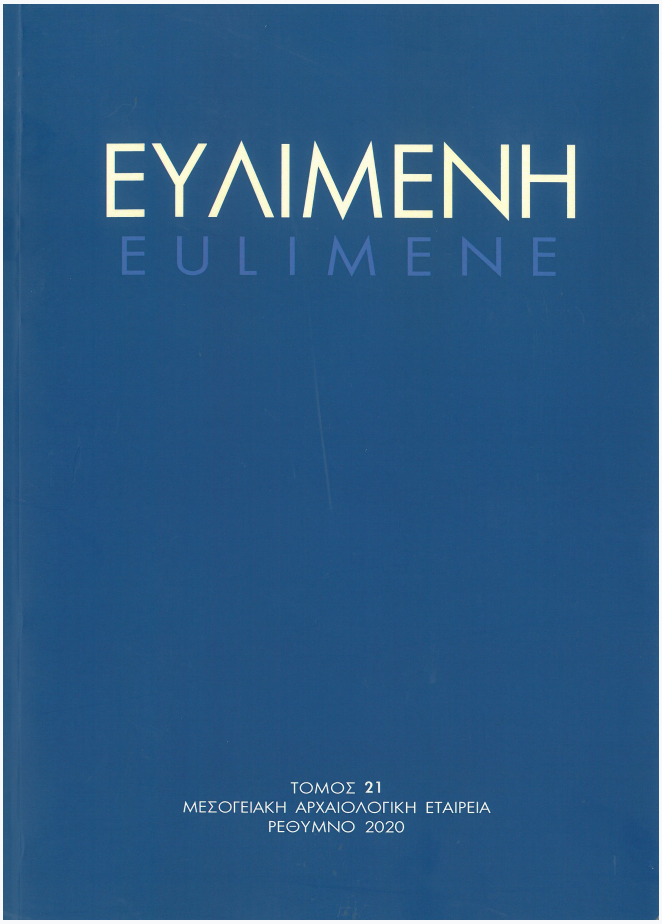
EULIMENE

Vol 21 (2020)

EULIMENE 21 (2020)



Arrowheads from ancient Pella A weapon as a tool or a tool as a weapon

Ioannis N. Bellas

doi: 10.12681/eul.32856

ΕΥΛΙΜΕΝΗ

ΜΕΛΕΤΕΣ ΣΤΗΝ ΚΛΑΣΙΚΗ ΑΡΧΑΙΟΛΟΓΙΑ,
ΤΗΝ ΕΠΙΓΡΑΦΙΚΗ, ΤΗ ΝΟΜΙΣΜΑΤΙΚΗ ΚΑΙ ΤΗΝ ΠΑΠΥΡΟΛΟΓΙΑ

Τόμος 21
Μεσογειακή Αρχαιολογική Εταιρεία
Ρέθυμνο 2020

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EULIMENE 2020
ISSN: 1108–5800

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Στέλλα Σπαντιδάκη – Μανόλης Ι. Στεφανάκης – Ιωάννης Π. Μπαρδάνης, Ο πολεμικός ροδιακός στόλος και τα υφάσματα του τυπικού εξοπλισμού του ναυτικού της ελληνιστικής Ρόδου, *ΕΥΛΙΜΕΝΗ* 21 (2020), 1-64.

The Rhodian military fleet and the textiles of the standard equipment of the navy of Hellenistic Rhodes. The island of Rhodes is one of the Greek islands with the longest naval tradition and the Rhodian navy of the Hellenistic period was the most powerful Greek navy after the Athenian one. This paper presents the results of a research project, entitled HISTIA, studying the production, maintenance, and administration of a neglected area of research, namely the sails, rope and any textile equipment needed for the military ships of Rhodes. By focusing on this previously unstudied field of naval studies, this project, not only aims at breaching a significant research gap, but also establishes a new field of textile archaeology that studies textiles intended for the ships, bringing together the fields of ancient history, naval history, and textile archaeology.

Based on similar studies carried out for the Athenian navy, as well as research on the naval power of Rhodes, HISTIA project investigates evidence and research questions related to the types of ships used in Classical and Hellenistic Rhodes, the facilities of the Rhodian harbors, the maritime networks of Rhodes and the navy stations, and the ship's equipment in textiles and rope; the basic type of ship being the trireme, a significant source of information for the establishment of the requirements in textiles and rope were the naval catalogues of Piraeus listing the triremes and their equipment. The project also studies the materials required for this production, the possibility of local cultivation, as well as the trade of raw materials and finished products; similarly, the production process, information about workshops, workforce, as well as different trades necessary to meet the constant requirements of the navy in textiles and rope. Moreover, as was also the case in Athens, in Rhodes too this material required constant and specific maintenance in storehouses with special conditions in order to be safely stored and be useful for a long period of time.

Ioannis N. Bellas, Arrowheads from ancient Pella: A weapon as a tool or a tool as a weapon?, *ΕΥΛΙΜΕΝΗ* 21 (2020), 65-100.

Αιχμές βελών από την αρχαία Πέλλα: ένα όπλο ως εργαλείο ή ένα εργαλείο ως όπλο; Οι αιχμές βελών τόξου αποτελούν ένα θέμα από το οποίο μπορεί κανείς να αντλήσει ενδιαφέροντα στοιχεία που αφορούν τη χρήση του τόξου γενικότερα. Από την πρωτεύουσα των αρχαίων Μακεδόνων, την Πέλλα, προέρχεται ένα σύνολο 50 αιχμών, το οποίο είναι ικανό για την εξαγωγή συμπερασμάτων που αφορούν σε όψεις της δημόσιας και ιδιωτικής ζωής των κατοίκων της. Στη συγκεκριμένη εργασία, αφού πρώτα παρουσιάζεται η τυπολογία και η κατανομή των αιχμών σε κατηγορίες, οι οποίες ερευνώνται ως προς την προέλευση και το χρονικό εύρος της χρήσης τους, στη συνέχεια γίνονται προσπάθειες ερμηνείας της παρουσίας τους. Σε μια περιοχή όπως η αρχαία Πέλλα, η οποία δεν πολιορκήθηκε και δεν λεηλατήθηκε κατά τη διάρκεια της ιστορίας της, οι ερμηνευτικές προσεγγίσεις της χρήσης των αιχμών οδηγούν στην αναζήτηση

πτυχών της ιδιωτικής ζωής των κατοίκων της: από το κυνήγι, την ασφάλεια και την προστασία τους και από την παρουσία μισθοφόρων, μέχρι την άσκηση των νέων στην τοξευτική στα γυμνάσια.

N. Vogeikoff-Brogan, The lamps from the sanctuary of Hermes and Aphrodite at Syme Viannou, Crete, *ΕΥΛΙΜΕΝΗ* 21 (2020), 101-150.

Οι λύχνοι από το ιερό του Ερμή και της Αφροδίτης στη Σύμη Βιάννου, Κρήτη. Η παρούσα μελέτη εξετάζει το σύνολο των λύχνων που βρέθηκαν στο Κτήριο C-D του Ιερού του Ερμή και της Αφροδίτης στη Σύμη Βιάννου. Εκτός από λίγους λύχνους των ύστερων ελληνιστικών χρόνων, η πλειοψηφία των λύχνων χρονολογείται από τον 1ο έως τον 3ο αι. μ.Χ. Από τη μελέτη της εικονογραφίας δεν προκύπτει άμεση σύνδεση των διακοσμητικών θεμάτων τους με τη λατρεία των δύο θεοτήτων. Ελάχιστοι λύχνοι που χρονολογούνται στον 6ο-7ο αι. μ.Χ., βρέθηκαν κοντά στη πηγή στα ανατολικά του ανασκαφικού χώρου, συνδέονται με την κατασκευή σύγχρονου βυζαντινού ναϊδρίου, αλλά και με τη συνεχή ιερότητα του χώρου κατά τη χριστιανική περίοδο.

Angelos Chaniotis, Too shameless, even for the gutters! Prostitutes in Tralleis, *ΕΥΛΙΜΕΝΗ* 21 (2020), 151-154.

Εξαιρετικά άσεμνο, ακόμη και για τους οχετούς! Πορνεία στις Τράλλεις. Μια νέα επιγραφή από τις Τράλλεις, σπάνιο δείγμα ρυθμίσεων για την προστασία της ηθικής, αναφέρει μέτρα κατά των εκπορνευομένων ανδρών και γυναικών. Σύμφωνα με τη συμπλήρωση που προτείνεται για ένα αποσπασματικά σωζόμενο χωρίο, οι νόμοι των Τράλλεων απαγόρευαν την παρουσία πορνών στις παρυφές των δρόμων, «ώστε η σεμνότητα της πόλης να μην ενοχλείται ούτε καν μέχρι τους οχετούς». Η συμπλήρωση αυτή στηρίζεται σε αρχαία κείμενα που συσχετίζουν τους οχετούς με ανηθικότητα. Αυτό το έντονα ρητορικό κείμενο χρησιμοποιεί το αίσθημα της αηδείας ως όπλο ηθικής καταδίκης.

Κωνσταντίνος Ι. Χαλκιαδάκης, Σχόλια σε τιμητική επιγραφή από τη Λύττο, *ΕΥΛΙΜΕΝΗ* 21 (2020), 155-158.

Comments on an honorary inscription from Lyttos. This article reexamines an honorary inscription from Lyttos (*I.Cret.* I xviii 50), first published by the Italian archaeologist and epigraphist Federico Halbherr, without further comments. However, based on some stereotypical expressions and the drawing of the inscription, we could date it to the reign of Trajan and make some assumptions concerning the identity of the *protokosmos* mentioned in the inscription.

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ARROWHEADS FROM ANCIENT PELLA: A WEAPON AS A TOOL OR A TOOL AS A WEAPON?

εἰ μὲν δὴ ἀντίβιον σὺν τεύχεσι πειρηθείης,
οὐκ ἄν τοι χραίσμῃσι βιὸς καὶ ταρφέες ἰοί
(Iliad 11, 386-387)

In the above passage of Iliad, Homer through Diomedes vituperates Paris because he is unable to deal with him in a duel, but he prefers cowardly to hurt him from afar by safely shooting his arrows. This passage in conjunction with another text by Pausanias (1, 23, 4) might summarize the ancient Greeks' view towards the use of the bow as an offensive war weapon. In the latter, Pausanias commenting some centuries on Dietrefes' statue on the Acropolis, refers to the aversion that Greeks – with the exception of Cretans – exhibited towards the use of this active and powerful weapon. But does this opinion correspond to the reality or the Greeks gradually begun to use the bow? If so, did they use it as a weapon in war events or as a tool in their daily life? These questions in conjunction with some specific affairs about the arrowheads, morphological and chronological, constitute the issue of this article.

During excavations in the area of ancient Pella conducted from 1977 to 2014, an important part of the ancient city was discovered. It includes the complex of the agora, a number of building blocks surrounding it and extending to the south, as well as a large section of the cemeteries (**Plate 1**).[1] During those excavations, many and various finds of particular importance for the research of both ancient Macedonia and the ancient Greek world in general have been brought to light. One group of these findings includes the arrowheads. In particular, 50 arrowheads were discovered, a number that enables, as will be seen in this paper, the drawing of conclusions on aspects of the public and private life of its inhabitants.[2] These arrowheads can be divided into two types: a) the tanged arrowheads (**Figure 1**) and b) the socketed arrowheads (**Figure 2**).[3]

[1] These works were conducted in the context of University's excavation (about Agora), of the project Conservation - Enhancement of the archaeological site of Pella, as well as performed by the local Ephorate of Antiquities during the reported period. See Akamatis 2012, with earlier bibliography. Also, Lilimpaki–Akamati and Akamatis, 2015; Lilimpaki–Akamati and Akamatis 2012; Lilimpaki–Akamati 2000; Lilimpaki–Akamati and Akamatis 2014.

[2] I owe many thanks to Professor I. Akamatis and the Honorary Director of the Ministry of Culture of Greece Dr. M. Lilimpaki-Akamati for granting me access to the material for this study.

[3] Concerning the typology of the arrowheads, it was considered more accurate to distinguish them based on the existence of a tang or a socket into two typological categories and then, to further divide each into

Type A: Tanged arrowheads (**Figure 1**)

The majority of the Pella arrowheads (37) belong to type A and can be divided into five categories: a) triangular, b) curved, c) bodkin, d) leaf-shaped and e) trilobate.

A1: Triangular arrowheads

The first category includes the triangular arrowheads, their main feature, as the category name suggests, being the triangular shape of the body. These are 18 arrowheads (cat. nos.1-18, **Plate 2**), seven of which are made of bronze and the remaining of iron. Based on the existence or lack of the boss at the junction point of the tang with the body, they are divided into two subcategories (**A1α** and **A1b**). The general characteristics of the first subcategory **A1α** (cat. nos. 1-15, **Plate 2**) are, apart from the triangular body, the conical or round boss and the barbs, where the blades of the body end.[4] In terms of morphology, a number of variations can be detected. One of them has an elongated body and short barbs (cat. nos. 1, 2, 3, 11 and 15, **Plate 2**). A second variation has a long and flat body with long or short barbs (cat. nos. 4, 6-10, **Plate 2**), while the third and final variation has either a short and narrow body (cat. nos. 5, 13, 14, **Plate 2**) or a short and flat one (cat. no. 12, **Plate 2**). The shape of the body is triangular with a straight outline except on three examples, where the outline is slightly curved-elliptical (cat. nos. 2, 11, 15, **Plate 2**). The tang has mostly square, and in some cases round, cross section; its length, when preserved in its entirety, varies and in its final form is usually particularly long. The barbs, when preserved, appear in both forms, with the exception of the first variation where they are short. In two examples, they have a curved outline (cat. nos. 2 and 9, **Plate 2**) whereas they are particularly long in arrowhead 16. The boss is mainly conical and, in most examples, distinct from the body without protruding. Its length ranges from 0.073-0.09 m and its width from 0.011-0.021 m.

A central rib is formed on two of the arrowheads (cat. nos. 2 and 12, **Plate 2**) running along the body and dividing it into two blades. One has a long body and short, curved barbs while the second, has a short and flat body, long barbs and long tang with square cross section.[5] The peculiarity of this arrowhead lies in that it bears an embossed emblem above the boss; the motif ⁂ can be seen at the lower part of the emblem and two symbols, a half thunderbolt and a triangular body of an arrowhead, at the upper part (**Plate 3**). The presence of the AB on the stamped tiles, many of which have been found in Pella, has been explained as the monogram of *βασιλικός* (=royal), which according to the current view, indicated the state-royal control of the workshops that had undertaken their production. This could point to a similar interpretation with regards to this particular arrowhead, i.e. it belonged to a production overseen by a state, and in this particular case, by a kingdom.[6]

Further morphological analysis shows that on two arrowheads (cat. no. 1 and 5, **Plate 2**) a shallow groove is formed on one side of each blade.[7] On another arrowhead

subcategories. On this particular typology, see Snodgrass 1964, 144-153; Batinger 2001, 8-27; Bellas 2018, 59-186, where also earlier bibliography.

[4] These are the category 1 c 2 arrowheads according to Snodgrass (1964, 146), I A 4 and 5 according to Baitinger (2001, 9-11) and A1β ii and iii according to Bellas (2018, 65-84).

[5] It belongs to category I A 4 according to Baitinger (2001, 9-10) and A1β i according to Bellas (2018, 65-69).

[6] On a further interpretation of the emblem, see Bellas 2018, 218-219; Bellas 2019.

[7] For the groove, see below 9.

(cat. no. 4, **Plate 2**), one of its blades has been shaped into a hook which is probably associated with the weapon's effectiveness. It should be also noted that two arrowheads have their sharp point broken (cat. no. 4 and 8, **Plate 2**) while a third has its own completely damaged (cat. no. 11, **Plate 2**), probably as a result of its crash on a hard surface, possibly a rock.

As for the topography, two arrowheads were discovered in the sanctuary of the Mother of Gods (cat. no. 8 and 9, **Plate 1**),[8] one near the sanctuary of Darron in the quarter of the public bath and pottery workshops (Information square) and the rest in the agora premises, primarily in the eastern stoa as well as in neighbouring quarters and streets. Only one (cat. no. 16) was found in the area of the eastern cemetery in a mixed fill outside a grave. In terms of chronology, all arrowheads were found in layers dated to the Hellenistic period (3rd-2nd century BC). A significant number, mostly those discovered in the workshops quarter, were in the destruction layer of the city.

The second subcategory, **A1b**, includes two iron arrowheads and differs from the first in the absence of the boss (cat. no. 17 and 18, **Plate 2**).[9] The triangular shape of the body with the blades ending in long barbs is discernable. The tang has a rectangular cross section in the first example and a square cross section in the second. In the first arrowhead (cat. no. 17), the tang is flattened at the point where it is joint to the body forming in a way a sort of boss while at the lower section a forked end is formed similar to those on Bronze age arrowheads.[10] The first was discovered in the area of the eastern stoa in the agora in a 3rd century BC layer while the second, in a courtyard of an early Hellenistic house.[11]

The triangular tanged arrowheads follow a long tradition, since at least the Mycenaean period.[12] Their distribution is detected primarily in Greece whereas is limited in Asia Minor and North Africa and absent in the West.[13] The first subcategory arrowheads (**A1α**) comprise several examples in places such as Olympia (11),[14] Stymphalos (13),[15] Delos (12),[16] Delphi (11)[17] and the Ideon Andron (7),[18] and are found in smaller numbers in many areas of the mainland and islands of Greece.[19] However, their number in northern Greece is of especial importance (53); in Macedonia,[20] they have been discovered mostly in Olynthus (25)[21] and Pella (15), as well as in Thrace, in Maroneia (7)[22] and Stryme (6).[23]

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[8] Lilimpaki 2000, 153, 154, nos. 426, 427.

[9] These are the category 2 arrowheads according to Snodgrass (1964, 148) and A1β iii according to Bellas (2018, 84-88).

[10] Buchholz 1962,19, pl.12, h.

[11] Akamatis 2015, 13, n.17.

[12] On the arrowheads of this period, see Buchholz 1962.

[13] On the distribution of these arrowheads, see Bellas 2018, 70-88; Baitinger 2001, 10-11 (type IA4 and 5).

[14] Baitinger 2001, 10-11 and 98-99, nos. 38-46.

[15] Hagerman 2014, 86-87, nos. 87-99, pl. 5.2 and 5.3b.

[16] Deonna 1938, 208-209.

[17] Avila 1983, 148-149, nos. 1102, 1105-1107, 1110-1112, 1119, 1143 and 1144.

[18] Sakellarakis and Sapouna-Sakellaraki 2013, 127.

[19] See above n. 13. It concerns areas of the Peloponnese, Attica, Epirus, Thessaly, the islands and Crete.

[20] In Macedonia, and in lesser numbers, appear in other places as well, like Vergina, Leukopetra, Aloros, Xerolimni, Stageira and Amphipolis. Bellas (2018, 74-77).

[21] Robinson 1941, 388-391, nos. 1940-1964. This is type D1 according to Robinson.

[22] Bellas 2018, 77, nos. 22-27.

[23] Triantafyllos 1999, 713-714, fig. 14; Bellas 2018, 78, nos. 28-33.

Based on the current data, the second largest number of arrowheads in this category following Olynthus has been revealed in Pella, which along with Stymphalos have the most iron arrowheads of this category.[24] In terms of chronology, they span a period from the Archaic to the Hellenistic times, with the majority dating back to the 5th and 4th centuries BC.[25]

The arrowheads of the second subcategory (**A1b**) are mostly traced in Crete,[26] Delos[27] and Lefkandi,[28] and less in Athens,[29] Aigina[30] and Lindos.[31] Nevertheless, their numbers in the region of Macedonia and mainly in Vergina –where they have been discovered in Proto-Geometric graves and in the acropolis–[32] is quite significant. These arrowheads are earlier in date compared to those of the previous categories and most of them belong from the Proto-Geometric to the Archaic period.[33] From this point of view, the chronology of the Pella arrowheads is problematic. Based on the stratigraphy, they should be dated from the end of the 4th to the beginning of the 3rd century BC; however, based on the typology and evolution of the category they are earlier and should be placed at least in the Classical period. Given that a cemetery of the Iron Age and the Archaic period has been found in Pella and specifically in the area of the new entrance to the archaeological site, perhaps these arrowheads should be associated, if not with the particular cemetery at least with the settlement or the town of the same period that could not have been far away.[34] Therefore, a dating of these arrowheads in the 7th and 6th centuries BC seems to be more plausible.[35]

A2: Curved arrowheads (with an S-shaped outline, Figure 1)

The second category includes arrowheads with a curved body that has an S-shaped outline. These are three items, two made of iron and one of bronze (cat. no. 19-21, **Plate 4**). Apart from their shape, they feature a conical or round boss and short barbs. Two have a quadrilateral cross sectioned tang preserved in fragmentary form (cat. no. 20, 21) while

[24] See below 10.

[25] See above note 13. Bellas 2018, 84.

[26] They originate in Karfi, Kavoussi, Fortezza and Arkadi. Snodgrass 1964, 148.

[27] These are 18 arrowheads. Gallet de Santerre and Tréheux 1947, 233-234; Gallet de Santerre 1958, pl. XXVIII, no. 63; Deonna 1938, 208, no. 4479; Bovon 1970, 227, no.143.

[28] These are 11 arrowheads. Popham 1996, Grave 79A, pl.78, A14; Popham, Sackett and Themelis 1980, 256, pl. 211, 244.

[29] Kübler 1943, 34, pl. 38, no. 34.

[30] Maass 1984, 276-277, n.51, pl. 10g.

[31] Blinkenberg 1931, 196, no. 606.

[32] A total of 26 arrowheads have been found, 22 in the cemetery of the Tumuli and 4 on the Acropolis. Andronikos 1969, 272-273; Bräunig and Kilian–Dirlmeier 2013, 264, fig. 201; Rhomiopoulou and Kilian–Dirlmeier 1989, 97, 114, 133. For the Acropolis arrowheads see Faklaris 1994a, 120, 123. Bellas 2018, 85, 268, nos. 34-37.

[33] Snodgrass 1964, 148; Bellas 2018, 88.

[34] On the Iron Age and Archaic times cemetery, see Akamatis 2008, 144-146; Lilimpaki–Akamati and Akamatis 2012, 9-12.

[35] A similar problem exists regarding the arrowheads of the same category from the Acropolis of Vergina, which in spite of being found in Hellenistic layers typologically are dated to earlier periods and together with other objects constitute a product of transport from the Iron Age cemetery. I owe this information to Prof. Faklaris, whom I also thank. Also see, Bellas 2018, 75, 85, 88. On the chronology issues of arrowheads see, Baitinger 2001, 7; Bellas 2018, 224-226.

the third has a round cross sectioned tang wholly preserved (cat. no. 19). Morphological variations can be observed in the body; the first arrowhead (cat. no. 19) has an elongated and narrow body, the second an even more elongated (cat. no. 20) and the third a short and flat body (cat. no. 21). Also, the S-shaped outline in arrowheads 19 and 20 is clearly discerned, while in arrowhead 18 appears to be more in a broken line. This arrowhead has also a shallow groove running down the blade of each side that is similar to those of the previous category. The length of the body minus the tang ranges from 0.023 to 0.044 m, whereas the whole arrowhead with the tang is 0.062 m long. Two of the arrowheads were found in the east stoa premises in the agora (cat. no. 20, 21) and the third inside a compacted fill of a road leading to the agora. All three were detected in Hellenistic layers.

However, placing these arrowheads in some general category remains problematic. Based on their curved body, they could be placed in categories 1b by Snodgrass[36] and IA3 by Baitinger.[37] These types contain arrowheads with a boss, short barbs and curved/S-shaped form but they differ in their cross section which is not rhomboid but broken as a result of a socket on one blade of each side.[38] Of those found in Pella, only one arrowhead (cat. no. 20) could belong to this category even though its cross section is not well-defined due to wear. The remaining items seemingly follow in the tradition of the triangular arrowheads, based also on their other features besides their curved body, i.e. the boss and the barbs. With regards to the bronze arrowhead in particular (cat. no. 19), this is further supported by both the broken S-shaped outline and the shallow groove seen in the examples of the previous category.

A3: Bodkin arrowheads (**Figure 1**)

The third category of the first type consists of ten iron arrowheads (cat. nos. 22-33, **Plate 4**) the main characteristic of which is their solid, pyramidal body with a square cross section.[39] Most of them have the general features of the category with no variations. The only exceptions are arrowhead 31 (**Plate 4**) with a trapezoidal body, arrowhead 32 with quite a flat body that is square at the bottom and with a smaller width at the top and arrowhead 33 with a square cross section but a curved outline. In most of them, the greater part of the tang is missing. Their surviving length ranges from 0.04 to 0.062 m. Three of them were found in the north stoa premises in the agora, five in streets adjacent to the agora (street of south agora, S of the south stoa between I/2-I/4 and N of I/7 quarter), one inside a room in the east stoa while the remaining four were discovered on the road towards the paved way to the south, in the quarter of the public bath and the pottery workshops (Information square) and the quarter east of the sanctuary of Darron. They were all found in Hellenistic layers of the 3rd and 2nd centuries BC.

They were widely used in Cyprus, hence they were called "Cypriot".[40] However, this name was questioned on account of their earlier presence in the East.[41] As far as their

[36] Snodgrass 1964, 145-147.

[37] Baitinger 2001, 9.

[38] These are arrowheads from Olympia (Baitinger 2001, 9, 97, nos. 15-21), Olynthus (Robinson 1941, 383-387, nos. 1913-1939) and the area of South Italy and Sicily (Baitinger 2009, 216-219).

[39] It is the corresponding type 4 according to Snodgrass (1964, 154), the IB category according to Baitinger (2001, 11) and A3α according to Bellas (2018, 96-104).

[40] Robinson 1941, 392.

[41] Erdmann 1973, 36. 1977, 7; Snodgrass 1964, 154.

terminology is concerned, the term *square* is probably more suitable to these arrowheads; it is taken from the *square arrows* (*τετράγωνα βέλη*) used by Galen to describe the arrowheads with four sides (τὰ τέσσαρας ἔχοντα γλωχῖνας).[42] Their appearance dates back to the Bronze Age (LH III2) both in Greece (Acharnai-Menidi)[43] and in Asia Minor (Alişar Hüyük, Boğazköy),[44] down to the Roman period, with the majority belonging to the Classical times.[45] During the late Classical and the Hellenistic period, these arrowheads appear in the Macedonian region, as well. Besides Pella, they are found in Olynthus,[46] Stageira,[47] Torone,[48] Sindos,[49] Pydna,[50] Vergina,[51] Leukopetra[52] and at the site of Kastri at Polyneri (Grevena).[53] On account of their presence in particular in cities besieged by Philip II (Olynthus, Stageira, Torone), they are associated with his army's archers.

A4: Leaf-shaped arrowheads (Figure 1)

The fourth category consists of arrowheads with the main characteristic being the oval or rhomboid body ending in a tang which gives them the shape of a leaf (cat. nos. 34-36, **Plate 4**).[54] These are three arrowheads which can be divided into two subcategories. The first, **A4α**, which includes arrowhead 34, has a midrib that runs across the body and ends in the noticeable conical boss. The item is made of iron with a big conical boss and the sharp point bent. It was found on the floor of the north stoa in the Agora in a 2nd century BC layer. In general, this category is not one of the most common ones and has few similar examples mostly from Cyprus (Vouni, Idalion, Kition (Citium), Marion, Amathous, Palaipaphos)[55] and fewer from Greece (Delphi, Kalapodi).[56] Most are dated from the 8th-5th centuries BC.

The second subcategory, **A4b**, has as its principal characteristic the oval outline and the absence of the midrib and includes the remaining two arrowheads (cat. no. 35 και 36,

[42] Galen, *Τῶν Ἱπποκράτους γλωσσῶν ἐξήγησις*, 19, 146, 4.

[43] Several arrowheads of this category bearing the characteristic long tang and the short tip have been found in the tholos tomb in Acharnai (Menidi). Lolling 1880, 29, 32, 35, pls. 9, 8. Buchholz 1962, 27, type IX.

[44] Erdmann 1977, 8; Erdmann 1982, 7.

[45] On the evolution of the category from the Geometric to the Hellenistic times, see Snodgrass 1964, 154; Erdmann 1973, 32-34; Bellas 2018, 103-104. Regarding Roman times, see arrowheads from Pergamum (Gaitzsch 2005, 197-198, 143, no. 36-40, 58-61) and a Roman camp in Saalburg (Erdmann 1982, 5-7).

[46] Robinson 1941, 392-397.

[47] Bellas 2018, 98, 279-281, no. 76-85.

[48] Cambitoglou, Jones, Joyner and McLoughlin 2001, 727-728, nos. 18.14, n. 44.

[49] Despoini 2016, 315, no. 661, fig. 693.

[50] Besios and Noulas 2010, 136.

[51] Bellas 2018, 98, 271-275, no. 42-61.

[52] Bellas 2018, 98, 276, no. 62-65.

[53] Drougou and Kallini. 2002, 664; Drougou 2015, 23.

[54] It is the corresponding type 5 according to Snodgrass (1964, 155) and type A4 according to Bellas (2018, 107).

[55] On arrowheads of Cyprus, see Gjerstad, Lindros and Sjöquist – Westholm 1937, 101, 105, nos. 205a, 220b; Gjerstad, Lindros and Sjöquist – Westholm 1935, 578, type 4, nos. 271, 379, 666, 788, 1000, 299, grave 43, nos. 19, 20, 33, pl. 55, grave 13, nos. 25-27; Karageorgis 2003, 98, 142, no. 3936, pl. 85; Gjerstad, Lindros and Sjöquist – Westholm 1935, 299, grave 43, no. 19, 20, 33, pl. 55; Gjerstad, Lindros and Sjöquist – Westholm, pl. 19, grave 13, no. 25-27; Erdmann 1977, 22; Bellas 2018, 108-109.

[56] Avila 1983, 146, no. 1152; Rainer 2007, 481, 546, no. 392; Bellas 2018, 108.

Plate 2).[57] These are an iron and a bronze arrowhead which do not deviate from the general features of the subcategory. They were discovered inside a compacted fill of the road leading to the agora inside a 3rd century BC layer. Examples of this category have been found in Lefkandi,[58] Lindos,[59] Crete and more specifically Kavoussi,[60] Knossos,[61] Kommos[62] and Arkadi[63] as well as Cyprus in Idalion,[64] Agia Eirini,[65] Kition,[66] Kourion,[67] Salamis[68] and Palaipaphos.[69] It is apparent from the above that their presence is limited to the islands of Greece and Cyprus and the unique examples from mainland Greece being those from Pella and one from Vergina.[70] In terms of chronology, they cover a period from the Proto-Geometric to the Archaic times, while their majority is dated to the Geometric period.[71]

However, the general category of the leaf-shaped arrowheads (**A4 a** and **b**), except of the abovementioned areas, has been also strongly represented in the East since already the Bronze Age; typical examples come from Egypt,[72] Palestine,[73] Mesopotamia,[74] Syria[75] and Tarsus[76] and Boğazköy[77] in the Asia Minor. They are dated from the Late Bronze Age to the Classical period. The subcategory **A4b** arrowheads without the midrib are earlier in date than the remaining since the majority belong to the Proto-Geometric and Geometric period.[78] They appear to be absent during the Hellenistic period but emerge in variations in Roman times .[79]

Once again, the Pella arrowheads remain as far as their chronology is concerned problematic. In accordance with the category A1β examples and despite having been

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[57] It is the corresponding of category A4*β* according to Bellas (2018, 114-117).

[58] Popham 1996, Grave 79A and 79B, pl.78, A14, B12.

[59] Blinkenberg 1931, 196, no. 611.

[60] Gesell, Day and Coulson 1986, 382, pl. 80 h, i; Gesell, Day and Coulson 1991, 155, pl. 59e.

[61] Coldstream and Catling 1996, 194, nos. f 3-6.

[62] Shaw 1981, 238, pl. 60b.

[63] Levi 1931, pl. 11.

[64] Gjerstad, Lindros and Sjöquist – Westholm 1935, 575, 578, nos. 200, 276, 485, 838, 879, 729, 730, 1311, 1134b, 1350.

[65] Gjerstad, Lindros and Sjöquist – Westholm 1935, 792, no. 2766.

[66] Karageorgis 2003, 108, no. 1260.

[67] Buitron – Oliver 1996, 158, 162 nos.104-125 and 200a.

[68] Chavane 1975, 106, nos. 324-327. Karageorgis 1970, 189, no. Z6.

[69] Erdmann 1977, 22, 35-36, nos. 129, 260-270.

[70] Bellas 2018, 114, 283, no. 89.

[71] Bellas 2018, 114-117.

[72] Examples of the 7th and 6th century BC were found in Egypt, Petrie 1888, 77, 78, pl. 37, nos.14-16 and 39, no.11.

[73] In Palestine, arrowheads of this category were found in many places (Samaria, Gazaros, Gerar), dating from the 9th-5th century BC. Crowfoot, Crowfoot and Kenyon 1957, 456, type B, 454, pl. 111, no.17. Macalister 1912, pl. 215, no.57. Petrie 1928, 16, pl. 29, nos. 26, 50, 52, 61, 62.

[74] In Mesopotamia, arrowheads were found in various places (Persepolis, Nimrud, Ur), dating to the 7th century BC. Erdmann 1977, 39.

[75] In Syria, examples are dated from the 14th – 10th centuries BC. (Byblos, Alalach). Woolley 1955, 282, pl. 71, no.1-3. Dunand 1939, pl. 99.

[76] Goldman 1963, 366, nos. 78, 85, 100 and 105.

[77] Erdmann 1977, 22, 39.

[78] Bellas 2018, 117.

[79] These are the arrowheads from Pergamum and in particular, types A, B, C, D. Gaitzsch 2005, 139-141.

found in Hellenistic layers (3rd and 2nd centuries BC), both the absence of such arrowheads in the Hellenistic period and the dating of most of their similar examples to earlier periods lead towards an earlier chronology. This is further supported by their provenance, i.e. compacted fill of a road leading to the agora for the two arrowheads (**A4β**) and mixed fill of a floor in the north stoa in the agora for the third (**A4α**). It is highly probable the mixed fill used for the aforementioned floors to have contained earlier material too, which may have originated in the cemetery of the Iron Age and the Archaic times noted previously.[80]

A5: Trilobate arrowheads (Figure 1)

The first type is completed with a category represented by one rare iron example; its main characteristics are the three blades that end in short barbs and a tang of round cross section (cat. no. 37, **Plate 4**). This is a category that is quite frequently seen in the type of arrowheads with a socket but is fairly scarce in the tanged one. It is uncommon in the Greek world with only two similar examples from Palaipaphos linked with the siege of the city by the Persians. A small number of arrowheads in this category comes from Palestine and specifically Samaria,[81] dating from the 7th to 5th centuries BC and Gazaros,[82] where one Hellenistic arrowhead exists. Furthermore, few examples come from Caucasus,[83] Persepolis, Phrygia –with just one arrowhead (*Boğazköy*)– as well as the region of Bactria (*D'aï Khanoum*), where four arrowheads of this category exist found in the Hellenistic palace.[84] It appears therefore that they are common in Anatolia and earlier scholars have considered them to be Persian.[85] Such type of trilobite arrowheads with a tang seems to have been widely used during the Roman period, both in the Republican and the Imperial times.[86] They are located in various parts of the West (Perugia, Entremont, Puy d' Issolud)[87] as well as in the acropolis at Pergamum in Roman layers.[88] With regard to the arrowhead from Pella, the fact that it was discovered in an area in the northern stoa at the agora during the removal of a floor of a later date, in a second half of the 2nd century BC layer, suggests that it is more closely connected with the Roman presence in the region following the battle of Pydna in 167 BC.

[80] See above 5. It was common practice the filling of a road or a floor to contain small objects that are not easily detected and have been transported with the soil. This is particularly true for arrowheads and poses a problem with regards to their chronology. Baitinger notes this problem in relation to the Olympia arrowheads. Baitinger 2001, 7. Again on the chronology of arrowheads, see Bellas 2018, 224-226.

[81] Crowfoot, Crowfoot and Kenyon 1957, 456, pl. 111, 19.

[82] Macalister 1912, pl. 215, 62.

[83] Virchow 1883, 96.

[84] Rapin 1992. 317, pl. 65, nos. 12, 14. Francfort 1984, pl.24, no.16, 21.

[85] Bulanda 1913, 44.

[86] Erdmann 1977, 40. Bishop and Coulston 2006, 58, 88-89, 133, 136 and 167.

[87] Bishop and Coulston 2006, 58, 72, n. 27.

[88] Gaitzsch 2005, 144, type Jb, pl. 40, Po. The arrowhead from Pergamum is different because its blades do not end in barbs but bend towards the tang shaping a rhomboid outline.

Type B: Arrowheads with a socket (Figure 2).

The second type with the characteristic feature of the socket includes thirteen arrowheads (cat. no. 38-50, **Plate 4**), which can be divided into three categories: a) those with three blades and barbs, b) with three blades but no barbs and c) the pyramidal.

B1: Three-edged arrowheads with barbs (Figure 2)

The main characteristics of this category are the three blades ending in short barbs and the socket with a round cross section that extends from the blades reaching to the middle of the body.[89] In Pella, this category includes eight bronze arrowheads that closely follow the characteristics of the category with no variations (cat. nos. 38-45, **Plate 4**). One was found in the eastern stoa at the agora on a surface layer whereas the remaining items in a grave of the late Classical period (third quarter of the 4th century BC) in the city's eastern cemetery.[90] Given that the Classical cemetery of the city was located in the area of the agora, the arrowhead from the eastern stoa may have originated from some damaged grave. These particular examples fall in the general form of the category with certain variations primarily in terms of size. Some of them have their sharp point bent or completely broken possibly as a result of their use (cat. nos. 40, 43, 45, **Plate 4**). What is also significant is that most arrowheads retain inside the socket remnants of the wooden shaft, items 43 and 45 being the most characteristic examples.

The arrowheads with three blades and barbs were quite widespread in the Greek world. A large number has been discovered in Olympia (55)[91] and Athens (81),[92] while fewer numbers have been detected in other areas of mainland Greece.[93] Their presence in northern Greece (Macedonia-Thrace) is important, in areas such Vergina (74),[94] Olynthus (16),[95] Linos in Rhodope (20)[96] and Stryme (17).[97] Outside Greece, their presence is limited in Asia with few examples in a region of Afghanistan (Sistan, six arrowheads),[98] Karhemis[99] and Al Mina[100] while others were found in Scythia (Caucasus: Mussi - Yeri, three arrowheads in a grave,[101] Georgia, two bronze arrowheads in a 7th and 6th century BC residential complex[102] and various other areas[103]), Thrace (Zlatinitsa)[104] and northern France (one arrowhead in Villenauxe).[105] With regard to this category, Weber has

[89] This is type 3b4 according to Snodgrass (1964, 153), IIB1 according to Baitinger (2001, 17) and B2α according to Bellas (2018, 145-153).

[90] This is grave 81 in the eastern cemetery. I extend my thanks to Dr Lilimpaki-Akamati both for granting access to the particular arrowheads and the information on the grave's chronology.

[91] Baitinger 2001, 17, 111-116, no. 172-226.

[92] Stichel 1984, 59, fig. 51.

[93] Bellas 2018, 146-148.

[94] Andronikos 1984, 77, 186, pl. 38. Faklaris 1994b, 110.

[95] Robinson 1941, 405, 409, no. 2097-2100 and 2124-2136, pl. 125, no. 2097-2099 and 2136.

[96] Bellas 2018, 148, 294-301, no. 125-144.

[97] Bellas 2018, 148, 288-293, no. 106-122.

[98] Sulimirski 1954, 299.

[99] Woolley 1921, 125, pl. 22β. Snodgrass 1964, 153.

[100] Woolley 1938, 166-167, pl. 25. Snodgrass 1964, 153.

[101] Sulimirski 1954, 300.

[102] Pirtskhalava 1995, 61-62, pl.11.

[103] Petrie 1917, 34, pl. 64-66, 68-71.

[104] Agre 2011, 97-99.

[105] Kleeman 1954,118, pl. 2d.

suggested a Greek provenance,[106] a reasoning that given the allocation could be true if we also take into account that some of the places in the East (Karhemis and Al Mina) could be associated with Greek residents or mercenaries.[107] However, their presence in Scythia probably indicates an origin from this region, where archery was the main form of defense and attack and the bow the principal weapon that required a great variety of arrowheads. The occurrence of these arrowheads in Thrace might show the way they were introduced in Greece.

B2: Three-edged arrowheads with three blades and no barbs (Figure 2)

This category includes arrowheads with three blades which do not end in barbs but turn towards the socket forming a rhomboid outline. They can be divided into two subcategories: the first, **B2α**, has examples with the socket protruding from the blades.[108] Two arrowheads of this subcategory have been found in Pella (cat. nos. 46, 47, **Plate 4**). These are made of bronze and were detected in the Agora, more specifically in the eastern stoa and areas 16 and 50. The socket in the second arrowhead (cat. no. 47, **Plate 4**) survives in part. Their length is measured in 0.034 m and the width ranges from 0.008 to 0.01 m. They were discovered in a 3rd century BC layer. The first arrowhead in particular (cat. no. 39) was embedded in the brick floor of the area along with a bronze coin of Alexander III.

The second subcategory, **B2b**, includes examples with the blades reaching to the end of the socket without extending further.[109] The sole arrowhead of this subcategory comes from Pella (cat. no. 48, **Plate 4**), is made of bronze and was found in the area 50 in the eastern stoa embedded in the brick floor together with arrowhead cat. no. 39. It bears a distinct hole at the point where the socket joins the body.

The category B2 arrowheads were quite widespread in almost the entire Mediterranean basin and especially the Greek world. They are found in many parts of the Greek mainland[110] and islands,[111] Cyprus[112] and the Asia Minor coast[113] while they are absent, except of few examples, in Magna Graecia and Sicily.[114] In Macedonia and Thrace, they are located, in addition to Pella, in Olynthus, Stageira, Leivithra, Leukopetra, Abdera,

[106] Weber 1944, 162.

[107] Snodgrass 1964, 153.

[108] This is category 3b1 according to Snodgrass (1964, 152), II B 3 according to Baitinger (2001, 20) and B2*β ii* according to Bellas (2018, 156-164).

[109] These are categories 3b2 according to Snodgrass (1964, 152) and II B 2 according to Baitinger (2001, 20) and B2*β iii* according to Bellas (2018, 164-170).

[110] These are places, such as Olympia, Paralion Astros, Tegea, Afysou, Argos, Halai, Mycenae, Nemea, Stymphalos, Corinth, Athens, Delphi, Kalapodi and Thermopylai. See Baitinger 2001, 21-22, where also relevant bibliography.

[111] Aegina, Chios (Kato Phana), Samos and Rhodes. See Baitinger 2001, 21-22, where also relevant bibliography.

[112] Idalio, Kourio, Tamasos, Salamina, Mersinaki, Vouni, Soloi και Palaipaphos. Gjerstad, Lindros and Sjöquist – Westholm 1935, 578. Buitron and Oliver 1996, 161, nos. 180, 186, 187. Buchholz 1987, 320, no. 11, pl. 4b, c. Karageorgis 1970, 193, 215, 217.

[113] Meli (Kleiner, Hommel and Müller – Wiener 1967, 94, 135, no. 2, fig. 72), Miletus (Graeve 1986, 50, pl. 17, no. 3-5), Assos (Comstock and Vermeule 1971, 416, no. 596), Larissa Phrikonis (Boehlau and Schefold 1942, 50, no. 12, pl. 10.3) and Pergamon (Gaitzsch 2005, 144, type Ja, 196, no. 42).

[114] A few arrowheads only have been found in Himera (Allegro, Belvedere and Banacasa 1976, 219, nos. 53-57) and Ramazza (Porcelli and Albanese 1992, 41, 70, 136, 148, pls. 39, 84).

Stryme, Linos in Rhodopi, Makri and Doriskos. In general, the arrowheads of this category are distributed, with the exception of the Greek world, in an area extending from Central Europe and France[115] to Asia Minor; the earliest examples (end of 7th-mid 6th century BC) were discovered in Asia Minor, i.e. apart from Meli, of the same period were found in Boğazköy,[116] Karhemis,[117] and Gordion[118] while continuing to the 5th century BC in Sardis[119] and Alişar Hüyük.[120] They have been identified as Persian, on account of both their presence in Archaic and late Classical layers in places where events of the Persian wars occurred (Thermopylae, Athens, Olynthus, Lindos, Palaipaphos, Miletus) and their association with a monument-trophy set up with the weapons of the defeated in Olympia probably for the victory at the battle of Marathon.[121]

B3: Pyramidal arrowheads with interior socket (Figure 2)

The last two arrowheads from Pella constitute part of a third category of type B with its main characteristics being the pyramidal body and the internal round socket where the wooden shaft was inserted.[122] The first arrowhead (cat. no. 49, **Plate 4**) has a distinct pyramidal body on the upper surface while further down the three edges of the sides form small blades. The second example (cat. no. 50, **Plate** 4) has three small blades ending in short barbs formed on the edges of the sides. Arrowheads of this category are very common in Greece and have been located in several sites (Olympia, Corinth, Elliniko in Astros, Kerameikos, Hydra, Argilos, Nea Kallikrateia, Stryme, Linos, Messembria)[123] as well as in places besieged by Philip (Olynthus, Stageira, Torone).[124] Additionally, a large number of these arrowheads has been found in Sicily, primarily in Himera (135), where they have been linked with the destruction of the city by the Carthaginians in 408 BC because they were discovered in the city's destruction layer.[125] In terms of chronology, they span a period from the middle of the 6th to the 3rd centuries BC; most of them are dated to the 5th and 4th century BC. [126] Concerning the Pella arrowheads, one (50) should be placed in the middle of the 4th century BC since it was found together with the remaining seven of the B1 category in a 4th century BC grave; the second (49), although it was located

[115] Two examples from Collombey-Muraz and Chatel-Gérard. Kleeman 1954, 117, 136, fig. 1f and 2e.

[116] Boehmer 1972, 111, no. 934, pls. 31, 934.

[117] Woolley 1921, 125, pl. 22β. They have been linked to the siege of the city by Nebuchadnezzar in 605-604 BC.

[118] Young 1953, 165, pl. 10l.

[119] Waldbaum 1983, 35, nos. 43-45, pl. 3, no. 43.

[120] Baitinger 2001, 22.

[121] Baitinger 1999a, 128-130. Baitinger 2001, 22.

[122] These are categories 3c2 according to Snodgrass (1964, 152) and II D 1 according to Baitinger (2001, 25) and B3*β iii* according to Bellas (2018, 173-184).

[123] Baitinger 2001, 25. Bellas 2018, 173-184, where the relevant bibliography as well.

[124] Robinson 1941, 408-409, no. 2115-2123 (type G IV), 406, 407, 409, no. 2101-2102 (type G II), 2104 (type G III), 2120 (type G IV) and 2130, 2132 (type G V). Bellas 2018, 174, 180. Cambitoglou, Jones, Joyner and McLoughlin 2001, 729, no.18.16, n. 49.

[125] Allegro, Belvedere and Banacasa 1976, 84, nos. 11-22. 219, nos. 1-52. 363, nos. 93-150. 478, nos. 33-42. 478, nos. 33-42.

[126] Bellas 2018, 178, 183. A grave in Kerameikos dated to the end of the 5th century BC is especially important because it yielded 33 arrowheads of this type (Stabolidis and Parlama 2000, no. 382), also found in the tomb of the Lacedaemonians again in Kerameikos (Baitinger 1999b, 120-121, fig. 3).

on the island of Phacos in a 2nd century BC layer, based on its typology should be dated at least to the 3rd century BC.

Placement, main features and dating of Pella's arrowheads

The examination of the arrowheads of Pella is completed with the examples of category B3. Fifty (50) arrowheads have been presented in total, 37 of which belong to type A and 13 to type B. It should be noted that their number is significant and sufficient to draw conclusions taken into account that, firstly, there was no major war in the region, known by the ancient writers at any rate, and secondly on account of the value of the material, many of the arrowheads were recovered and either repaired or melted to produce others. A typical example is Thermopylae where, after a survey conducted in the middle of the last century, only 100 arrowheads were found of the thousands that must have been thrown during the battle against the Persians. In terms of topography, (**Plate 5**) most of them (18) were located in the area of the agora distributed in the eastern and northern stoas, whereas one was found in the Archive (SW corner of the agora). Twelve arrowheads were discovered in the compacted fill of roads, eight in various building blocks adjacent to the agora (Bl. I/6) or more distant (Bl. Enimerosi, Bl. E of the sanctuary of Darron and in a block on the eastern boundaries of the city), two in the sanctuary of the Mother of Gods to the N of the agora, one in the area of Phacos, one in the mixed fill of the eastern Classical cemetery and eight in a grave of the same period.

The categories A1 (triangular) and A3 (bodkin) are the most numerous consisting of 18 and 12 examples respectively. The remaining categories of type A, A2 (curved) and A4 (leaf-shaped) are represented by 3 examples each, whereas the final category of type A, A5 (trilobate) consists of one example. The first category of type B, B1 (trilobite with barbs) includes eight examples, the second B2 (triobate without barbs) three and the third B3 (pyramidal) two examples.

An initial observation that can be made is that the tanged arrowheads are far more than those with socket; the triangular in particular and then the bodkin examples. The former are known in bibliography as "*Cretan*" and have been associated with the Cretan archers who were employed as mercenaries in practically the entire Hellenistic world.[127] The curved examples of category **A2** should also be included in the Cretan group because on one hand, they resemble the arrowheads depicted on 4th century BC coins issued by Cretan cities and on the other, of the general similarity between the two categories in addition to the curved outline.[128] The latter, the bodkin arrowheads may be identified –as already stated above– with the "*square arrows*" mentioned by Galen[129] and were quite widespread in Greece. The remaining categories, leaf-shaped (A4) and trilobate (A5), are represented by four examples.

As far as the morphology and the special characteristics of the arrowheads are concerned, most observations have been made during the examination of each category.

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[127] On the connection of the triangular arrowheads with the Cretan ones, see Forsdyke 1919, 155. Snodgrass 1964, 147. Hagerman 2014, 86. Sekunda 2017, 81. Bellas 2018, 215-217. For another opinion see Mazis and Wright 2018, 206-208.

[128] Snodgrass considers these arrowheads as a more general type (1964, 147). Also, see Bellas 2018, 216-217.

[129] See above 4.

A further morphological study reveals that a common feature in the type A categories, except for the *bodkin* (A3), is the conical or round boss which can be distinguished from the body in most cases by incisions. In the leaf-shaped arrowhead of category A4α (cat. no. 34, **Plate 4**), the conical boss is distinct and ends in a midrib. A second common feature observed in categories A1 and A2 is the shallow groove running down one blade of each side. This can be seen in two arrowheads of category **A1α** (cat. no. 1 and 5, **Plate 2**) and in one of category **A2** (cat. no. 18, **Plate 2**). This groove appears in 21 arrowheads from various areas and may be related either to manufacturing purposes or to function as an adjunct to the effectiveness of the arrow inside the victim's body.[130] Finally, a third common element relevant to the use of the arrowheads is the bent or broken sharp point which is the result of their crash on hard surfaces. It is present in 3 examples of category A1 (cat. nos. 4, 9 and 14, **Plate 2**), 3 examples of category A3 (cat. nos. 21-23, **Plate 4**), the leaf-shaped example of category A4α (cat. no. 31) and the trilobate with barbs and socket of category B1 (cat. no. 35, **Plate 4**).

A second observation concerns the material used for their manufacture. The iron arrowheads (29) outnumber the bronze ones (21). All iron examples belong to type A, whereas those of type B are exclusively made of bronze. More specifically, the 12 arrowheads of category A3 (*bodkin*), the 11 –of 18 in total– of category A1 (*Cretan*), the 2 –of 3 in total– of category A2 (*curved*) and A4 (*leaf-shaped*) and the one of category A5 (*trilobate*) are made of iron. A broader study of the arrowheads shows that the use of iron as their manufacturing material was apparently more infrequent and, as in the case of Pella, it mainly concerned the type A tanged arrowheads.[131]

In general, iron arrowheads were in use since already the 10th century BC; the earliest examples include the *Cretan* arrowheads of category **A1b** and the *leaf-shaped* ones of category **A4**, which largely belong to the Proto-Geometric and Geometric times, while their presence was being reduced during the Archaic period.[132] These are followed by the *bodkin* arrowheads of category **A3**, which form the principal category for which iron is almost exclusively used, and as mentioned above, were very common in Greece mainly from the 4th century BC, while a large part of them comes from Macedonia and dates from the 4th to the 2nd centuries BC.[133] The *Cretan* arrowheads, both the triangular and curved (**A1** and **A2**), also belong to the same period comprising the second largest group of iron arrowheads. Finally, the iron arrowhead with the three blades and the category A5 tang is a sole example and is probably associated with the Roman presence in the city.[134]

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[130] These are triangular arrowheads from Olympia, Corinth, Mycenae, Attica, Dodona, Leucas, Stageira, Corycian Cave, Maroneia, Stryme, Kastraki on Agathonisi, Knossos, Delos and Cyrene. See Bellas 2018, 84. Baitinger 2001, 11. On the reason of this groove, see Forsdyke 1919, 153.

[131] In general, the iron arrowheads are much less than the bronze ones. On the whole, and in regard to the Greek world the iron examples are slightly less than half the type A and almost 1/5 of the total of arrowheads. See Bellas 2018, 210-211.

[132] Concerning the first category, the most characteristic examples come from the cemetery of the Tumuli in Vergina (Andronikos 1969, 272-273, 279), Lefkandi (Popham 1996, Tomb 79A, pl. 78, A14. Popham, Sackett and Themelis 1980, 256, pl. 211, 244) and Crete (Arkadi, Kavoussi and Fortezza, see Bellas 2018, 87). Concerning the second category, characteristic examples come from the islands (Lefkandi, Lindos), Crete (Kavoussi, Arkadi) and Cyprus (Amathous, Marion, Idalion, Agia Eirini, Kourion, Salamis and Palaipaphos). Bellas 2018, 108-109, 114-116.

[133] See above 4.

[134] See above 6.

A third topic concerns the chronology of the arrowheads of Pella. Generally speaking, the dating of the arrowheads touches upon three different issues: a) the chronological range of an arrowhead's use, b) the chronological range of an arrowhead category's use and c) the time of an arrowhead's construction.[135] Concerning the first and second issues, information can be obtained from the type and the provenance in the stratigraphic layers together with the relevant co-finds. With regards to the third issue, not enough data exist to offer a secure answer. Here, the arrowhead with the embossed emblem from Pella is decisive, because it enables us to determine not only the period of its use but also to come closer to its construction time, which based on the monogram, is placed at the end of the 3rd century BC.[136] Furthermore, the eight arrowheads of the closed group of grave 81 dating to the third quarter of the 4th century BC give the opportunity to place them in approximately the middle of the century.

In general, however, it can be argued that, with some exceptions, the arrowheads of Pella date to the Hellenistic times and mainly the 3rd and 2nd centuries BC. The exceptions concern the arrowheads of grave 81 mentioned above and the two *Cretan* examples of category **A1b** (triangular without a boss) that have already been noted and which according to their shape and general type should be considered earlier and possibly dated from the 7th to the 5th centuries BC. These arrowheads may originate from the Archaic cemetery or the settlement of the corresponding period and were transferred in compacted fill to layers of the end of the 4th century BC. The remaining Cretan arrowheads of category **A1*α*** (*triangular with boss*) and **A2** (*curved*), apparently cover a time span from the 4th to the 2nd centuries BC. More specifically, the bronze *Cretan* arrowheads of category **A1*α*** and **A2** and primarily those with the short tang and the elongated body ending in short barbs (cat. no. 1, 2, 4, 5 and 19, **Plate 1**), on account of their shape and regardless of the layer they were found in, should be dated from the second half of the 4th to the end of the 3rd century BC. The shallow groove, which as mentioned above is observed in a group of 21 arrowheads scattered in various places, constitutes a significant feature that dates them to this period.[137]

The iron triangular arrowheads with boss of category **A1*α***, which are represented with nine examples in Pella are of particular interest. Together with those of Pella, 48 iron arrowheads of this type have been found in total. The earliest in date were discovered in Olympia and belong to the end of the 6th century BC.[138] Most of them (13) were found in Stymphalos and have been dated by Hagermann from the 5th century BC to the Roman times.[139] In Nemea, five –out of seven– arrowheads were detected in disturbed layers dating from the Archaic to the Early Byzantine period and the remaining two in a layer of the second half of the 5th century BC.[140] Additionally, ten arrowheads of this type were found in Idaion Andron[141] and one in Dodona in a 3rd and 2nd century BC layer,[142] at

[135] On difficulties of dating the arrowheads, see Bellas 2018, 224-225. Baitinger 2001, 7.
[136] See above 2.
[137] See above 2, 9.
[138] Baitinger 2001, 11, no. 48-50.
[139] Hagerman 2014, 86-87, no. 87-99, pl. 5.2 and 5.3b. On the chronology, see 94-96.
[140] Miller 1977, 63, 70, 77, pl. 7a.
[141] Sakellarakis and Sakellaraki 2013, vol. 2, 127.
[142] Dakaris 1973, 89, 92, pl. 111β.

the sanctuary of Athena Itonia in Philia in a Classical period layer,[143] in a farmhouse at Phila of Herakleion in Pieria in a layer dating from the second half of the 3rd to the second half of the 2nd century BC,[144] at Leukopetra in Imathia in a 2nd century BC layer,[145] at Isthmia in a 1st century BC compacted fill[146] and finally in Egypt.[147] Actually, the latter bears on the boss the symbol:  which has been interpreted by most scholars as the monogram of Berenice II.[148] It appears, based on the above, that these arrowheads cover a period from the 5th century BC to the late Hellenistic times (1st century BC), with most, except those of Olympia and perhaps some of Stymphalos and Nemea, dating from the 3rd to the 1st centuries BC.[149] The arrowheads of Pella can be dated to this period, and considering that most of them were found in the city's destruction layer or in surface layers, they could be more accurately placed in the 2nd century BC and especially in its second half.

The bodkin iron arrowheads belong to the same period as well. They represent a category that has appeared in the Macedonian region since the mid-4th century BC (Olynthus, Stageira, Pydna, Torone), several of which originating in layers of the 2nd century BC (Vergina, Leukopetra, Kastri at Polyneri, Phila at Herakleion).[150] Finally, concerning type B arrowheads, apart from those found in the cemetery, the remaining were detected in layers of the 3rd century BC (cat. nos. 46-48, **Plate 4**) and in a surface layer at the eastern stoa (cat. no. 38, **Plate 4**). Perhaps this last arrowhead with the three blades and barbs also originates from a 4th century BC grave that was destroyed in the area of the Classical eastern cemetery located in the agora premises. Based on their general type, they should be dated to the 3rd century BC at the most as they apparently do not continue to be used for a long time into the Hellenistic era.[151]

Interpretation of Pella's arrowheads: weapon or tool?

The last question that emerges from the examination of the Pella arrowheads concerns their interpretation, which is always noteworthy and has many aspects. Of particular importance to this issue constitutes the group of eight arrowheads found in grave 81 and dating to the middle of the 4th century BC, because it comprises the only grave in Pella which has yielded arrowheads. Probably, this is the burial of an archer, which however does not include the entire arrow-case as observed in other cases,[152] but

[143] Kilian – Dirlmeier 2002, 115, no. 1777.

[144] Poulaki 2003, 58, 216, no. 213β.

[145] Bellas 2018, 75, 259, no. 7.

[146] Parsons 1943, 241-242, fig. 26.

[147] Petrie 1917, 35.

[148] For this interpretation, see Haynes 1951, 45-46. Snodgrass 1964, 147. Sekunda 2017, 81-87. For another interpretation see Mazis and Wright 2018.

[149] See above 2-3.

[150] See above 4. Olynthus: Robinson 1941, 392-397. Stageira: Bellas 2018, 98-99, 280-283, no. 76-86. Pydna: Besios and Noulas 2010, 136. Torone: Cambitoglou, Jones, Joyner and McLoughlin 2001, 727-728, nos. 18.14, note. 44. Vergina: Bellas 2018, 98, 272-276, no. 42-61. Leukopetra: Bellas 2018, 98, 277, no. 62-65. Kastri at Polyneri: see above n. 53. Fila at Herakleion, Pieria: Poulaki 2003, 58, 216, no. 213α.

[151] Bellas 2018, 150-152, 156-170, 342-344.

[152] In a tomb at the Athenian Kerameikos, 80 arrowheads in total of the same category have been found as burial offerings, which may have been placed inside a leather arrow-case that has not survived (Stichel 1984, 59, pl. 51). In a second tomb in the same area, 33 bronze arrowheads have been discovered (Stampolidis and

only the eight arrowheads, some of which are broken thus also revealing their usage. Any other interpretation should be ruled out, one that would link these arrowheads only with funerary customs, mainly due to their absence in other graves of the period. The fact that this is the burial of an archer is further supported by the dating of the grave, which is placed at a time when Philip II reinforced his army with archery units as well as the type of arrowheads which seem to have been used by the Macedonian archers, as indicated by corresponding examples found in areas besieged by Philip (Olynthus, Stageira).[153]

Looking once again at the remaining arrowheads, in his publication on the examples from the acropolis of Stymphalos and mainly from the sanctuary of Athena (arrowheads, catapults, lead sling bullets and spearheads) Hagermann presents four interpretations; two are the most persuasive, i.e. one, being votive items and the other, being linked with some military event that occurred between the 4th and the 2nd century BC.[154] The other two hypotheses refer to either a storage space of military equipment similar to the Chalkotheke on the Athenian Acropolis or the transfer of mixed fill where due to their small size the arrowheads had got drawn into. In Pella the arrowheads were discovered in a) the agora areas, b) building blocks and c) compacted fill of roads. It is obvious that in the latter case, it is a product of the transfer of mixed fill used for the road, which usually consists of objects to be discarded. It is certainly a case of a secondary use of the arrowheads whether it is a conscious one (using them together with other objects for filling and supporting the road) or not (arrowheads transferred with soil without being separated and removed). Nevertheless, their primary use should be explained, which is obviously extending, by and large, to the use of the bow.

One explanation could refer to their connection with some military event that occurred in Pella. However, given the distribution of the arrowheads, such an event would not have simply been a siege but would extend to the capture and sacking of the city, where some sort of battle would have probably taken place. As it has been already mentioned though, such an event with this outcome has not been recorded by the ancient writers. Moreover, no excavation data has emerged to suggest such a hypothesis.[155] It is only known that in 383 BC, under the rule of Amyntas III, the city came under the rule of Olynthus for a short period of time in a manner unknown to us.[156] In the turbulent period following the death of Alexander III during the wars of his successors, Pella as the capital did not appear to have been directly affected at least as the result of a siege or plunder, apart from the fact that it was occupied by Monimus on behalf of Olympias; he surrendered Pella to Cassander after the events at Pydna and the capture of Olympias.[157]

The next big event that affects the city is the battle of Pydna in 167 BC. After the defeat of the Macedonian army followed by Perseus's escape, Pella submitted to the Romans without resistance, who looted the city by transferring works of art and other

Parlama 2000, no. 382). Also, 174 arrowheads were discovered inside a tomb in Boulgaria in the region of Zlatinitsa (Agre 2011, 97).

[153] Bellas 2018, 247.

[154] The other two interpretations refer to either their being inside some storage area in the sanctuary or being transferred by means of mixed fill. Hagermann 2014, 96.

[155] Akamatis 1987, 130.

[156] Xenophon, *Hellenica*, 5, 2, 13.

[157] Diodorus, 19, 50, 3-7.

precious objects to Rome.[158] Nevertheless, there was no organized plan to siege and plunder Pella. Yet, there is a piece of information offered by the historian Titus Livius who mentions that after the battle of Pydna Aemilius Paulus allowed his cavalrymen to loot the surrendered areas for two nights and his infantrymen to despoil the dead.[159] It is unknown, whether at that time some of the cavalrymen to Pella, possible getting involved into skirmishes with defenders of the city. Even in the case of Andriskos / Philip VI revolution, who in 149 liberated a large part of Macedonia and Thessaly[160] and was probably proclaimed king in Pella,[161] the city does not seem to be involved in any battle or plunder as Andriskos was defeated in the area of Pydna in 148 BC and then he left for the region of Thrace.[162] Thus, it seems that the explanation involving a military event is not convincing; it is quite possible though to associate some arrowheads with the army, the *Cretan* arrowheads in particular, with the Cretan mercenary archers employed by the Macedonian kingdom from the time of Philip II and Alexander III down to Perseus.[163]

Most likely, these arrowheads are not related to the army but to the daily routine of the residents and activities such as their presence in the gymnasium or during hunting. Hence, their distribution within building blocks or the area of the agora is also justified. As far as hunting is concerned, it goes without saying that the bow was of major importance on account of the possibilities it offered, namely the long-distance shot. Especially for hunting birds it should have been the most appropriate means.[164] With regards to gymnasia, it is known from the "Gymnasiarch's law" inscription of Veroia that, at least at the time of Philip V, the training in archery had been introduced, which justifies a further increasing usage of the bow.[165] Moreover, the bow may have offered a certain kind of security to citizens from possible attacks by bandits or even animals, especially those who had to go early in the morning, probably before sunrise, in the workshops at the agora but also stay there until late in the evening, depending on their daily tasks. A well-known incident described by Aristophanes in the *Birds*, is when Euelpides walked at night to go to his house and as soon as he came out of the city walls someone hit him with a stick and stole his expensive himation.[166] At another point in the comedy play, the chorus draws attention to the danger of going about at night in a city without lights.[167] Also, the presence of bows in residences, aside from hunting, was probably related to the prevention of any danger. The use of the bow for personal security involves a major advantage and a

[158] Titus Livius, 45. 33. 5-6.

[159] Titus Livius, 44. 45. 4.

[160] Cassius Dio *Historiae Romanae*, 312, 14-15 "*…εἰς Μακεδονίαν ἐνέβαλεν καὶ αὐτην κατέσχε καὶ ἐπὶ τὴν Θετταλίαν ὁρμήσας οὐκ ὀλίγα ταύτης προσεποιήσατο*". Daubner 2018, 142-144.

[161] Daubner 2018, 143.

[162] Cassius Dio *Historiae Romanae*, 312-313. Daubner 2018, 145.

[163] On Cretan mercenaries in the Macedonian kingdom, see Launey 1987, 248-286. It is known that Demetrius Poliorcetes recruited Cretan archers during the siege of Rhodes (Diodorus, 20,85,3). Also, the Polyrrhenians and their allies sent to Philip V and the Achaeans 500 archers (Polybius *Histories*, 4,55,5), while Perseus had Cretan mercenaries in his service too, whom he escaped to Amphipolis and Galepsos with after the battle of Pydna (Plutarch *Aemilius Paulus*, 23,7,1).

[164] On the usage of bow in hunting, see Tölle – Kastenbein 1980, 29-32. Manakidou 2011, 282-284.

[165] "*Ἀκοντίζειν δὲ καὶ τοξεύειν μελετάτωσαν οἱ τὲ ἔφηβοι καὶ ὑπό τὰ δύο καὶ εἴκοσιν ἔτη καθ' ἑκάστην ἡμέραν...*" Gauthier, Ph., and M.B. Hatzopoulos. 1993, *La loi gymnasiarchique de Beroia*, Athens, 20, (B10-12), 68-69, 162.

[166] Aristophanes *Birds*, 492-498.

[167] Aristophanes *Birds*, 1482-1490.

significant disadvantage: the advantage is that it can keep any attacker away either inside a house or a workshop or some other private space. The drawback is that it does not give room for reaction in case of surprise and physical contact, where a dagger might be more effective.

However, the notion of protection or security concerning the inhabitants of a city is not limited to the abovementioned cases. In troubled times or periods of anarchy, where there would probably be on one hand, a fear of a possible siege or plunder and on the other, marauding forays without an effective action taken by the city itself, the inhabitants would try to protect themselves and their families. In this case the use of the bow is more successful because it allows a distant shot while keeping the opponent at a distance. As far as Pella is concerned, two such periods can be distinguished. The first concerns the wars between Alexander III's successors, which may not have influenced the city directly, as mentioned above, but created feelings of insecurity and uncertainty among the inhabitants; particularly in the period after the death of Cassander (297 BC) until the consolidation of the kingdom by Antigonus Gonatas (272 BC). This period is characterized by disruption in the interior of the state caused by Demetrius Poliorcetes, Lysimachus, Ptolemy Keraunos and Pyrrhus. The latter even had in his army Gallic mercenaries who carried out pillaging culminating in the looting of the royal cemetery at Aigai.[168] The second turbulent period would probably be the time after the battle of Pydna and the Roman conquest of the city, and especially the years of great turmoil initially when Andriskos revolted in 148 BC as mentioned above[169] and later, when the Scordisci descended in the middle of the 2nd century BC. The Scordisci from 141 BC and throughout the 2nd century BC successfully raided the broader region of Macedonia and Thrace causing serious problems to the Romans.[170]

Stating all possible interpretations also constitutes the final matter in question that arises from the examination of the arrowheads of Pella. Obviously, we cannot be certain of any of these interpretations; some might be more plausible than others while naturally, one does not exclude the other. Unquestionably, their examination reveals many interesting issues of the daily life of the city's residents.

Catalogue

A1α

1. 80/150 **Pl. 2**

Agora. East Wind.

L. 0,083 m. W. 0,016 m. Diam. of boss: 0,01 m., Th. of tang: 0,002-0,005 m. 12,1 g.

Bronze arrowhead.

Long tang, square in section, triangular head, small barbs and conical boss. A shallow groove is running one blade on each side. The boss is marked off from the body with shallow grooves. Hellenistic period (ca. 4th to 3rd century BC).

[168] On this period in general, see Hammond, N.G. and F.W. Griffith 1988. A History of Macedonia, Oxford, III, 221-282. On the looting of the royal cemetery at Aigai, see Plutarch *Pyrrhus*, 26, 6-7. Diodorus, 22, 12.

[169] See above 12.

[170] Daubner 2018, 161-163. Akamatis 1990, 182-183.

2. 97/1262 **Pl. 2**
Information square.
L. 0,069 m. W. 0,014 m. Diam. of boss. 0,009 m., Th. of tang: 0,003 m. 15,2 g.
Bronze arrowhead. Missing part of tang.
Triangular head with curved outline, small barbs and conical boss.
Late Classical to Hellenistic period (ca. 4th to 3rd century BC).

3. 12/5116 **Pl. 2**
Square I/6.
L. 0,07 m., W. 0,02 m. Diam. of boss. 0,01 m., Th. of tang. 0,005x0,007 m. 14,5 g.
Iron arrowhead. Missing part of tang and the barbs.
Triangular head, boss marked off from the body, tang square in cross section.
Hellenistic period (ca. 3rd century BC).

4. 98/2053 **Pl. 2**
Information square.
p. L. 0,06 m. p. W. 0,018 m. Diam. of boss. 0,008 m., Th. of tang: 0,003 m. 12,3 g.
Bronze arrowhead. Point broken.
Triangular head, small barbs, conical boss marked off from the body and tang square in cross section. There is a hook shape in one blade.
Late Classical to Hellenistic period (ca. 4th to 3rd century BC).

5. 12/4371 **Pl. 2**
Road west of Archive.
p. L. 0,039 m. p. W. 0,011 m. Diam. of boss. 0,006 m., Th. of tang: 0,001-0,003m. 5,3 g.
Bronze arrowhead. Missing part of tang and one barb.
Triangular head, conical boss, marked off from the body with shallow grooves, small barbs and tang oval in cross section. A shallow groove is running one blade on each side.
Found in compacted fill of a road west of the agora inside a Hellenistic layer.
Hellenistic period (ca. 3rd century BC by the context).

6. 96/558
Square East of the Sanctuary of Darron.
p. L. 0,084 m. p. W. 0,019 m. Diam. of boss. 0,01 m., Th. of tang: 0,002-0,004 m. 16 g.
Iron arrowhead. Missing one barb.
Triangular head with curved outline, conical boss embedded, long barbs and tang square in cross section.
Hellenistic period (ca. 3rd Century BC by the context).

7. 03/4956 **Pl. 2**
Akamatis 2003, 491.
Road north of Square I/7 (south of Agora).
Compacted fill of a second road
p. L. 0,061 m. p. W. 0,021 m. Diam. of boss. 0,011 m., Th. of tang: 0,006 m. 14,4 g.
Iron arrowhead. Missing part of tang and one barb.
Triangular head, conical boss marked off from the body, long barbs and tang square in cross section.
Hellenistic period (ca. 3rd to 2nd century BC by the context).

8. 85/120
Lilimpaki–Akamati 2000, 154, no. 427, pl. 134b.
Sanctuary of Mother of Gods / Terracotta's warehouse, destruction layer.
L. 0,07 m. p. W. 0,021 m. Diam. of boss. 0,011 m., Th. of tang: 0,006 m. 16 g.
Iron arrowhead. Missing part of tang and one barb.
Triangular head, conical boss marked off from the body, long barbs and tang square in cross section.
ca. 2nd century BC (by the context).

9. 83/101
Lilimpaki–Akamati, 153, no. 426, Pl. 131b.
Sanctuary of Mother of Gods / Terracotta's warehouse, destruction level.
L. 0,07 m. p. W. 0,016 m. Diam. of boss. 0,01 m., Th. of tang: 0,006 m. 16 g.
Iron arrowhead. Missing one barb.
Triangular head, small, curved barbs, spherical marked off boss and tang circle in cross section.
ca. 2nd century BC (by the context).

10. 05/2749 **Pl. 2**
Road South of South Wind of Agora.
p. L. 0,069 m. p. W. 0,02 m. Diam. of boss. 0,012-0,014 m., Th. of tang: 0,004-0,008 m. 12,8 g.
Iron arrowhead. Missing part of tang and one barb.
Triangular head, oval boss marked off from the body, small barbs and tang square in cross section, flattened in upper surface.
Hellenistic period. (ca. 2nd century BC by the context).
Kilian–Dirlmeier 2002, 115, no. 1777, pl. 110.

11. 15/10 **Pl. 2**
SW corner of Agora / Archive
p. L. 0,049 m. p. W. 0,016 m. Diam. of boss. 0,009-0,011 m., Th. of tang: 0,004 m. 15,7 g.
Iron arrowhead. Missing part of tang and the barbs.
Triangular head, conical boss marked off from the body and tang square in cross section. The point end is damaged probably due to strong impact on a hard surface, maybe rock.
Hellenistic period. (ca. 2nd century BC by the context).

12. 12/4370 **Pl. 2**
Bellas 2019.
Agora. East Wind / Room 30.
L. 0,09 m. p. W. 0,019 m. Diam. of boss. 0,007 m., Th. of tang: 0,003-0,005 m. 11,9 g.
Bronze arrowhead.
Triangular short head, boss marked off from the body with shallow grooves, conical on one side and spherical on the other, long barbs and a long tang square in cross section. A central ridge is running the entire length of the arrowhead. In one side above the boss there is an embossed emblem: .
End of 3rd and beginning of 2nd century BC (by the context and the monogram).
Baitinger 2001, 98, no. 34; Sakellarakis Sapuna– Sakellaraki 2013, B', 127, pl. 78, no. 8; Pantos 1974, 81, 82, fig. 12.

13. 06/11507 **Pl. 2**
Road South of Agora.
L. 0,08 m. p. W. 0,015 m. Diam. of boss. 0,009 m., Th. of tang: 0,003-0,005 m. 9,1 g.
Bronze arrowhead. Missing a part of the barbs.
Triangular short head, conical boss marked off from the body, small barbs and long tang square in cross section.
Hellenistic period (ca. 3rd to 2nd century BC).

14. 97/1296 **Pl. 2**
Information Square / Destruction layer.
L. 0,089 m., p. W. 0,016 m., Diam. of boss. 0,011 m., Th. of tang. 0,003-0,005 m. 16,1 g.
Iron arrowhead. Missing the barbs.
Triangular short head with curved outline, conical boss marked off from the body, small barbs and long tang square in cross section.
Hellenistic period (ca. 2nd-1st century BC by the context).

15. 08/5709 **Pl. 2**
South of Agora. Road between Squares I/2 and I/7. Fill of road.
L. 0,073 m., p. W. 0,014 m., Diam. of boss. 0,009 m., Th. of tang. 0,003-0,005 m. 13,4 g.
Iron arrowhead. Missing the barbs.
Triangular head, conical boss and tang square in section.
Hellenistic period (ca. 2nd-1st century BC by the context).

16. 80/2048α **Pl. 2**
East cemetery.
p. L. 0,06 m., p. W. 0,014 m., Diam. of boss. 0,009 m. 12,6 g.
Bronze arrowhead. Missing the tang and one barb.
Triangular head, conical boss and long barbs.
Classical to Hellenistic period (ca. 4th-3rd century BC by the context).

A1β
17. 12/4404 **Pl. 2**
Agora. East Wind / Room 24.
L. 0,078 m., p. W. 0,016 m., Th. of tang. 0,005x0,008 m. 12,7 g.
Iron arrowhead. Missing the sharp end.
Triangular head, small barbs, tang rectangular in cross section, flattened in upper part. In the lower end forms fork.
Probably Archaic to early Classical period (7th-5th century BC by the type).

18. 08/2640
Akamatis 2015, 13, n. 47.
Hause.
Iron arrowhead. Missing part of tang and the point end.
p. L. 0,06 m., p. W. 0,02 m. Th. of tang. 0,003 m.
Triangular head, small barbs and tang rectangular in section.
Probably Archaic to early Classical period (7th-5th century BC by the type). It has been found in early Hellenistic layer.

A2
19. 02/3627 **Pl. 4**
Akamatis 2002, 443.
Agora. Road between Squares I/2 and I/4. Fill of road.
L. 0,062 m., p. W. 0,015 m., Diam. of boss. 0,014 m. Th. of tang. 0,004-0,005 m. 12,9 g.
Bronze arrowhead.
Double curved outline head, conical boss marked off from the body by shallow grooves, small barbs and tang circular in cross section. A shallow groove is running one blade on each side.
Hellenistic period (ca. 4th-3rd century BC).

20. 06/11341 **Pl. 4**
Agora. East Wind / Room 16, Fill of late floor.
p. L. 0,044 m., p. W 0,018 m. g.12,5 g.
Iron arrowhead. Missing tang.
Double curved outline head and small barbs.
Hellenistic period (ca. 3rd-2nd century BC).

21. 13/3177 **Pl. 4**
Agora. East Wind / Room X.48.
p. L. 0,04 m., p. W. 0,02 m., Diam. of boss. 0,008 m., Th. of tang. 0,004-0,006 m. 9,5 g.
Iron arrowhead. Point broken. Missing part of barbs.
Small head with double curved outline, spherical, embedded boss, small barbs and tang square in cross section.
Circa 2nd century BC by context. Beneath the destruction layer and above the latest floor).

A3
22. 06/10607 **Pl. 4**
Road Chanel
p. L. 0,062 m., p. W. 0,008 m., Th. of tang. 0,004 m. 11,2 g.
Iron arrowhead. Missing part of tang.
Bodkin head, tang square in cross section.
Hellenistic period (ca. 2nd century BC by context).

23. 06/11534 **Pl. 4**
Road south of Agora.
p. L. 0,043 m., p. W. 0,007 m., Th. of tang. 0,003x0,004 m. 7,6 g.
Iron arrowhead. Point broken. Missing part of tang.
Bodkin head, tang rectangular in cross section.
Hellenistic period (ca. 2nd century BC by context).

24. 14/34
Agora. North Wind / Room 26.
p. L. 0,055m., p. W. 0,006 m., Diam. of tang. 0,003 m. 13,7 g.
Iron arrowhead. Missing tang.
Bodkin head, tang circular in cross section.
Hellenistic period (ca. 2nd century BC by context).

25. 88/1580 **Pl. 5**
Agora. North Wind.
p. L. 0,048 m., p. W. 0,008 m., Th. of tang. 0,003 m. 8,5 g.
Iron arrowhead. Point broken. Missing part of the tang.
Bodkin head, tang square in cross section.
Hellenistic period (ca. 2nd century BC by context).

26. 15/11
Agora. North Wind - Stylobate
p. L. 0,04 m., p. W. 0,007 m., Th. of tang. 0,002-0,004 m. 8 g.
Iron arrowhead. Missing the upper part of the body.
Bodkin head, tang circular in cross section.
Hellenistic period (ca. 2nd century BC by context).

27. 99/1251 **Pl. 4**
Square East of Darron's Sanctuary
p. L. 0,043 m., p. W. 0,008 m., Th. of tang. 0,003 m. 7,3 g.
Iron arrowhead. Point broken. Missing part of tang.
Bodkin head, tang circular in cross section.
Hellenistic period (ca. 2nd century BC by context).

28. 97/342
Information Square.
p. L. 0,06 m., p. W. 0,009 m., Th. of tang. 0,002x0,004 m. 9,6 g.
Iron arrowhead.
Bodkin head, tang rectangular in cross section.
Hellenistic period (ca. 2nd century BC by context).

29. 99/1271
Square East of Darron's Sanctuary
p. L. 0,054 m., p. W. 0,007 m., Th. of tang. 0,004 m. 6,3 g.
Iron arrowhead. Missing part of tang.
Bodkin head, tang square in cross section.
Hellenistic period (ca. 2nd century BC by context).

30. 80/1301
Road North of square I/7 (South of Agora).
p. L. 0,048 m., p. W. 0,018 m., Th. of tang. 0,005 m. 8,3 g.
Iron arrowhead. Missing part of tang.
Trapezoidal head, square in cross section. Tang square in cross section.
Hellenistic period (ca. 2nd century BC by context).

31. 02/5470 **Pl. 4**
Road between Squares I/2 and I/4.
p. L. 0,051 m., p. W. 0,012 m., Th. of tang. 0,003-0,004 m. 14,6 g.
Iron arrowhead. Point broken.
Bodkin head, which width is reduced to the upper surface. Tang square in cross section.
Hellenistic period (ca. 2nd century BC by context).

32. 05/2721 **Pl. 4**
Road South of South Wind of Agora.
L. 0,09 m., p. W. 0,012 m., Th. of tang. 0,003-0,004 m. 14,3 g.
Iron arrowhead.
Bodkin head, tang square in cross section, pointed at the end.
Hellenistic period (ca. 2nd century BC by context).

33. 03/706
Agora. East Wind / Room 43 layer of marble chippings
L. 0,09 m., p. W. 0,012 m., Th. of tang. 0,003-0,004 m. 7,8 g.
Iron arrowhead.
Curved head, square in cross section. Tang circular in cross section.
Early Hellenistic period (ca. 4th century BC by context).

A4
34. 14/33 **Pl. 4**
Agora. North Wind. Floor.
L. 0,056 m. Diam. of boss. 0,006 m. Diam. of tang. 0,001-0,003 m. 4,5 g.
Iron arrowhead.
Leaf shaped head, conical boss and tang circular in cross section.
Hellenistic period (ca. 3rd century BC).
Rainer 2007, 481, 546, no. 392; Gjerstad, Lindros and Sjöquist – Westholm 1935, 578, type 4, nos. 271, 379, 666, 788, 1000; Gjerstad, Lindros and Sjöquist – Westholm 1935, 101, 105, nos. 205a, 220b.

35. 02/3799 **Pl. 4**
Road between Squares I/2 and I/4.
L. 0,053 m., p. W. 0,008 m., Th. of tang. 0,001-0,002 m. 3,4 g.
Bronze arrowhead.
Leaf shaped head, tang circular in cross section.
Hellenistic period (ca. 3rd century BC).
Karageorgis 2003, p. 108, no.1260; Buitron-Oliver 1996, 158, 162 nos.104-125 and 200a.

36. 80/1301
Road between Squares I/2 and I/4.
p. L. 0,03 m., p. W. 0,01 m., Th. of tang. 0,001-0,002 m. 1,4 g.
Iron arrowhead. Missing part of tang.
Leaf shaped head, tang rectangular in cross section.
Hellenistic period.

A5
37. 15/8 **Pl. 4**
Agora. North Wind / Room 40. Latest floor.
p. L. 0,035 m., p. W. 0,016 m., Diam. of tang. 0,004 m. 4,49 g.
Iron arrowhead. Missing part of tang.
Three-edged arrowhead with small barbs and tang circulate in cross section.
Hellenistic period (ca. 2nd century BC by context and shape).

B1

38. 99/3021 **Pl. 4**
Agora. East Wind.
L. 0,021 m. p. W. 0,007 m., Diam. of socket. 0,003 m. 1,6 g.
Bronze arrowhead. Point broken.
Three-edged blade with barbs and projecting socket.
Classical to Hellenistic period (ca. 3rd century BC).
Robinson 1941, 28, no. 2097, pl. 125; Bellas 2018, 147, 288, nos. 104, 105.

39. 79/1448.1 **Pl. 4**
East cemetery. Grave 81.
L. 0,035 m. p. W. 0,006 m., Diam. of socket. 0,004 m. 2 g.
Bronze arrowhead. Bent point.
Three-edged blade with barbs and projecting socket. In the socket, remains of the wooden shaft.
Third quarter of 4th century BC by context.
Robinson 1941, 28, no. 2097, pl. 125; Bellas 2018, 147, 288, nos. 104, 105.

40. 79/1448.2 **Pl. 4**
East cemetery. Grave 81.
L. 0,038 m. p. W. 0,007 m., Diam. of socket. 0,005 m. 1,8 g.
Bronze arrowhead. Bent point.
Three-edged blade with barbs and projecting socket. In the socket, remains of the wooden shaft.
Third quarter of 4th century BC by context.
Robinson 1941, 28, no. 2097, pl. 125; Bellas 2018, 147, 288, nos. 104, 105.

41. 79/1448.3 **Pl. 4**
East cemetery. Grave 81.
L. 0,035 m. p. W. 0,007 m., Diam. of socket. 0,005 m. 1,7g.
Bronze arrowhead.
Three-edged blade with barbs and projecting socket. In the socket, remains of the wooden shaft.
Third quarter of 4th century BC by context.
Robinson 1941, 28, no. 2097, pl. 125; Bellas 2018, 147, 288, nos. 104, 105.

42. 79/1448.4 **Pl. 4**
East cemetery. Grave 81.
L. 0,032 m. p. W. 0,007 m., Diam. of socket. 0,005 m. 1,7 g.
Bronze arrowhead.
Three-edged blade with barbs and projecting socket. In the socket, remains of the wooden shaft.
Third quarter of 4th century BC by context.
Robinson 1941, 28, no. 2097, pl. 125; Bellas 2018, 147, 288, nos. 104, 105.

43. 79/1448.5 **Pl. 4**
East cemetery. Grave 81.
p. L. 0,032 m. p. W. 0,007 m., Diam. of socket. 0,004 m. 1,3 g.

Bronze arrowhead. Broken point.
Three-edged blade with barbs and projecting socket. There is an oval hole at the joint of the socket with the body. In the socket, remains of the wooden shaft.
Third quarter of 4th century BC by context.
Robinson 1941, 28, no. 2097, pl. 125; Bellas 2018, 147, 288, nos. 104, 105.

44. 79/1448.6 **Pl. 4**
East cemetery. Grave 81.
p. L. 0,033 m. p. W. 0,007 m., Diam. of socket. 0,004 m. 1,4 g.
Bronze arrowhead. Broken point.
Three-edged blade with barbs and projecting socket. There is an oval hole at the joint of the socket with the body.
Third quarter of 4th century BC by context.
Robinson 1941, 28, no. 2097, pl. 125; Bellas 2018, 147, 288, nos. 104, 105.

45. 79/1448.7 **Pl. 4**
East cemetery. Grave 81.
p. L. 0,02 m. p. W. 0,008 m., Diam. of socket. 0,004 m. 0,9 g.
Bronze arrowhead. Missing the upper part, part of socket and of one blade.
Three-edged blade with barbs and projecting socket. In the socket, remains of the wooden shaft.
Third quarter of 4th century BC by context.
Robinson 1941, 28, no. 2097, pl. 125; Bellas 2018, 147, 288, nos. 104, 105.

B2
46. 13/467 **Pl. 4**
Agora. East Wind / Room 50.
L. 0,034 m. W. 0,001 m., Diam. of socket. 0,004 m. 3,6 g.
Bronze arrowhead.
Three-edged blade without barbs. Projecting socket.
Hellenistic period (first half of 3rd century BC by context).

47. 06/4538 **Pl. 4**
Agora.
East Wind / Room 16.
L. 0,029 m. W. 0,008 m., Diam. of socket. 0,003 m. 2,5 g.
Bronze arrowhead. Missing part of socket.
Three-edged blade without barbs. Projecting socket.
3rd century BC.

48. 13/466 **Pl. 4**
Agora. East Wind / Room 50.
L. 0,026 m. W. 0,001 m., Diam. of socket. 0,004 m. 2,5 g.
Bronze arrowhead.
Three-edged blade without barbs, rhombic in section. The socket does not protrude from the blade. There is an oval hole at the joint of the socket with the body.
Hellenistic period (first half of 3rd century BC by context).

B3

49. 02/473 **Pl. 4**

Region of Phakos.

L. 0,028 m. W. 0,004 m., Diam. of socket. 0,004 m. 1,1 g.

Bronze arrowhead.

Pyramidical with three small blades and interior socket. There is an oval hole in one side.

Hellenistic period (ca. 2nd century BC by context).

50. 79/1448.8 **Pl. 4**

East cemetery. Grave 81.

L. 0,025 m. p. W. 0,007 m., Diam. of socket. 0,004 m. 1,7 g.

Bronze arrowhead.

Pyramidical with three barbs and interior socket. In the socket remains of the wooden shaft.

Third quarter of 4th century BC by context.

Robinson 1941, 28, no. 2097, pl. 125; Bellas 2018, 147, 288, nos. 104, 105.

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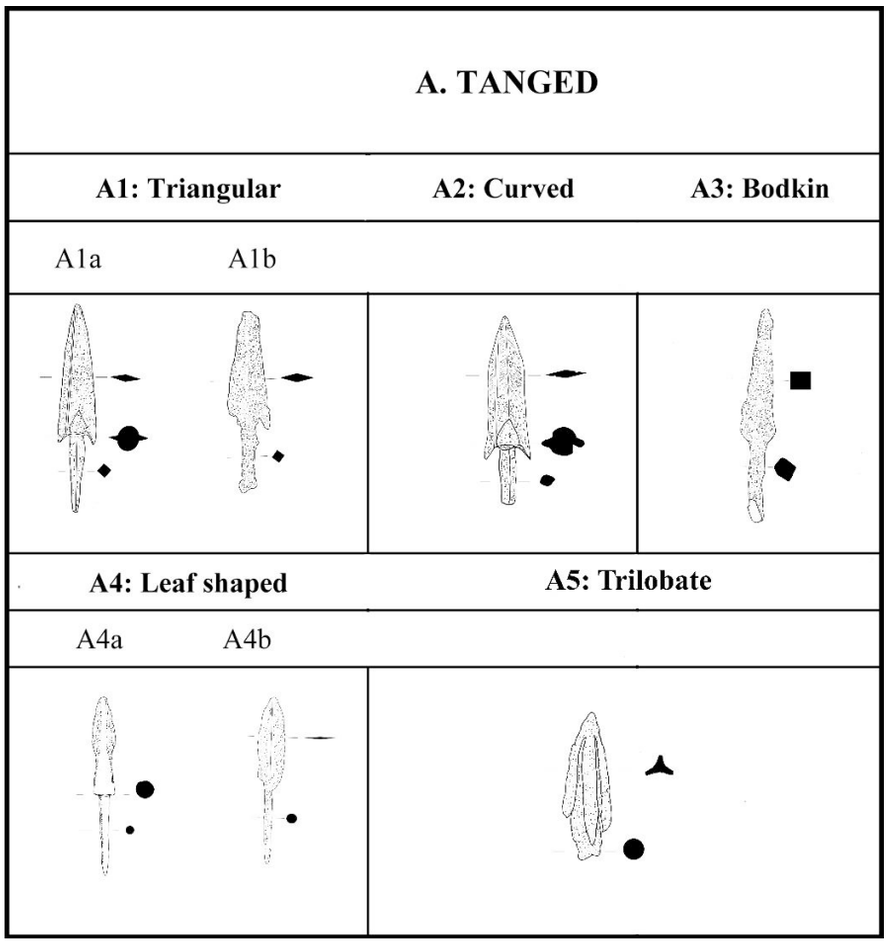


Fig. 1. Tanged arrowheads (cat. nos 1, 17, 19, 22, 34, 35, 37).

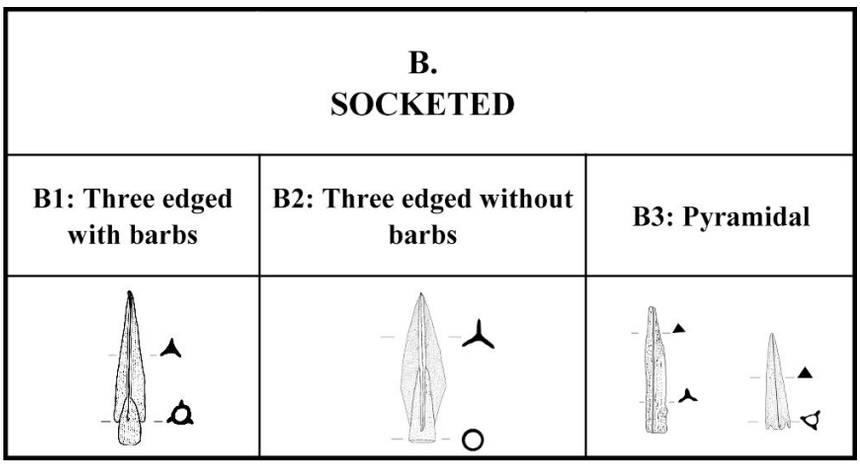
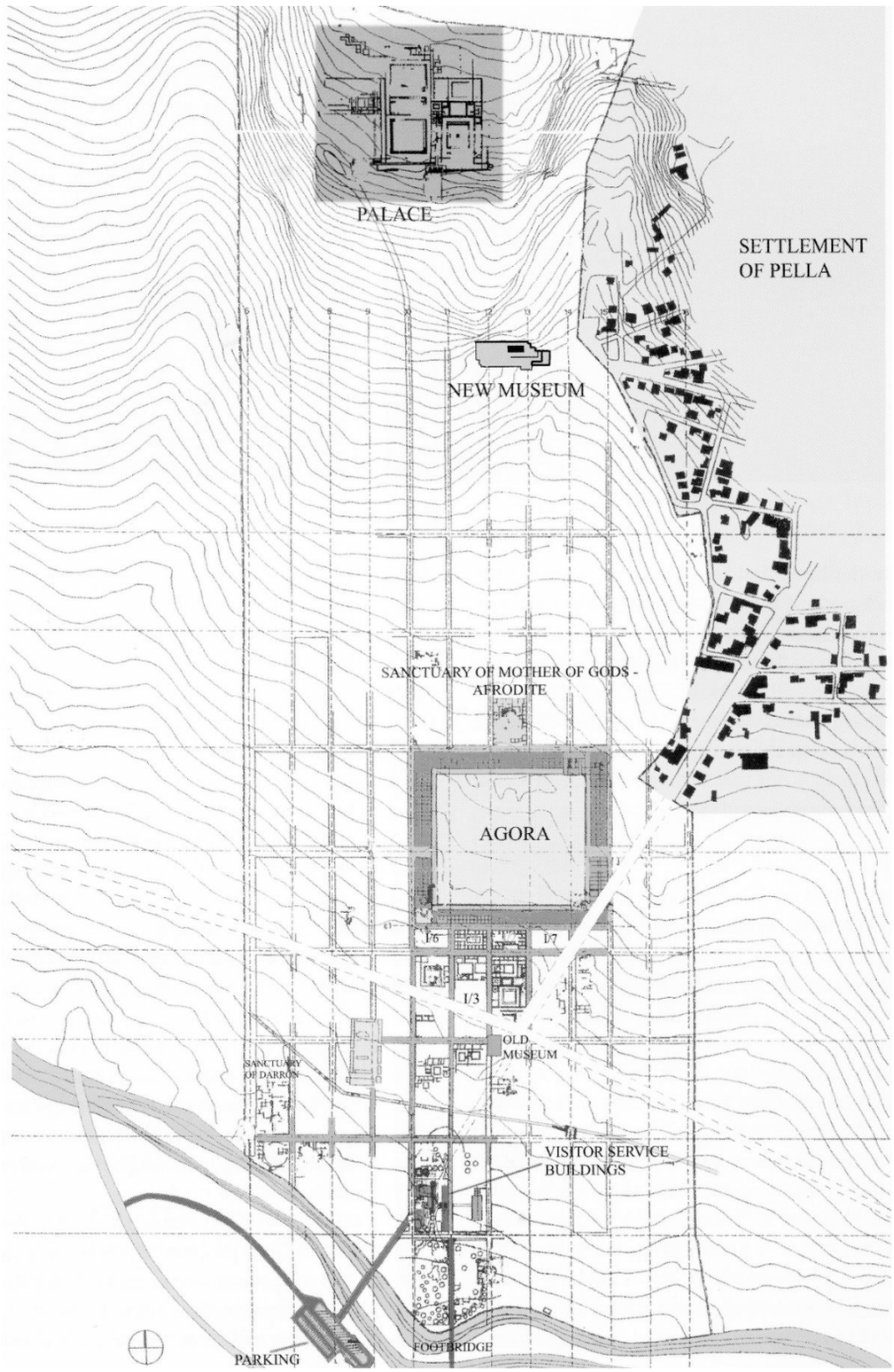
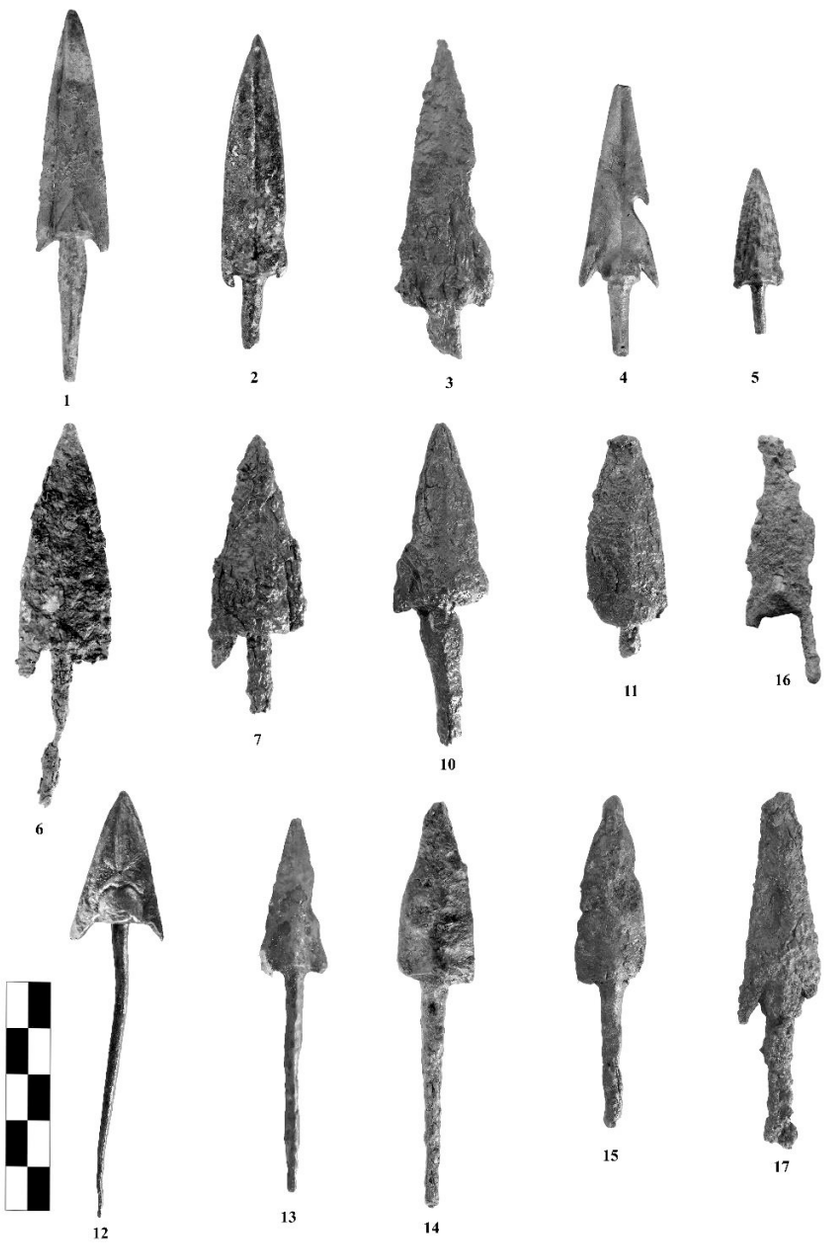


Fig. 2. Socketed arrowheads (cat. nos 40, 46, 49, 50).

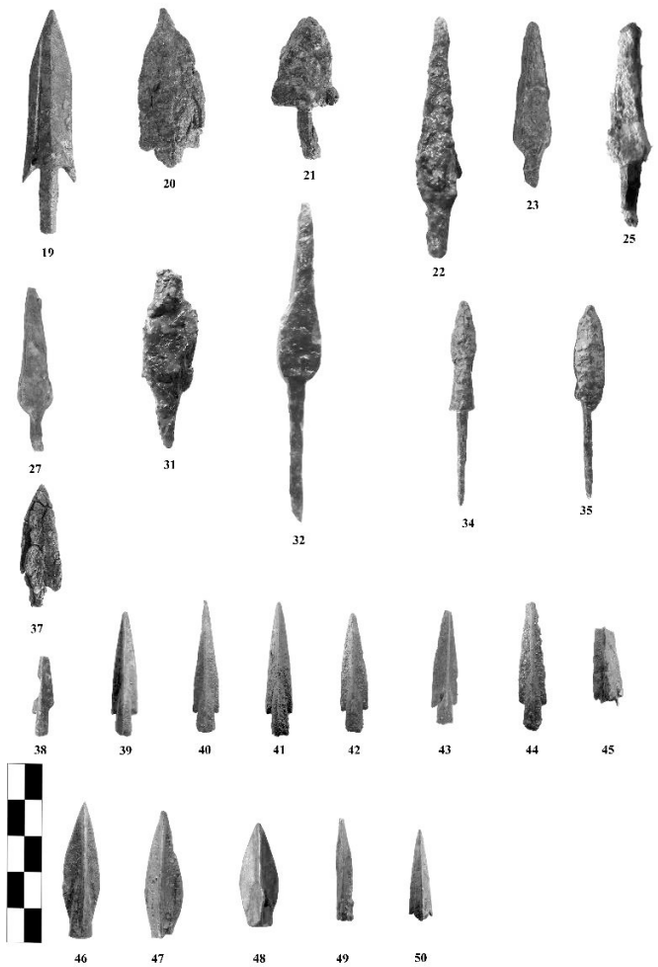


Pl. 1. The town plan of ancient Pella (© excavations of Agora of Pella, Aristoteles University of Thessaloniki. Ephorate of Antiquities of Pella).

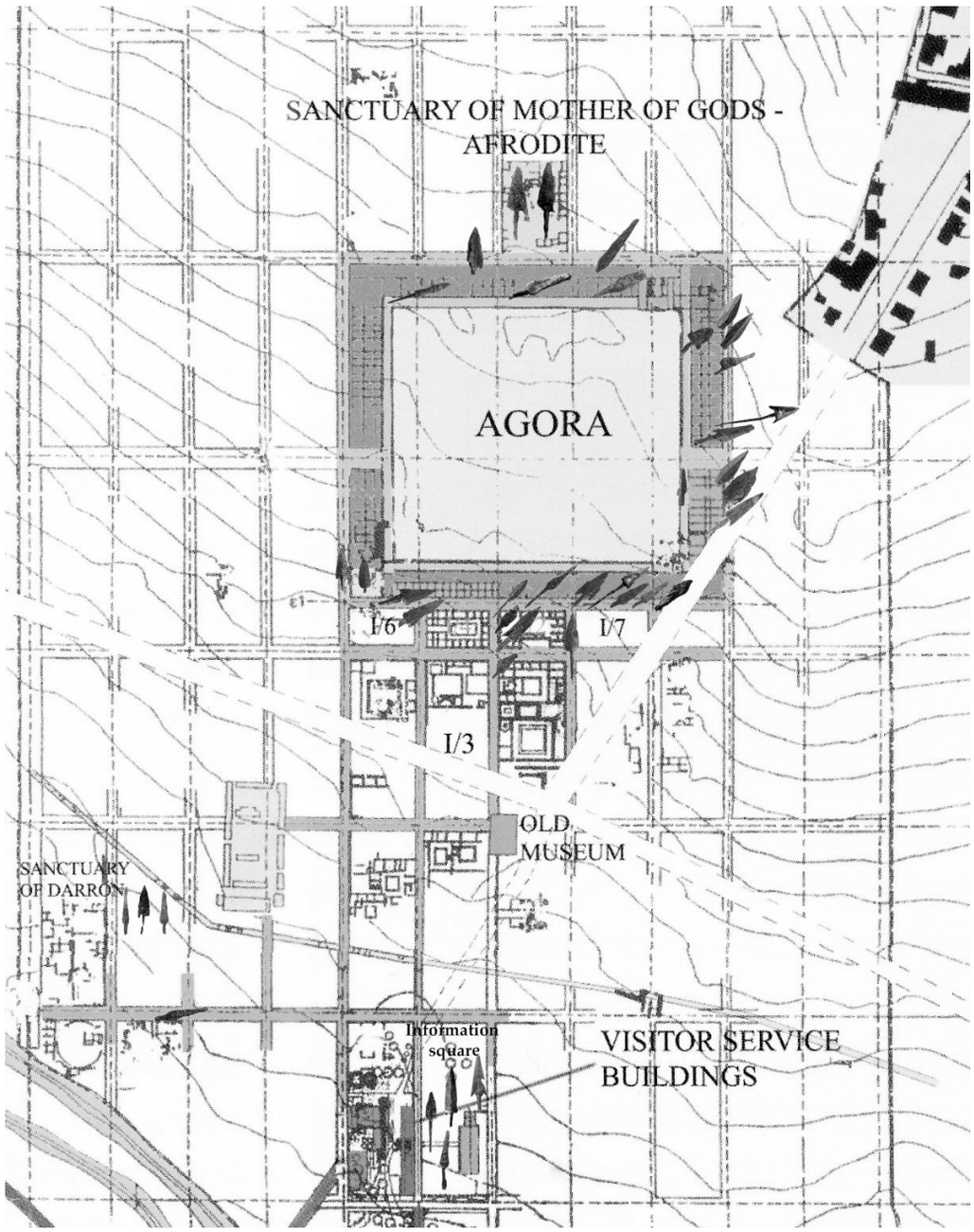


Pl. 2. Arrowheads of type A. 1, 3, 5,7, 10-13, 15, 17 (© excavations of Agora of Pella, Aristoteles University of Thessaloniki), 2, 4, 6, 14, 16 (© Ephorate of Antiquities of Pella).

Pl. 3. Arrowhead cat. no. 12 detail (© excavations of Agora of Pella, Aristoteles University of Thessaloniki).



Pl. 4. Arrowheads of type A and B 19-21, 23, 25, 31, 32, 34, 35, 37, 38, 46-48 (© excavations of Agora of Pella, Aristoteles University of Thessaloniki), 22, 27, 39-45, 49, 50 (© Ephorate of Antiquities of Pella).



Pl. 5. Arrowheads dispersion in ancient Pella (© excavations of Agora of Pella, Aristoteles University of Thessaloniki and Ephorate of Antiquities of Pella).