[18] Ariel, pers. comm., 2018. The 26 arrowheads of other types consisted of iron arrowheads with a square section, socketed, trilobite copper-alloy arrowheads, and atypical arrowheads of both iron and copper-alloy. The excavation small finds also included many fragmentary iron butt spikes.

[19] Preliminary reporting on the Givati Parking Lot does not mention the arrowheads (Ben-Ami 2015; Ben-Ami and Tchekhanovets 2016).

[20] Two of the arrowheads were published in online news (e.g., i24-News 2015; Lo Paro 2015).

[21] The coin type is in Houghton 1987: no. 2123. The Givati Parking Lot excavation has produced at least 120 such coins in the upper levels of the glacis (see Ariel's contribution to The Maccabees Project 2016).

All three Jerusalem excavations—the Jaffa Gate at the Tower of David Citadel, Area G, and the Givati Parking Lot—appear to show the walls of Jerusalem besieged by Antiochos VII Sidetes in the late 130s B.C.E. (Josephus, *A.J.* 13.8.236–48).[22] Baitinger Type IA5 arrowheads stamped with the 𐅂 monogram were found at both the Jaffa Gate and the Givati Parking Lot. At the Jaffa Gate, these were clearly used by the attackers and fired at the walls (Sivan and Solar 2000). At the Givati Parking Lot, this is less clear, however, as the arrowheads were found on the upper surface of the glacis, it appears to be a reasonable interpretation.[23]

Ashdod-Yam, Israel

A single 𐅂 stamped arrowhead was unearthed at Ashdod-Yam (ancient Azotos Paralios, about 65 km west of Jerusalem) (see **Fig. 3**) as part of a metal-detector survey conducted around the excavated Hellenistic areas. Results of scanning electron microscopy with energy dispersive spectroscopy of the Ashdod-Yam stamped arrowhead reveal a composition of 90.6–92.5 wt% copper and 7.5–9.4 wt% tin—that is, a high-grade binary alloy of tin and copper.[24]

The arrowhead was a surface find near an impressive Hellenistic building on which excavations began in 2015. So far, the building has yielded a number of spectacular Hellenistic finds, as well as ballista stones and other arrowheads. In the preliminary report on the first season of excavations, Fantalkin suggests that, in the context of similarly dated Hellenistic sites at Ashkelon to the south and Gan Soreq to the northeast, the Hellenistic constructions could be viewed within the framework of Seleukid military activity in the area, perhaps representing the settlement of mercenaries in the service of the empire (Fantalkin 2014: 51). He suspects that there was a fortress and garrison of Antiochos VII Sidetes at Ashdod-Yam and expects to clarify the situation with future excavations of the Hellenistic building (pers. comm., 2017).

Interestingly, Ephraim Stern (1988: n. 24) reported that Antiochos VII Sidetes' siege of Tel Dor (ancient Dora) against his rival Diodotos Tryphon (1 Macc. 15:28–31; Josephus, *A.J.* 13.236–48, 261) was marked by arrowheads, ballista stones, and lead sling bullets "almost identical" to those found by Sivan and Solar in the Jerusalem Citadel excavations. It is not clear if Stern is referring to arrowheads of Baitinger Type IA5; however, he most certainly is referring to a group of sling bullets found before the excavations at Tel Dor outside the site proper. One of these bore the inscription ΤΡΥΦΩΝΟ ΝΙΚΗ, clearly dating it to the reign of Diodotos Tryphon (ca.142–138 B.C.E.) (Schlesinger 1982: 116; Gera 1995: 491–96). A great number of other sling bullets, ballista stones, and arrowheads have been found at Tel Dor over the years, but they are not definitively associated with this particular campaign. To date, none of the Hellenistic arrowheads appears to be stamped (Ilan Sharon, pers. comm., 2016).

Observations about 𐅂 Arrowheads Based on New Material

The recent Levantine evidence must call into question Haynes's interpretation of the device as representing Berenike II. Of the five North African stamped arrowheads, four (the Petrie Collection examples and the British Museum example from Kyrene) have imprecise provenances and no datable contexts. Even the reliable provenance of the Sidi Khrebish stamped arrowhead—which may have been seen to support Haynes—can be dated no more securely than a likely 1st-century B.C.E. date, but possibly the 3rd century B.C.E. or even much later. Furthermore, the stamped examples from Byblos, Crete, Delos, Euboea, and the specimen dubiously provenanced to Marathon, all have uncertain contextual dates and cannot be relied upon to support a Berenike II interpretation for the device.[25]

The unquantified but clear majority of well-provenanced and stratified arrowheads bearing the 𐅂 stamp have been found in Jerusalem, where they can be uniformly associated with Antiochos VII Sidetes' siege of the city of ca. 132 B.C.E. The single stamped arrowhead from Ashdod-Yam may have a similar association, which could be validated if Fantalkin's theory of a fortress or garrison of Antiochos VII Sidetes is confirmed in future excavations. Four stamped arrowheads are provenanced to Seleukid Jebel Khalid in northern Syria. These come from secure 2nd-century B.C.E. contexts with probable dates in the second half of that century (see **Table 2** and **Fig. 11**).

Other than the physical attributes of the arrowheads and the general political and temporal context, there is no obvious link between the group of stamped arrow-

[22] The siege is commonly dated to 132/131 B.C.E., although other published dates range from 135–130 B.C.E.

[23] We note that final reporting on the military finds for the site, including the arrowheads, is still in progress (under the direction of Guy Stiebel, Tel Aviv University).

[24] Results of XRF analysis of surface oxides of the same object were 88.4–90.6 wt% Cu, 2.4–10.2 wt% Sn, 0.2–4.7 wt% zinc (Zn), 0.4–1.9 wt% Pb, and 0.4–0.8 wt% iron (Fe) (Ashkenazi and Fantalkin 2017: table 10). The authors are grateful to Fantalkin, director of the Ashdod-Yam Archaeological Project, for early access to these results.

[25] For stamped arrowheads provenanced to Lato (Crete) and Eretria (Euboea), see Sekunda 2017.

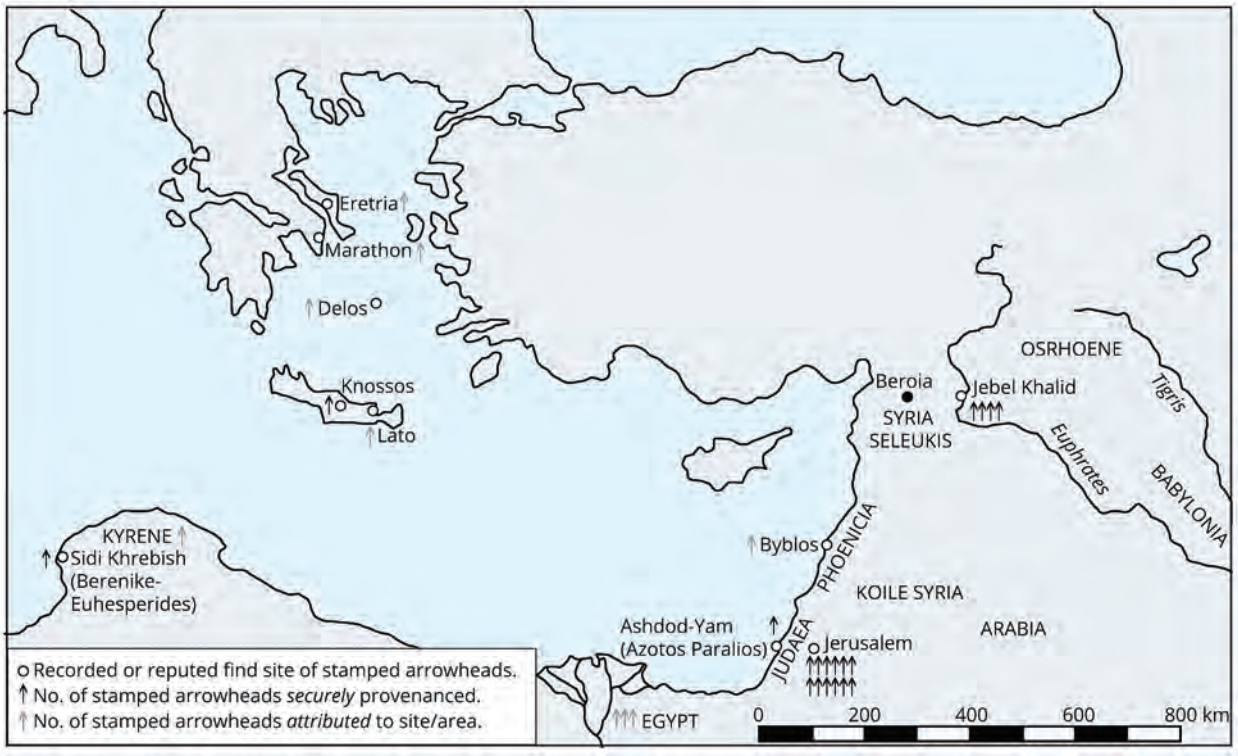

Fig. 11. Distribution map showing known provenances of 𐅂-stamped arrowheads. (Map by N. L. Wright)

heads found in Judaea and the group recovered from Jebel Khalid in Syria. Antiochos VII Sidetes' presence in the southern Levant may relate to his early campaign against the usurper Tryphon or the more general attempt to reconsolidate Seleukid control over Judaea. Having succeeded in both aims, Antiochos VII turned his sights to restoring Seleukid control over Mesopotamia and the eastern satrapies, which had fallen to the Parthians over the course of the previous half-century. Antiochos VII amassed a vast army, including forces of foreign and/or subject auxiliaries from Judaea, Kommagene, and Charakene, and decamped for his *anabasis* in 130 B.C.E.; he would not return (Josephus, *A.J.* 13.249–52; Justin, *Epit.* 38.10; Debevoise 1938: 31, n. 9).

There is no direct evidence of Antiochos VII Sidetes and his troops at Jebel Khalid in Syria, and his route eastward to Mesopotamia remains vague.[26] Yet, as a significant fortified Seleukid settlement guarding a Euphrates River crossing, it is conceivable that Jebel Khalid hosted a Seleukid garrison, including archers in possession of 𐅂-stamped arrowheads, either before, during, or even in the aftermath of Antiochos VII's ill-fated campaign in the east.[27] Regarding Haynes's Ptolemaic origin theory for the stamped arrowheads, there is no evidence of a Ptolemaic occupation or incursion at Jebel Khalid. Only three Ptolemaic coins have been found at Jebel Khalid—all dating to the reign of Ptolemy VI, one of which bore a Seleukid countermark (Nixon 2008: 143, nos. 570–72).

The Significance of the 𐅂 Arrowheads

The 𐅂 device appears, in most observable cases, to have been applied using an engraved die and hammer rather than as part of the molding process. This is evidenced at the macro-scale by the displacement of material caused by the striking impact and the occasional uneven impression seen on some examples, such as Jebel Khalid inventory number 91.278 (McConchie 2011: 133). The stamping would need to have occurred when

[26] Three battles are listed (Justin, *Epit.* 38.10.7), one of which is named as the battle against Idates/Indates on the river Lykos (the Greater Zab—a tributary of the Tigris in modern Turkey and Iraq), where Antiochos VII is said to have stayed two days (Josephus, *A.J.* 13.251). He then went on to conquer Babylonia in 130 B.C.E. but fell to the Arsakid king Phraates II in the spring of 129 B.C.E. (Debevoise 1938: 31–35).

[27] It is not clear if archers were settled or visitors at Jebel Khalid; however, three of the four stratified stamped arrowheads were located in the housing insula (McConchie 2011: 134).

Fig. 12. Close-up of stamped device on Arrowhead 06.029 from Jebel Khalid, showing displacement. Scale 10 mm. (Photo by M. Mazis)

the cast was comparatively cool in order to create a distinctive, clear impression with a visible level of displacement (**Fig. 12**).

The general form of the device differs significantly in only one case, the iron example in Petrie's 1917 catalog (no. 202). Here, the marks linking the bars are rectangular "boxes" rather than curved parts of a *beta*. The peculiar appearance of the device was perhaps dictated by the need to mark the harder material; in fact, the device in this case might have been incised rather than stamped. Generally speaking, the specifics of the device on each of the known examples—the size, dimensions, length of central bar, as well as the irregular placement of the mark in general (cf., e.g., BM 1907,0119.223, BM 1948,11-11.1, and Jebel Khalid specimens)—indicate a lack of standardization in the form and application of the stamp.

Haynes's confident identification of the device as a monogram giving a ligature of the letters *beta epsilon* (or *epsilon beta*) is probably right; however, the meaning of the monogram is less certain. We find analogous examples of manifold stamped or inscribed metal objects in two different areas: coinage and other weapons.

Coin Parallels

The imagery that was used to define and decorate ancient coinage was directly linked to the heart of the state's prestige and power (Wright 2012: 25–44). Imagery can therefore have significant cultural value for manufacturers and users. However, the accompanying subtypes and other control marks (consisting of monograms and symbols) can be used to identify, more specifically, the issuer and place of production.

Classical and Hellenistic coin inscriptions provide the ethnic of the issuing state, sometimes alongside an eponymous magistrate, or else the name and titles of the monarch or dynast who controlled the minting polity. The moneyers responsible for the physical production of the coins appear not to have been high-ranking magistrates for the most part but could retain their positions through successive reigns—or even successive regimes—and often marked the coins with small monograms or symbols as part of the minting process. The purpose of these minor controls has been variously given and might include naming the mint, an eponymous magistrate, the liturgent who donated the metal, the name of the intended end user—the military commander to whom the coin issue was to be sent—or, most commonly, the personal mark of the moneyer himself (Callataÿ 2012: 56–58).

The monogram does occur on Ptolemaic coins, which have been tentatively assigned, on the basis of the monogram, to a mint at Berenike-Euhesperides in Kyrene (Svoronos 1904: no. 858, pl. xxxiv:10; Robinson 1927: group IV). Notably, the coin version of the monogram lacks the stylizations on the pendant lines and corner vertices often found on the arrowhead stamps. Nevertheless, given that the attribution of the coins themselves to Berenike-Euhesperides is far from certain,[28] the attribution of the arrowheads to the same city is not supported. It should also be noted that in a Seleukid numismatic context, mint cities may be identified through type, control, or full ethnic but were not named in monogram form.

The probability that there was a production and distribution hub for missiles in an otherwise unremarkable town is low, and there is no corroborating evidence to support Berenike-Euhesperides as the location of a *fabrica* or military workshop, even if coins were minted there. Indeed, even Ioannes Svoronos, who initially proposed the existence of a mint at Berenike-Euhesperides, was more inclined, given other examples in the Kyrene series (nos. 859, 1141, 1143, 1147, 1132, etc.), to read the  monogram on his coin number 858 as the name of the ruler Berenike rather than the city (1904: no. 858, pl. xxxiv:10).

Ballistic Marks

As might be expected, inscriptions on weapons are much less common than those found in the numismatic corpus. Stone balls used as projectiles for ballis-

[28] Michele Asolati (2011: 28) explicitly doubts that the monogram is a mintmark, suggesting that it refers to a Cyrenean moneyer instead.

tae or slings are found throughout the Mediterranean in the Hellenistic period, some marked with letters or acrophonic numerals (e.g., Actium: Marsden 1969: xix; Pergamon: von Szalay and Boehringer 1937: 48–56; pl. 31, 32; Rhodes: Laurenzi 1938: 33–36; Salamis: Marsden 1973; Tel Dor: Shatzman 1995: 52–72). Israel Shatzman argues that some of the markings—specifically, those found on stone spheres near the Hellenistic walls of Tel Dor—represent a classification system based on diameter and weight in minas, and would have been used to sort the caliber of the projectile (1995: 56–64).

Sivan and Solar extemporize that the 𐡁𐡄 device on the arrowheads from the Jaffa Gate at the Tower of David Citadel excavations could be an emblem for a military unit, the initials of a ruler, or an indication of the range of the missile (Sivan and Solar 2000: 173). With respect to the last suggestion, ideally we would need examples of arrowheads with other ranging marks, as in the case of the ballista stones from Tel Dor, where both a variety of markings and a correlation between markings and weight/size are discernible. As it stands, the stamped arrowheads are unique, and the presence of any form of markings indicating shooting ranges on ancient, medieval, or modern arrowheads is without precedent. Furthermore, it would be unusual for Greek letter-numerals to be presented as a ligature rather than as separate characters. It is far more plausible to read 𐡁𐡄 as a monogram of a person, people, or place.

Military Identifiers

At least as early as the beginning of the 4th century B.C.E., certain Greek poleis used standardized letters to mark the shields of their hoplites.[29] Such decoration was almost certainly painted onto the equipment rather than inscribed. As Haynes acknowledges, where weaponry is marked with the name or symbol of a city, the city is always an independent polis, never a small city subject to a Hellenistic monarchy such as Berenike-Euhesperides (1951: 46).

With the exception of ethnic (or pseudo-ethnic) labels, we know practically nothing about the way most individual units in Hellenistic armies were identified beyond the names of their commanders. We hear of certain divisions of the heavy infantry referred to by the color of their shields—*argyraspides*, *chalkispides*, *leukaspides*, etc.—and an attempt has been made to identify the use of uniform shield blazons for distinct units of the phalanx in the army of Alexander the Great (Matthew 2009: 15–34). In the Ptolemaic army, divisions based on a unit's ancestral ethnicity seem to have existed, and unit names may even have been marked on items as seemingly insignificant as the pins used in the construction of shields (Tsaravopoulos 2010–2013: 187–98; 2016: 43–48). For lighter armed units, we have no historic information beyond ethnics or the names of their commanders.[30]

As far as arrowheads are concerned, it would appear that the 𐡁𐡄 stamp is without parallel, although other projectiles were sometimes marked in antiquity. For example, several Phoenician projectiles are inscribed with the Ugaritic designation for arrow *ḥṣ* followed by differing personal names (Milik and Cross 1954: 5–15; Bordreuil 1982: 187–92).[31] At Olynthos, large bronze projectile heads that must have been fired from artillery pieces were inscribed ΦΙΛΙΠΠΟ, naming Philip (II of Macedon) in the genitive form to denote ownership over the projectile (Robinson 1941: 382–83, nos. 1907–11; Snodgrass 1999: 117) (**Fig. 13**).

Military identifiers on equipment do not only have an operational function (i.e., helping commanders to identify the deployment of units on the battlefield). Identifiers may also serve social and political functions. Inherent in the nature of a military projectile is the conveyance of propaganda in an up-close and personal way. If we think of those who could have experienced the inscription of ΦΙΛΙΠΠΟ on the Olynthos projectiles or the 𐡁𐡄 stamp on the arrowheads under discussion, the possibilities might include the producer, distributor, user, victim, and scavenger. The significance of the stamp to one or more of these classes of people would have been idiosyncratic, depending on the nature of their investment in the object. For example, archers using 𐡁𐡄 arrowheads may have conveyed to companions-in-arms, employers, or the enemy itself their special status—one to be admired and/or feared. Of course, this argument is not new. We see this phenomenon in the case of sling bullets with inscriptions that promote group identity within a corps and instill fear in the enemy (Kelly 2012: 282, 284).

[29] The Lakonians/Spartans employed a Λ (Pausanius, *Descr.* 4.28.5–6), and the Sikyonians employed a Σ (Xenophon, *Hell.* 4.4.10), while in Athens, state-issued equipment might be marked with either an A or AΘE (Kroll 1977: 141–46). Symbols also designated ownership/identity, such as the club of Herakles on 4th-century B.C.E. Theban shields (Xenophon, *Hell.* 7.5.20). William Murray (1991) argues that symbols decorating the bronze ram of a classical/Hellenistic warship discovered in Athlit Bay, south of Haifa, functioned as governmental controls, perhaps linking the warship to Ptolemaic Egypt.

[30] E.g., the Seleukid army at Raphia in 217 B.C.E. where Antiochos's army included 1,500 Cretans under Eurylochos and 1,000 Neocretans under Zelys of Gortyna (Polybius 5.79.10).

[31] Based on the palaeography, the arrowheads are dated 1150–950 B.C.E. (Mitchell 1985: 146–47).

Fig. 13. Projectile head from Olynthos (first half of the 4th century B.C.E.) (1960.490), inscribed with retrograde ΦΙΛΙΠΠΟ and measuring 6.8 × 2.1 cm. (© Harvard Art Museums/Arthur M. Sackler Museum, Bequest of David M. Robinson)

More common than inscribed arrowheads, sling bullets from classical and Hellenistic contexts often bear images or inscriptions (Vischer 1878: 240–84, partially updated in Martínez Fernández 2007: 399–405). Some inscriptions, such as ΔΕΞΑΙ ("Take this!" [Guarducci 1969: 522]), or ΑΙΣΚΡΟΔΩΡΟ ("an unpleasant gift" [Robinson 1941: 421, inv. no. 31.226]), were intended as demoralizing messages for the enemy, while others bear the names of cities or peoples such as ΒΟΙ[ΩΤΙΩΝ] (Vischer 1878: 260), ΑΘΗΝΙΩΝ (Robinson 1941: 429–31, nos. 34.58a, 34.58, 38.ms127), or ΚΝΩ[ΣΙΩΝ] (Guarducci 1935: VIII:43–45). Such ethnics, where they occur, were obviously intended to enable the slinger to be identified with and represent their respective armies.

However, the most common inscriptions found on sling bullets take the form of personal names, either in the genitive case, representing a commanding officer or, more rarely, in the nominative case representing either the manufacturer or slinger (Foss 1975: 28). At Olynthos, inscribed bullets most commonly bore the genitive case names ΦΙΛΙΠΠΟΥ ("of Philip"), ΙΠΠΟΝΙΚΟΥ ("of Hipponikos"), and ΚΛΕΟΒΟΥΛΟ ("of Kleoboulos"), naming the Macedonian king and several of his leading officers who besieged the city in 349–348 B.C.E. (Diodorus Siculus 16.52.2.3; Demosthenes, 3 *Philip.* 58; Robinson 1941: 418–43).[32]

A range of sling bullets marked with the names of probable commanders (ΣΥΛΑΛΑ, ΑΙΝΕ[. . .], ΠΑ[. . .], ΚΛΕΑΝΔΡΟC) are known from Crete (Kelly 2012: 282–86). In addition, a number of sling bullets bearing names of certain or probable Cretan origin (ΕΠΑΙ[ΝΕΤΟΥ], ΑΙΝΙΣ, ΛΑΣΤ[. . .], ΠΟΔΑΙΘΟΥ, ΠΑΙΩΝΙΔ[. . .]) have been found on Antikythera (Tsaravopoulos 2012: 207–20). For Amanda Kelly, "the spread of identical slingshots, bearing the name of a squadron commander, over such a wide range of locales affords insight into the disparate nature of auxiliary troops and their consequent need for self-cohesion" (2012: 285; see also Chaniotis 2005: 95).

Inscribed sling bullets appear together in the same contexts as 𐤁-stamped arrowheads in Jerusalem at both the Tower of David and the Givati Parking Lot. At the former, at least one sling bullet was even marked with a device showing an arrowhead of Baitinger Type IA5 (Sivan and Solar 2000: 173–74). At the Givati Parking Lot, multiple sling bullets were molded with a trident-like device similar to the classical–Hellenistic bullet found at Knossos (The Maccabees Project 2016: object no. A6691 70623; Kelly 2012: 280, fig. 5) (**Fig. 14**). While the trident symbol itself bears no obvious impact on the current study, the fact that it appears as a blazon on sling bullets in both locations could give air to the Cretan connection theory—namely, that Cretan slingers in the Seleukid army camped at Jerusalem. But at Jebel Khalid, no such iconographic link exists, although an uninscribed sling

[32] ΚΛΕΟΒΟΥΛΟ also appears on sling bullets found at Amphipolis, Torone, Stagera, and Apollonia, helping to pinpoint his location, or at least the deployment of his slingers, during Philip's Chalkidian campaigns in 357 and/or 349 B.C.E. (Diodorus Siculus 16.8.2, 16.53.2; Nankov 2015: 2–3). Sling bullets inscribed with the names ΚΛΕΟΒΟΥΛΟ, ΙΠΠΟΝΙΚΟΥ, and a third commander, ΑΝΑΞΑΝΔΡΟΥ, were also found at Strumica/Astraion, Kozi Gramadi, and Kolopenishteto in Bulgaria, representing actions or maneuvers during Philip's subjugation of Thrace in the 340s B.C.E., which escaped detailed notice in the extant historical sources (Nankov 2015: 3–4).

Fig. 14. Sling bullet molded with a trident-like motif from Knossos. (Courtesy of the British School at Athens)

bullet was found in the Housing Insula along with three of the stamped arrowheads (Jackson 2014: 587, n. 82). The contextual link between the arrowheads and sling bullets could signify a similar battlefield role for archers and slingers, or that there were mixed units of the two; there is abundant literary evidence for both scenarios.[33]

𐅂𐅄 *as the Name of an Individual*

Having questioned the reliability of the Queen Berenike II or Berenike-Euhesperides interpretation, we consider other Greek names beginning with BE and find they are relatively uncommon in surviving inscriptions. There are a total of 94 BE names, or variations of names, cited in the online *Lexicon of Greek Personal Names* (http://www.lgpn.ox.ac.uk/). Only 11 of these are known from 5 or more inscriptions and, on the assumption that the monogram could represent a male commander, only 5 are male (Βέλλων, Βενοῦστος, Βέργις, Βερενικιανός, Βερονικιανός). If one were bent on a Cretan connection from this list, Βέργις is the only BE name in the corpus with a Cretan origin (connected with the cities of Dreros and Lato) (Guarducci 1935: 139, no. 26.3; 142, no. 32.3; 143, no. 33; 148, no. 52). With respect to Greek names beginning with EB, they are exceedingly rare; in this case, it was not possible to identify a realistic example.

One possibility is that the 𐅂𐅄 stamp is a producer's mark—namely, of an artisan or artisan group used by or attached to the fighting unit. We know from medieval contexts that metal tools sometimes bear a maker's mark or custom touchmark of the smith who manufactured them, presumably to distinguish the artisan's products from the work of others (Baart 1977: 478). Interesting as this suggestion is, there are few contemporary parallels to support it, although there are signs of growing cohesion among Hellenistic craftsmen in the 1st century B.C.E.[34]

𐅂𐅄 *as a Center of Manufacture*

Haynes's proposition that 𐅂𐅄 was a mintmark indicating an arrowhead manufacturing center at Berenike-Euhesperides has already been dismissed as unlikely. However, if we consider the proposition that 𐅂𐅄 was indicative of a place of arrowhead manufacture more generally—in effect, a mint or *fabrica* mark—we might do better to focus on the Levantine heartland, where most of the arrowheads have been found, or even Crete, given the two stamped finds from there.

On Crete itself, there were no poleis whose names started with the letters *beta epsilon* or *epsilon beta* (Hansen and Nielsen 2004). In the Levant, the largest BE settlement, and therefore perhaps the preeminent candidate for the location of a *fabrica*, was the city of Beroia (modern Aleppo, about 100 km west of Jebel Khalid) (Cohen 2006: 153–55). Beroia was, at best, a middle-tier city for much of its Hellenistic history (2 Macc 13:4),[35] and in the 80s B.C.E., the city formed part of a separatist principality under the tyrants Dionysios and Straton (Strabo 16.2.7; Josephus, *A.J.* 13.384).[36] There is, in reality, little about Seleukid Beroia that would recommend it as a place of arrowhead manufacture of enough importance to warrant the stamping of a civic device on its output.

[33] Accounts of mixed or complementary units of archers and slingers working together are too numerous to mention here succinctly. Some illustrative examples are the conflict at Issos (332 B.C.E.), where both Darius III and Alexander the Great posted interspersed archers and slingers on their flanks (Q. Curtius Rufus 3.9.1–9); the battle between Antiochos III the Great and the secessionist Molon in 220 B.C.E., in which the latter posted his archers and slingers together on either wing, just as the former was to do in 217 B.C.E. at Raphia (a mixed unit of Agrianian and Persian bowmen and slingers) and in 191 B.C.E. at Magnesia (mixed unit of Kyrtian slingers and Elymaian archers). There, the Roman right flank was supported by Cretan archers who fought alongside slingers and javelineers to counter the Seleukid scythed chariotry (Molon: Polybius 5.53.9; Raphia: Polybius 5.79.6; Magnesia: Livy 37.40–41).

[34] For examples of professional guilds in the 1st century B.C.E. and an evolving "consciousness of identity" among Hellenistic craftsmen, see Treister 1996: 329.

[35] It was at Beroia that the Jewish high priest Menelaus was imprisoned and executed by Lysias during the brief reign of Antiochos V Eupator (164–162 B.C.E.).

[36] Beroia was considered the possible location for a late Seleukid mint under Antiochos XI Epiphanes (Philadelphus) (95–92 B.C.E.) and Philip I Philadelphus (95–84/83 B.C.E.) (Houghton 1987: 81–82), but this theory has now been rejected (Houghton, Lorber, and Hoover 2008: 575).

Mobile Producers and Fighting Units

At this point, we consider the physical characteristics of the arrowheads, which provide clues about the meaning of the stamp in terms of production and manufacture.

Earlier, we described irregularities in the application of the ⊟ stamp on the arrowheads, together with the likelihood that the stamp was applied to the metal once it had solidified after casting. The stamped nature of the ⊟ device on the arrowheads differs from the ΦΙΛΙΠΠΟ projectile heads from Olynthos and inscribed sling bullets, all of which are in relief and were created by the mold during the casting process. Arguably, the post-production marking of ⊟ suggests that the monogram was not an integral part of the production process but applied retrospectively to the completed arrowheads. In essence, a *fabrica* or other established place of manufacture was not necessary for the stamp to be applied.

In the field of numismatics, multiple dies used for single coin issues relate either to large emissions or long-term production.[37] Regarding the ⊟ arrowheads, the variation in the stamped marks could similarly suggest long-term production, where one might discern the effects of developments in technique, technology, and/or style over time. However, the same stamp variability could occur in large-scale emissions in a limited time frame—say, ahead of a campaign, where elements of central control and standardization are present but discernible variations are possible if parts of the production process are dispersed or outsourced for the sake of efficiency. A combination of centralized control and outsourcing might result in a product that conforms to required specifications in some ways—for example, style and shape—but differs markedly in others—for example, composition or finishing. A third possibility for high variability is a situation in which individuals create a product to their own specifications, available resources, and needs.

Before considering these possibilities in the case of the stamped arrowheads, evidence of the chemical composition of the group of stamped arrowheads from Jebel Khalid could be useful. As noted earlier, the composition of the Jebel Khalid arrowheads is far from consistent. Compositional variation may represent the use of differently weighted arrowheads for different combat situations. There is no obvious contemporary corroborating evidence for adjustable arrow ranges; in fact, the literary evidence suggests a potential lack of adaptability at times.[38] More likely, the variation in alloy quality denotes production under suboptimal circumstances, perhaps in haste and/or with constrained resources.[39] This could account for the significant variability of chemical composition and, in at least two cases, potential compromises in hardness and toughness of the Jebel Khalid arrowheads—higher-grade examples notwithstanding. It is not inconceivable that producers might be forced from time to time, especially in the midst of campaigning, to resort to metal readily at hand, such as recycled copper-alloy objects of dubious quality or even lead objects, which would be thrown into the casting mix. This is certainly not without precedent—after the battle of Cunaxa, Cretan archers made use of Persian arrows that fell into their hands and seized bowstrings and lead from local peasants (Xenophon, *Anab.* 3.4.17).

We suggest, therefore, that the Baitinger Type IA5 stamped arrowheads have standardizing as well as individualizing attributes. Undeniably, the shape of the arrowhead conforms to well-known style specifications involving tang, barb, and nodule. Every stamped arrowhead found to date is stylistically similar; the ⊟ stamp itself is in its familiar arrangement of *epsilon* and *beta*, and never includes other letters. However, the chemical composition of the arrowheads tested so far has a degree of variability that is remarkable, not only as an indicator of different production runs but also of a variety of source material in the composition of the object. Given the varying size of the arrowheads (including nodules) and the inconsistency of the stamp "font," we can infer the use of many molds and dies for stamping.

The most likely explanation for the high variability in composition and finishing is that vast quantities of arrowheads were made, thereby accounting for the numerous dies and molds; and there were occasions of limited or constrained resources (raw materials, fuel, skilled producers), resulting in evidence for recycling or suboptimal alloying. This is the sort of situation that would be expected in the context of a large campaign or series of campaigns, where weapon points would need to be made and finished rapidly and in large numbers to replenish stocks.

[37] Cf. Antiochos III the Great's intense production of elephant drachms in preparation for his Armenian campaign in 212/211 B.C.E. (Houghton and Lorber 2002: nos. 1065, 1066) with quasi-municipal issues of Anazarbos, where a single obverse die was used to strike multiple emissions of bronze coins over a period of perhaps 10 years (Wright 2008: 115, quasi-municipal types I–IIc).

[38] Xenophon (*Anab*. 3.3.15) describes the enemy as being able to shoot arrows and sling stones so far that neither the Cretan archers nor javelin-men could reach them in reply.

[39] Cf. Justin (*Epit*. 38.10), who, perhaps influenced by the ascetic tastes of Posidonius (Bar-Kochva 1976: 101), describes the vast army of Antiochos VII Sidetes as having so many cooks and so much precious tableware that the army appeared to be on its way to a banquet.

For any hostile force living off the countryside, supplies of materiel are as significant a consideration as food and water for the troops. Antiochos VII Sidetes' army appears to have shifted from several siege affairs in Judaea to open battles against Parthia. We have only a glimpse into the provisioning of his forces during his time in Judaea: There is Simon's reported gift of large quantities of provisions and money to support the siege of Tel Dor (Josephus, *A.J.* 13.224); and Hyrkanos furnished Antiochos with whatever his army needed after the siege of Jerusalem, including soldiers (Josephus, *A.J.* 13.250–51). Even if exaggerated, an army and train of the alleged size of Antiochos VII's would have been hard pressed to resupply materiel, no matter the generosity of Judaean leaders (Downey 1961: 125, n. 28). Accounts relating to Antiochos VII's Parthian expedition provide no information about supplies, although one could infer from the reported behavior of the billeted troops that looting took place.[40]

For archers, an adequate and secure supply of arrows to fight long campaigns and sieges would be essential for success. Describing the ratio of 14th-century C.E. orders of bows and sheaves of arrows as approximately 100 to 1, Robert Hardy suggests that an archer on campaign could count on 100 arrows, to be replenished as often as possible—a considerable undertaking for any army on the move (1992: 85). In antiquity, the Parthians' ability to bring in fresh supplies of arrows by camel gave them a decided advantage in the battle of Karrhai against the army of Crassus in 54 B.C.E. (Plutarch, *Crass.* 24.5–25.1). Archery requires the supply of several consumable components: metal for the arrowhead, wood for the shaft, gut for the bow, and stocks of wood for bow breakages. Scavenged arrows after battle would be one source of metal, but this would mean re-melting and recasting broken or misshapen heads (requiring fuel and refractory material), and there would need to be new metal sources to account for total losses. Recycling or even "bulking up" the arrowhead alloy with any metal products at hand—particularly lead, which has a low melting point and is cheaper and more abundant than tin[41]—might be expected if not excused. By contrast, objects from the Hellenistic settlement at Rishon Le-Zion show controlled alloying processes involving consistent quality copper-tin binary alloys with object-appropriate material selection and thermal treatments (Ashkenazi, Iddan, and Tal 2012: 528–48). In clear terms, the physical variability of the arrowheads in the Jebel Khalid group and the compromises in quality are consistent with the idea of a group of archers manufacturing, supplementing, and mending their equipment while on the move from one deployment to the next.

There is additional support for the notion of logistically expedient mobile weapons production. The logistics of the Hellenistic army were shaped by the 4th-century B.C.E. reforms of Philip II to optimize speed and mobility: reducing the size of the baggage train and requiring equipment and supplies to be carried by the troops themselves along with a restricted number of servants (Engels 1978: 120).[42] Furthermore, the use of replacement shafts for sarissae (pikes) indicates the technological development of Hellenistic weaponry that could be repaired quickly and efficiently by its own troops (Matthew 2015: 56, 62, 65). Finally, the Seleukid army is known to have traveled with a mobile mint during major campaigns, and, on practical grounds, there would have been little difference between casting copper-alloy coin flans or copper-alloy arrowheads while in the field.[43]

In all probability, the 𐅂 device on the arrowheads would have been stamped "on the go," probably by multiple individuals, as large quantities of battle-ready arrows were demanded and produced. Significant is the appearance of these stamped arrowheads in the archaeological record alongside far more common and widespread unstamped ones, assuming depositional bias would affect all arrowheads of the type relatively equally. It gives credence to the idea that the stamp represents a discrete unit's identity within a larger group. Similar to Kelly's theory regarding the case of stamped sling bullets showing the same name at multiple locales, the 𐅂 device would represent a company of archers displaying the need for "self-cohesion" in the context of "the disparate nature of auxiliary troops" (Kelly 2012: 285). Given the unprecedented use of stamped monograms on arrowheads, the device might be speculated to identify an elite cohort within the body of auxiliary archers, perhaps personal guards to the king or commander, or those having

[40] After early victories in Parthia, Antiochos VII's troops were billeted into winter quarters, where they appear to have made themselves so unpopular with the locals that the latter are said to have shifted loyalties to the Parthians (Justin, *Epit.* 38.10.8–10; Diodorus Siculus 34.17.2).

[41] Pliny the Elder (*Nat.* 34.48.16) discusses the relative value of "white lead" (tin) and "black lead" (lead). In the vicinity of the Levant, the Bolkardağ Valley in southern Anatolia contains rich deposits of argentiferous lead ore (Yener et al. 1991).

[42] Bezalel Bar-Kochva (1976: 100) argues that the Seleukid army under Antiochos VII Sidetes had reached a low standard, trailing a horde of civilians, craftsmen, and servants; however, this position is clearly derived from the negative bias inherent in ancient literary accounts of the later Seleukid kings.

[43] E.g., Uncertain Mints 59 and 60, active in Koele-Syria during the Fifth Syrian War (ca. 202–198 B.C.E.) (see Houghton and Lorber 2002: 411–15).

a singular reputation or skill. Evidently, the device was important enough socially and/or politically that it continued to be stamped on arrowheads, even when these were made of recycled metal.

The evidence supports a theory of mobile production and finishing and an opportunistic marshaling and recycling of supplies in the late Hellenistic period. The clustering of comparatively secure provenances of 𐤁 arrowheads, principally Levantine, suggests an active unit of mercenary archers of unspecified ethnicity being deployed across multiple theaters of conflict in the Near East, from Jerusalem to the Euphrates Valley.[44]

Concluding Remarks

There are established historical accounts of the extensive use of mercenary light infantry in the Hellenistic period, with archers playing a notable role in numerous battles, skirmishes, and sieges from before the time of Alexander the Great. It may well be that the widespread distribution of the Baitinger Type IA5 arrowhead is due to the deployment of mercenary archers in the region across various theaters of war. This article does not rule out the possibility that ethnic Cretans were the mercenary archers who used the Baitinger Type IA5 arrowhead, but we caution that the commonplace "Cretan" in literary sources may not relate so much to ethnicity as to the equipment and combat role of certain auxiliary units. Looking to physical evidence to support a Cretan origin for the Baitinger Type IA5 arrowhead, there are iconographic ties between the arrowhead and Cretan coinage; however, this is not a compelling justification for an ethnic label.

In the case of the 𐤁-stamped group, the arrowheads are perceptibly more rare in the archaeological record than their unstamped counterparts. The concentrated distribution and dating evidence from sites in Jerusalem and other parts of Judaea presents a remarkable body of stamped and unstamped Baitinger Type IA5 arrowheads (as well as siege projectiles and sling bullets) within a comparatively narrow time frame, principally linked to the campaigns of Antiochos VII Sidetes. We have argued that 𐤁 is the distinctive marking of a body of mercenary archers predominantly working in the Levant in the latter half of the 2nd century B.C.E., although we do not exclude their presence elsewhere in the region or in other near-contemporary periods. The evidence is also consistent with the four stamped arrowheads (and one unstamped) from Jebel Khalid in Syria, which mainly come from 2nd-century B.C.E. contexts—one more narrowly dated to the latter half of the second century B.C.E.

With respect to the 𐤁 device itself, this article provides evidence in support of the idea of mobile production and constrained supplies, requiring recycling and opportunistic resourcing—an understandable corollary of the movement of military units through different theaters of war. Such an interpretation accounts for those arrowheads produced in a way that risked poor performance outcomes and is in contrast to controlled alloying processes seen elsewhere in the Hellenistic period. Finally, comparable numismatic evidence for monogram usage, together with the evidence from inscribed sling bullets, also lends weight to the idea that 𐤁 was the mark of a cohesive unit, promoting its collective identity, whether that is shared ethnic or cultural origins, reputation and skill, or elite service.

In essence, we can put to rest the idea that the 𐤁 device relates to the Cretan bodyguard of a 3rd-century B.C.E. Ptolemaic queen, as this is unsupported by the available evidence. To date, the overwhelming association is between the stamped arrowhead with the 𐤁 device and the late 2nd century B.C.E., particularly the Seleukid campaigns of Antiochos VII Sidetes.

[44] Hyrkanos's capitulation to Antiochos VII Sidetes to end the siege of Jerusalem involved a sum of money and payment for mercenary soldiers; presumably, they would have set out with Hyrkanos as he accompanied Antiochos VII against the Parthians (Josephus, *B.J.* 1.61; *A.J.* 13.249; cf. *A.J.* 7.393).

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Appendix: Results of X-Ray Fluorescence Analysis of Copper Alloy Arrowheads from Jebel Khalid, Syria

Purpose and Procedure

The aim of this XRF analysis was to determine the gross chemical composition of each of the objects.

Analysis of the objects was carried out at the Mineral Processing Unit of RWTH Aachen University in Germany using a Niton XL3T-53523 COM3 Analyzer, operated in alloy mode. Silicon and aluminum detection was disabled for the analysis.

Because XRF is a near-surface measurement (~ 10 μ depth), the objects required preparation in order to remove non-representative material for the directed radiation beam. In each case, the objects had been previously conserved with a protective layer of microcrystalline mineral wax. This was removed using a solvent (ethanol). An area measuring approximately 5 × 5 mm on the surface of each arrowhead was abraded with successive grades of polishing paper in order to remove patina and surface corrosion products until fresh metal was exposed. The samples were cleaned in ethanol one final time.

Results

The major chemical components of five arrowheads from Jebel Khalid (including error margins) are set out in **Table 3**. Results of analysis of an unprovenanced arrowhead from a private Irish collection are also included.

Conclusions

The results confirm that all the objects are copper alloys. One sample (91.678) is a binary alloy of copper and tin (mild tin-bronze < 5.9 wt% Sn). The remaining samples are ternary alloys of copper, lead, and tin. There are two samples that are very high-leaded tin-bronzes (02.341, 06.029), with around 30 wt% lead each. The tin content in three of the leaded tin-bronze samples (91.278, 06.029, 89.653) is comparatively low (< 4.6 wt%). It cannot be discounted that the high lead contents of two of the samples (02.341, 06.029) are a result of gravity lead segregation of a high-lead tin-bronze object (Tylecote 1962: 119; Hughes et al. 1982: 359–64). The unprovenanced sample was a leaded tin-bronze of 10 wt% lead and 10 wt% tin.

If the results for 02.341 and 06.029 are not anomalous, the high lead content would materially affect the mechanical properties of the arrowheads and result in material with comparatively low levels of hardness and toughness. Lead is nearly completely rejected by the copper lattice as it freezes and occurs as a series of interdendritic solid particles in the alloy. A high-leaded tin-bronze will stay in solution at high temperature, but as the alloy freezes, large globules of lead tend to pool, often resulting in a high-volume fraction of voids and an ultimately weakened and porous material (Craddock and Giumlia-Mair 1988: 317–26). Theoretically, attempts to improve the arrowheads' properties through deformation by cold hammering, for example, would most likely result in mechanical failure along the copper-lead interface (Ashkenazi, Iddan, and Tal 2012: 532).

The inference is that the lead in these cases was used to bulk out the alloy. The use of scrap metal in production could be supported by the prevalence of low tin in some of the samples, which may be the result of preferential oxidation of tin during recycling (Rovira and Montero 2003: 15–22).

Table 3. Major Chemical Components of Five Arrowheads from Jebel Khalid, Syria, and the Unprovenanced Arrowhead in a Private Irish Collection

Inv. Nos.	*Copper*	*Tin*	*Lead*	*Iron*	*Zinc*	*Antimony*	*Nickel*	*Cobalt*	*Titanium*	*Chromium*	*Vanadium*
02.341	59.222 ± 0.254	6.801 ± 0.05	29.944 ± 0.177	0.209 ± 0.009	< LOD ± 0.023	0.081 ± 0.005	0.019 ± 0.008	0.075 ± 0.006	0.068 ± 0.005	0.037 ± 0.006	0.059 ± 0.005
91.678	92.518 ± 0.607	5.887 ± 0.063	0.276 ± 0.009	0.114 ± 0.005	0.04 ± 0.014	0.032 ± 0.005	< LOD ± 0.014	0.054 ± 0.004	0.111 ± 0.005	< LOD ± 0.009	0.058 ± 0.004
91.278	87.055 ± 0.297	0.97 ± 0.011	9.535 ± 0.06	0.246 ± 0.006	< LOD ± 0.024	0.046 ± 0.004	< LOD ± 0.016	0.02 ± 0.003	0.066 ± 0.004	0.052 ± 0.004	0.078 ± 0.004
06.029	58.961 ± 0.318	4.54 ± 0.044	30.828 ± 0.227	0.388 ± 0.012	< LOD ± 0.025	0.062 ± 0.006	< LOD ± 0.016	0.037 ± 0.006	0.079 ± 0.007	0.03 ± 0.007	0.112 ± 0.007
89.653	91.516 ± 0.351	4.554 ± 0.033	3.412 ± 0.033	0.195 ± 0.006	< LOD ± 0.027	0.094 ± 0.006	0.02 ± 0.007	0.027 ± 0.003	0.071 ± 0.004	0.016 ± 0.005	0.081 ± 0.004
Private Irish Collection	78.131 ± 0.048	10.394 ± 0.028	9.682 ± 0.039	0.958 ± 0.014	0.173 ± 0.015	0.048 ± 0.007	0.042 ± 0.009	0.165 ± 0.009	0.172 ± 0.005	0.011 ± 0.005	0.203 ± 0.005

Note: LOD = limits of detection

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