'Atiqot 87, 2016

Late Ptolemaic Assemblages of Metal Artifacts and Bronze Coins Recovered off the Coast of 'Atlit

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The Site

The artifacts discussed in this article were recovered from the Mediterranean coast, in the northern bay of 'Atlit (34º 56' E, 32º 42.5' N), which is 10 km south of Haifa (Figs. 1, 2).[2] They were found between 50 and 300 m offshore, scattered on the sea bottom at depths of 1–9 m, above a dark clay matrix (paleo-soil) that fills a trough located between a submerged sandstone ridge and the shore (Fig. 3). The clay and archaeological material are usually covered by a 1–2 m thick layer of quartz sand, but occasionally, waves and sea currents remove the sand layer and expose the artifacts.

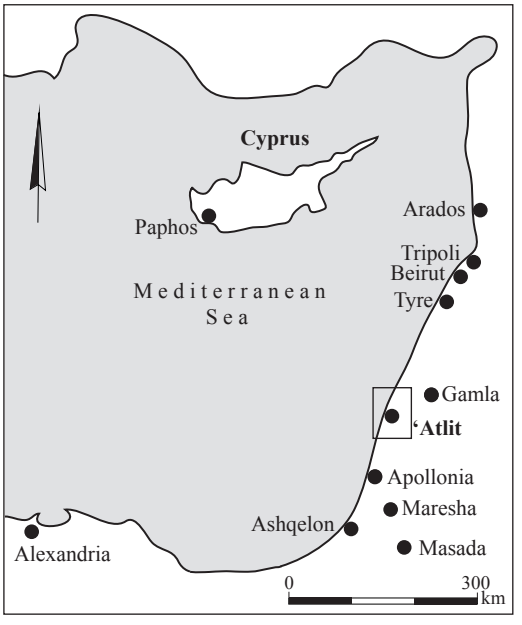

Fig. 1. Map of the eastern Mediterranean showing the location of 'Atlit and other sites mentioned in this article.

Underwater excavations and surveys in 'Atlit's North Bay have revealed numerous relics of shipwrecks, cargoes, anchors and harbor

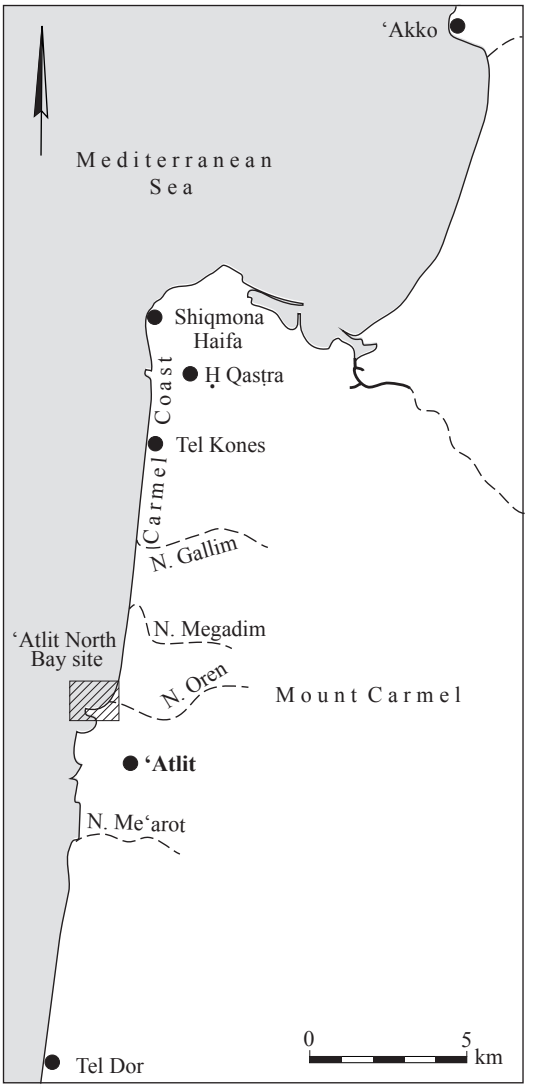

Fig. 2. Location map showing the Carmel coast of Israel.

Fig. 3. Location of Hellenistic assemblages in ‘Atlit North Bay (satellite photo from Google Earth).

installations, as well as submerged prehistoric settlements, which existed in a period when sea level was lower than today (Galili and Sharvit 1999b). These archaeological remains attest to extensive maritime and coastal activity over the last nine millennia. The earliest evidence for open-sea navigation is provided by an Early Bronze Age pottery vessel containing fresh-water mollusks from the Nile River (Sharvit et al. 2002). During the Middle Bronze Age, around 4000 years ago, sea level reached its present elevation, forming the morphology of today’s coastline, with the two bays and the headland between them. From the Middle Bronze Age onward, the ‘Atlit North Bay seems to have been almost continuously in use, offering shelter for sea-going vessels and local fishermen.

SHIPWRECK ASSEMBLAGES FROM THE HELLENISTIC PERIOD

Among the shipwreck relics found in the North Bay are numerous artifacts from the Hellenistic period, which may be assigned to seven assemblages according to their location, their discovery circumstances and the nature of the finds (Fig. 3).

Assemblage 1

During the late 1970s and 1980s, a cluster of bronze artifacts was discovered in the North Bay (Fig. 3:1; Raban 1992; Galili and Sharvit 1999b:99*, Fig. 196:13). The finds were located in the general area where the bronze coins of Assemblage 2 were later discovered (Fig. 3:2). Raban suggested that all the artifacts belonged to an assemblage from an Assyrian-period shipwreck; Merhav (1996), on the other hand, placed some of these finds in the late Hellenistic period, on the basis of parallels from that period. It seems that these artifacts may be divided into two different assemblages: one Assyrian, including an Assyrian-style chair leg, duck-shaped weights and a bronze handle in the shape of a lioness, and the other Hellenistic, including a bronze furniture leg in the shape of a goat’s leg, two finely designed

and decorated bronze handles of large vessels and a horse bridle.

Assemblage 2

The artifacts were discovered at a depth of 3–5 m (Fig. 3:2) in the course of several separate surveys during 1984–1985 (Galili and Sharvit 1999b: Fig. 196:15). The assemblage contains bronze coins (Fig. 5), square lead scale weights (Fig. 7:4, 5) and some additional metal objects.

Assemblage 3

Also during 1984–1985, a bronze horse bit (Fig. 12) was found at a depth of 7 m, some 170 m northwest of Assemblage 2 (Fig. 3:3; Haifa University Underwater Survey, unpublished diving reports D180, D181, D213, D232, D233 and D235). Several folded rectangular lead fishing sinkers were recovered near the horse bit.

Assemblage 4

During 1997–1999, additional Hellenistic-period artifacts were recovered at a depth of 9 m, c. 250 m west–northwest of Assemblages 1 and 2 (Fig. 3:4; IAA unpublished diving reports 13/99/5, 29/98/7, 30/97/46). These findings consisted of four square lead weights (Fig. 7:1, 2, 3, 6), two of which are decorated, fifteen "pyramid"-shaped lead artifacts (Fig. 8) and a decorated bronze oil lamp (Fig. 11).

Assemblage 5

Approximately 100 m southwest of Assemblage 2 and some 120 m offshore, a second-century BCE bronze battering ram, with no associated hull in the vicinity, was found at a depth of 3.5 m (Fig. 3:5; Galili and Sharvit 1999b: Fig. 196:29). When discovered, the remains of the ship's prow were still inserted in the ram and a meter long wooden beam protruded from it (Fig. 4). Fifteen fishing sinkers in the form of tubes, two ring-shaped fishing sinkers (or brailing rings) cast of lead, and three raw glass chunks were found near the ram. The ram was widely described and discussed in a volume dedicated to that artifact alone, as well as in additional publications (Casson and Steffy 1991; Galili and Sharvit 1999b; Oron 2006).

Fig. 4. The ʻAtlit battering ram being hauled from the sea, with the elongated wooden prow beam still attached.

Assemblage 6
Found 30–50 m northeast of the ram (Fig. 3:6; Galili and Sharvit 1999b: Fig. 196:14; Haifa University Underwater Survey, unpublished diving report D 178), this assemblage consists of a circular basalt millstone with remains of iron and lead attachments, and a lead sling shot (Fig. 13) bearing a thunderbolt motif.

Assemblage 7
This assemblage was found approximately 400 m northeast of the hoard of bronze coins, some 100 m offshore, at a depth of 4–6 m (Fig. 3:7; Galili and Sharvit 1999b: Fig. 196:16). Among the artifacts were several Ptolemaic silver and bronze coins in a very poor state of preservation, a lead measuring cup with a handle, bronze handles of containers and a rim fragment of a bronze vessel. Artifacts associated with ship gear included four elongated lead bars having a trapezoidal cross section, possibly core castings of wooden anchors or steering oars (Friedman, Galili and Sharvit 2002), as well as a bronze tooth from the end of a wooden anchor arm.

This article presents the Hellenistic-period objects that constitute Assemblages 1–6, including coins, weights and other objects, mostly of metal. They are described together in view of the possibility that several or all of them may come from the same wreckage event.

THE LATE PTOLEMAIC COINS

Altogether, 81 coins were recovered from Assemblage 2, all but one of them being bronze. Three are completely unidentifiable and the remaining 78 are all Late Ptolemaic (see below, *Catalogue of the Coins*). The coins are in a very poor state of preservation, due to damage from corrosion and possibly also from wear. A silver *tetradrachm* of Ptolemy VIII (145–116 BCE) from the mint of Salamis, Cyprus (Fig. 5:78), and a large, 27 mm Ptolemaic bronze coin, its surviving details too worn to enable full identification (Coin No. 77; not illustrated),[3] might in fact derive from Assemblage 7, rather than the hoard discussed here.

It appears as though all the remaining 76 coins do, in fact, originate from the same ship. When found, most of them were separate, but there were a few groups of two or three coins joined together by concretion. This may indicate that when lost at sea, the coins were kept together in a pocket or a purse made of organic material (leather or linen), which gradually disintegrated. The coins are all small and bronze, and have a beveled edge. They can be separated into two groups.

Group 1
This group consists of 67 coins (Nos. 1–67; Fig. 5:1, 6, 21). A central cavity (hole-centering) is evident on 24 of them, and all are struck on flans that were strip-cast, many showing prominent lugs on opposing ends. The diameter of the coins in this group ranges between 14 and 18 mm, and as seen in Fig. 6 (see below), the majority falls within the 16–17 mm range. The weight range is 1.81–6.20 g. On 19 coins, the axis is upright; on the others, it cannot be determined. Most are 2–3 mm thick.
Obverse: The grotesque head of Zeus-Ammon can be discerned on ten coins, while on a further ten, traces of the head can be observed.
Reverse: Two eagles facing left can be seen on 25 coins. On five other coins it cannot be determined for certain whether there are one or two eagles. The eagles have a long, snake-like neck. The inscriptions, if there were any, have been obliterated on all coins. On one coin (Fig. 5:1) and possibly on three others, a small cornucopia can be seen in the left field.

On only seven coins (Nos. 1–7; Fig. 5:1, 6) can both the head of Zeus-Ammon and the two eagles be clearly seen. However, based on the overall range of dimensions, it can be reasonably argued that all coins of this group are, in fact, of the same type: Head of Zeus-Ammon r./two eagles l.; hole-centering, beveled edge, and fixed dies. The small cornucopia in the left field may or may not be common to all.

Group 2
This group consists of nine coins (Nos. 68–76; Fig. 5:68). All have a central cavity, and strip-casting lugs are evident in only one instance (Coin No. 72). The diameter range of the group is 17–18 mm (five coins and four coins respectively), and the weight range is 3.29–5.48 g. The coins of this group are thin (1.0–1.5 mm) and show signs of wear.
Obverse: On three coins, a normal head of Zeus can be seen and on two further coins, traces of a head.
Reverse: On six coins, two eagles can clearly be made out. The inscription cannot be read on any of the coins.

Both the obverse and reverse type can be clearly seen on only one coin of this group (Coin No. 70). However, once again, the measurement statistics suggest that all nine coins are of the same type: Head of Zeus/two eagles l.; hole-centering.

CATALOGUE OF THE COINS (Fig. 5)

All coins, except No. 78 are bronze. An asterisk after the catalogue number indicates that the coin is illustrated in Fig. 5. Not all coins were assigned IAA registration numbers.

Group 1
Thick coins, beveled edge, strip-cast flans. Grotesque head of Zeus-Ammon.

1–3. *Obv*. Head of Zeus-Ammon r.
Rev. Two eagles l. In field l. cornucopia.
1.* IAA 102819. ↑, 4.63 g, 16 mm. Small cornucopia in left field. Central cavity.
2. IAA 102824. ↑, 4.72 g, 16 mm. Traces of cornucopia. Central cavity.
3. IAA 102829. ↑, 5.43 g, 17 mm. Traces of cornucopia.

4–10. As No. 1, mint mark, if any, illegible.
4. IAA 102839. ↑, 4.15 g, 16 mm. Central cavity.
5. IAA 102836. ↑, 3.47 g, 16 mm.
6.* IAA 102821. ↑, 4.16 g, 16 mm.
7. IAA 102832. ↑, 4.48 g, 16 mm.
8. IAA 102822. ↑, 4.30 g, 17 mm.
9. IAA 102840. ↑, 4.23 g, 16 mm.
10. IAA 102834. ↗, 4.31 g, 16 mm. Central cavity.

11, 12. As No. 4, with details of reverse mostly obliterated.
11. IAA 102830. ↑, 3.72 g, 16 mm.
12. IAA 102827. 3.22 g, 16 mm. Central cavity.

13–30. As No. 4, with details of obverse mostly obliterated.
13. IAA 102818. ↑, 6.20 g, 18 mm.
14. IAA 102837. ↑, 4.33 g, 16 mm.
15. IAA 102820. ↑, 4.84 g, 17 mm. Central cavity.

Fig. 5. Coins from the hoard.

16. IAA 102817. ↑, 4.41 g, 17 mm.
17. IAA 102838. ↑, 3.25 g, 16 mm.
18. IAA 102828. ↑, 4.45 g, 17 mm.
19. IAA 102833. ↑, 4.67 g, 16 mm.
20. IAA 102825. 4.20 g, 16 mm. Central cavity.
21.* IAA 102816. 4.25 g, 17 mm.
22. IAA 102835. 2.90 g, 15 mm. Central cavity.
23. IAA 102823. 4.51 g, 16 mm.
24. IAA 102831. ↑, 3.17 g, 17 mm. Central cavity.
25. IAA 102807. 4.33 g, 17 mm.
26. IAA 102808. 2.39 g, 17 mm.
27. IAA 102841. 2.59 g, 16 mm.
28. IAA 102826. 5.64 g, 17 mm.
29. 4.37 g, 16 mm.
30. 3.68 g, 16 mm.

31–67. No details visible.
31. 3.29 g, 17 mm. Central cavity.
32. 5.19 g, 16 mm. Central cavity.
33. 5.00 g, 18 mm.
34. 2.92 g, 16 mm.
35. 2.40 g, 15 mm.
36. 5.88 g, 17 mm. Central cavity.
37. 4.22 g, 16 mm.
38. 1.81 g, 14 mm.
39. 4.10 g, 15 mm.
40. 4.40 g, 17 mm.
41. 4.02 g, 14 mm. Central cavity.
42. 1.94 g, 15 mm.
43. 4.43 g, 17 mm.
44. 3.00 g., 15 mm. Central cavity.
45. 4.25 g, 16 mm.
46. 4.86 g, 16 mm. Central cavity.
47. 4.02 g, 16 mm. Central cavity.
48. 4.94 g, 16 mm.
49. 4.57 g, 17 mm.
50. 3.67 g, 15 mm.
51. 5.18 g, 16 mm. Central cavity.
52. 4.40 g, 16 mm.
53. 3.98 g, 16 mm.
54. 5.29 g, 17 mm.
55. 4.29 g, 16 mm. Central cavity.
56. 2.89 g, 16 mm.
57. 4.36 g, 16 mm. Central cavity.
58. 3.40 g, 16 mm.
59. 3.58 g, 15 mm. Central cavity.
60. 4.82 g, 17 mm. Central cavity.
61. 4.90 g, 17 mm.
62. 4.55 g, 16 mm.
63. 4.31 g, 15 mm. Central cavity.
64. 4.67 g, 16 mm.
65. 4.75 g, 16 mm. Central cavity.
66. 4.04 g, 16 mm.
67. 3.96 g, 18 mm. Central cavity.

Group 2
Thin coins, beveled edge, central cavity.

68–73. *Obv*. Head of Zeus r.
Rev. Two eagles l.
68.* IAA 102812. 5.12 g, 18 mm.
69. IAA 102813. ↑, 4.47 g., 17 mm.
70. IAA 102810. ↑, 4.29 g, 18 mm.
71. IAA 102814. 4.08 g, 18 mm.
72. IAA 102815. 3.93 g, 17 mm.
73. 5.48 g, 17 mm. Traces only. The head is on the flat side.

74. *Obv*. Head of Zeus r.
Rev. Obliterated.
IAA 102811. 4.24 g, 18 mm.

75, 76. No details visible.
75. 3.29 g, 17 mm.
76. 3.76 g, 17 mm.

Other Coins
77. Ptolemaic, second century BCE.
Obv. No details visible.
Rev. Two eagles l. (traces).
IAA 102809. 13.52 g, 27 mm.
Cf. Svoronos 1904: No. 1425 (joint reign of Ptolemy VI and VIII, 170–164 BCE).

78.* Ptolemy VIII (146–116 BCE), Salamis.
Obv. Head of Ptolemy r.
Rev. Traces of inscription. Eagle with folded wings l. To r. ΣΑ. To l. illegible letters.
IAA 102806. AR, ↑, 9.22 g, 24 mm.
Cf. Svoronos 1904: Nos. 1533, 1534.

CHRONOLOGY OF THE COINS

In an article discussing a type of Late Ptolemaic bronze coin found with some regularity in Israel, Gitler and Kushnir-Stein (1994–1999:47, Type 2) convincingly argue that it was minted in Paphos, Cyprus, by either Ptolemy IX or Ptolemy X before 103 BCE, and arrived in Israel with the troops of Ptolemy IX Lathyrus in 103 BCE.[4]

This coin type is very similar to Group 1 in our assemblage, except that it is larger, mostly in the 19–21 mm range, and has a characteristic relief ringlet in the center of either or both faces of the coin. Otherwise it has the same grotesque depiction of Zeus-Ammon and the two eagles with the snake-like neck. Moreover, looking closely at Gitler and Kushnir-Stein's catalogue, it can be seen that the features of at least ten coins are much closer to our Group 1 (Table 1; Fig. 6); they have a "central drilling hole" (i.e., central cavity) rather than a relief ringlet, and most axes are upright.[5] It is true that their diameter range seems slightly larger, but this is perhaps due to the fact that the coins were measured across the lugs remaining after the casting process, rather than across the circle, adding 1–2 mm to the diameter.[6] Reducing the published diameters by those measures would put this group squarely within the diameter

Table 1. Hole-Centered Coins from Akko, Ginnosar and Dor
(based on Gitler and Kushnir-Stein 1994–1999)

No.	Weight (g)	Diam. (mm)	Axis	Provenance	Remarks
7	4.62	20	5	ʻAkko	Mint mark: cornucopia
9	5.95	18	1		
12	4.23	17	12	Ginnosar	Illustrated; the hole centering is visible in the photograph
14	4.45	19	12		
16	4.90	16–18	12		
36	7.69	20	12	Dor	
39	7.55	18–20	12		
44	4.11	16–18	12		
52	4.24	18	12		
56	6.05	18	12		Illustrated

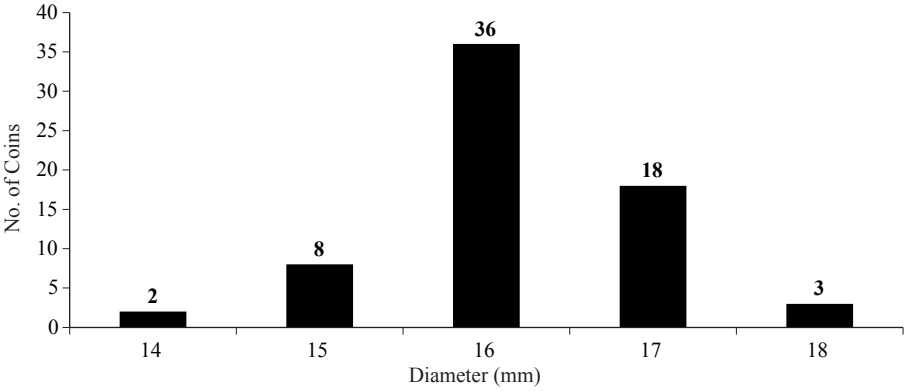

Fig. 6. Diameter frequency of coins in Group 1.

range of our Group 1. Most of these coins are not illustrated, apparently for the same reason as in the case of the hoard under discussion here: the extremely bad state of their preservation. Thus, it may be possible that several more coins from that catalogue are similar to those in Group 1 from ʻAtlit.

It is therefore suggested that the aforementioned ten coins are, in fact, of the same type as those in Group 1, and not of the type discussed by Gitler and Kushnir-Stein (1994–1999). The grotesque Zeus-Ammon head and the eagles are characteristic of Cyprus, and the similarity between Group 1 and their coins suggests either a contemporaneous issue by a different mint on Cyprus, or a different series, which in turn raises the possibility that one series was issued by Ptolemy IX, and the other, by Ptolemy X.

Returning to our hoard, it seems, thus, that Group 1 can be assigned to either Ptolemy IX or Ptolemy X, and to a Cypriot mint, likely in Paphos. The single *tetradrachm* from Salamis (Coin No. 78) is probably of Ptolemy VIII. Though the *tetradrachm* and the coins of Group 1 argue for a Cypriot mint for Group 2 as well, this cannot be determined with certainty. The coins of Group 2, which are of better workmanship, are a good match to Svoronos (1904), Nos. 1427 and 1428. This issue, attributed by Svoronos to Alexandria under the joint reign of Ptolemy VI and Ptolemy VIII (170–164 BCE), is most likely a later issue, dated to the end of the century.[7] The *tetradrachm* seems to be an older coin, and as stated above, may in fact belong to Assemblage 7.

This conclusion might also bear on the state of preservation of the coins. Though none of the coins under discussion have been tested metallurgically, a corroded coin discovered at Ashqelon (Gitler and Kahanov 2002:262–263, No. 47), that appears to be similar to the type discussed by Gitler and Kushnir-Stein, was found to be made of a highly leaded alloy. Such alloys are prone to heavy surface corrosion (Gitler and Kahanov 2002:263–264, n. 5), which would explain the extremely poor condition of most of these coins.

THE SQUARE LEAD SCALE WEIGHTS

Six square scale weights were found: three bear features characterizing weights from the Hellenistic southern Levant (Weights 2, 4, 6); two are plain, such as are common in the region at that time period (Weights 1, 3); and one, on the basis of its style and mass, belongs to a different metrological system (Weight 5). In the catalogue below and in Fig. 7, the weights are listed in ascending order of net mass, a neutral method of presentation. Each weight is identified by catalogue number, IAA inventory number and excavation registration number, in parentheses.

CATALOGUE OF THE SCALE WEIGHTS (Fig. 7)

1. IAA 2000–1064 (30/97.46/3)
Form: Square.
Measurements: 2.8 × 2.3 × 0.8 cm; mass 46.5 g.
Face One: Plain; an arrow-like mark that may have been created in the process of casting (metal folded or with voids).
Face Two: Plain; a motif shaped like a chair that may have been created during casting, as on face one.
Side: Plain.
Preservation: Good; a chip seems to be missing in one corner of face two, but this may represent a flaw that occurred during the casting process.

2. IAA 2000-1065 (30/97.46/2)
Form: Square.
Measurements: 6.2 × 6.0 (obverse), 5.2 × 5.0 (reverse) × 0.8 cm; mass: 239.2 g.
Obverse: Raised frame of eggs and darts. In the upper part of the weight, there is a date written according to the Greek alphabetical system, introduced by an L-shaped symbol: L ΔΣ (δσ', *delta*, *sigma*). In the center, there is a representation of a ship's prow oriented to the right, with a furled foresail (*artemon*; Basch 1987:422, 454, Figs. 908, 1008, 1009) separating the two letters of the date. There is a large wedge (∠) in the lower right corner. Between the base of the *sigma* and the top of the

Fig. 7. Lead scale weights.

upper branch of the wedge there are two parallel oval elements, perhaps part of the foresail in a full wind. Most details of the ship's prow are discernible: the stem post, upper battering ram (*proembolion*; Basch 1987:388, Fig. 810), tridentate battering ram (Basch 1987:388, Figs. 811, 812) and bulwark (Basch 1987:388, Figs. 810a, b).[8]

Reverse: Protruding lines of superimposed + and × create a symbol resembling a Union Jack or a Basque flag. The transition between the reverse and the sides is quite angular (as on Weight 6).

Side: plain.

Preservation: Obverse is slightly eroded, with a faint brown patina on the background surface. Reverse is eroded (smoothed).

3. IAA 2000-1062 (29/98.7/1)

Form: Square.

Measurements: 5.7 × 5.5 × 0.8 cm; mass 241.0 g.

Face One: Plain.

Face Two: Plain.

Side: Plain.

Preservation: Very good.

4. IAA 2000-1066 (1985.D 242.S 22/58)
Form: Square, with a protrusion on the lower edge.
Measurements (protrusion on lower edge not included): 5.9 × 6.1 (obverse), 5.4 × 5.4 (reverse) × 0.7 cm; mass 244.4 g.

The protrusion on the lower edge may have been an addition of lead meant to adjust the weight according to the standard. It may not necessarily have been meant as a proper lug.
Obverse: Irregular raised frame with rounded profile. On the upper side of the weight, there is a date according to the Greek alphabetical system, introduced by the symbol L. The left sign is ligatured with the L and looks like a retrograde *zeta* (ƧI instead of ZI), which it may be; however, it is more likely an angular *stigma* (ϛ; see below). The middle sign looks like a retrograde digamma (FI/ꟻI) however, this is an unlikely reading in the numeral system. It should rather be seen as a slightly damaged *koppa* (ϙ; see below). Finally, only the vertical bar of the sign to the right is clearly discernible, and it can be only a PI . So the date should be read: L ZIϘIPI or L ϛIϘIPI (ζϘρ’ or ϛϘρ’, *zeta* or *stigma*, *koppa*, *rho*). In the lower left third of the weight, there is a monogram, in which the letters ⍺ (alpha with broken bar), retrograde Γ and N, Π, T, Φ, may be discernible (see Weight 5, below). In the lower right corner, there is a large wedge (∠).
Reverse: Plain.
Side: Plain.
Preservation: Good. Slightly eroded (smoothed).

5. IAA 2000-1067 (1985.D 234.S 22/58)
Form: Square.
Measurements: 6.3 × 6.2 × 0.8–1.0 cm; mass 318.8 g.
Obverse: Three thick raised lines forming a monogram looking like the letter N (Greek *nu* or Latin N?). The middle line runs from below the tip of the left vertical line to the middle of the right one, and a bar set at the bottom of the N protrudes to the right. However, when the weight is rotated 180 degrees, the middle line runs from the middle of the left vertical line to just before the tip of the right one, and the bar set above the N protrudes to the left, so that the N appears to be inserted in a retrograde Γ. Note that a bar protruding above the N is also found in the monogram of Weight 4 (see above). Another possibility achieved after rotating the weight 90 degrees, is the combination of a ZI (*zeta*) inside a non-retrograde Γ (*gamma*).
Reverse: Plain.
Side: Plain.
Preservation: Very good.

6. IAA 2000-1063 (30/97.46/1)
Form: Square, with protrusion on the lower edge.
Measurements (protrusion on lower edge not included): 8.0 × 7.8 (obverse), 6.5 × 6.5 (reverse) × 0.9 cm, mass: 504.0 g.

The protrusion on the lower edge may have been an addition of lead meant to adjust the weight according to the weight standard. It may not have been meant as a proper lug.
Obverse: Raised frame with angular profile. On the upper side of the weight, there is a date according to the Greek alphabetical system, introduced by the L-shaped symbol: L EIϘIPI (ϵϘρ’, *epsilon*, *koppa*, *rho*). On the right side, in its center, there is a sign resembling a small *tau* (TI), turned 90 degrees clockwise. In the center, there is a protruding, roughly rounded ‘button’, flanked on both sides by the letter ⍺ (*alpha* with broken bar). The ‘button’ seems an addition, probably meant to adjust the weight significantly (see reverse).
Reverse: Protruding lines of superimposed + and ×, resembling a Union Jack or a Basque flag. A very large thick protruding oval ‘button’ is situated in the center, where the lines cross. It was perhaps meant to adjust the weight significantly (see obverse).
Side: Plain.
Preservation: Very good.

DISCUSSION OF THE SCALE WEIGHTS

Dating

Of the six square scale weights, only Nos. 2, 4, and 6 are inscribed and dated. Although their molds may have been engraved by different

hands, the three bear similarities, suggesting they belong to the same series. All of them exhibit the same pattern of design: the date on the top, introduced by the symbol L and with units, tens and hundreds from left to right; a device located approximately in the center, and the value of the weight located most probably in the lower right part. Weights 2 and 4 are linked by the wedge symbol (∠; see discussion below). Weights 2 and 6 are linked by the Union Jack reverse type. All these features are commonly found on lead scale weights of the southern Levant in the Hellenistic period. It may be suggested that these three weights were issued in the same city, which—on the basis of the prow device in Weight 2—may have been a maritime one.

The similarities between the three dated weights confirm the date on the less clear inscription on Weight 4. Considering the homogeneity of the group, the sign on the left can only be an "angular" *stigma* (ϛ) or, less likely, a retrograde *zeta* (Ƨ).[9] The sign in the middle is a *koppa* in the form of a retrograde *rho* (commonly used in the Hellenistic period on weights) (ϙ). The sign on the right can only be a *rho* (P). Thus, in chronological order, the dates would be: Year 195—Weight 6, Year 196 (with a *stigma*, rather than 197 with a *zeta*)—Weight 4, and Year 204—Weight 2. Since the Seleucid era began in October 312 BCE, the dates are the equivalent of 118/7 BCE, 117/6 BCE (rather than 116/5 BCE) and 109/8 BCE respectively.

Metrology

On weights found in the Southern Levant, the value is almost never mentioned, although they do display a device, a date and the name of the agoranomos (Kushnir-Stein 1997; Finkielsztejn 1998a:33–38; 2003: *passim*; 2007).

The square scale weights from ʻAtlit can be divided into four groups in ascending order of their mass: (a) Weight 1 at 46.5 g; (b) Weights 2, 3 and 4, for which the masses are very similar: 239.2, 241.0 and 244.4 g respectively; (c) Weight 5 at 318.8 g; (d) Weight 6 at 504.0 g. It should be taken into consideration that the preservation conditions over the course of the centuries variously affects the mass of lead objects (Finkielsztejn 1998a:37–38, with references, especially to Henri Seyrig's works; 2003: *passim*; 2007). Moreover, variations in the weight's thickness may be a relevant parameter influencing the changes occurring in the metal while exposed to the elements (in this case, the sea). Therefore, it might be suggested that the relative rate of decay of a thicker artifact was comparatively reduced.

The above-mentioned stylistic links among Weights 2, 4, and 6 lend credence to the possibility that the original weight value of Weight 6 was intentionally double that of Weights 2 and 4. This may be corroborated by the fact that the letter *alpha* appears twice on Weight 6. One would expect the use of such a letter to symbolize "one unit of the standard," and, indeed, it quite commonly indicated the value of one *mina*. However, there are other possible explanations as to why the letter *alpha* is repeated. It could be simply a decorative motif, or possibly, one *alpha* might represent the number "1", while the other, perhaps, the initial of the name of the magistrate in charge of the weights and measures, i.e., the *agoranomos*.

The weight standard in the second half of the second century BCE Southern Levant was the *mina* (μνᾶ), at a supposed mass of approximately 550–560 g (probably c. 566.8 g; see nn. 11 and 12), although some examples do weigh about 504 g (Finkielsztejn 2015:76–77). It appears that the origin of that standard was a *mina* of Syria introduced to the area by Antiochus IV (Finkielsztejn 2007; 2014; 2015; forthcoming).

The meaning of the small sign shaped like a T rotated 90 degrees clockwise, along the right edge of Weight 6, is not certain. It may have signified "half," with the intended reading, "one half of two *minas*" (= one *mina*), an occurrence not uncommon in Greek metrology inscriptions, especially in the Levant. Alternatively, the sign may be a *tau*, an initial signifying τέταρτον (*tetarton*, a

quarter), τετρα- (*tetra*-, four), τριτη- (*triti*-, one third) or τρι- (*tri*-, three), relating to a weight standard different from the standard expressed by one of the two *alphas* (signifying 1, see above). The practice of relating to two different standards on a single weight is known elsewhere (see Dumont 1892; Finkielsztejn 2007). The word τέταρτον (*tetarton*, a quarter) is by far the most commonly mentioned fraction on such weights. However, a reference to a *mina* of 2016 g (504 g × 4) is not likely, as "quadruple" *minas* are exceptional for this period and geographical area.[10] Indeed, besides the "simple" *mina*, only *minas* with a mass of double the regular values, weighing about one kilogram (here it would be 1008 g) were in use at the end of the second century BCE, and may have been the consequence of some sort of reform that is yet to be understood (Seyrig 1946–48:74–75, Tables I and II).

One last possible meaning for the rotated *tau* on Weight 6 could be the symbol of the *drachm* in retrograde presentation (a T rotated 90° counterclockwise), as is common in the Aegean and the eastern Mediterranean. This is supported by Charles Doyen's recent discovery that the *mina* of the Southern Levant is equivalent to (and most probably based upon) 128 Attic *drachms* of 4.35 g (Doyen 2014:284–298), thus providing a possible harmonization between the Attic *drachm* and the various standards of the Levant.[11] Also in evidence in the Southern Levant during the second century BCE, is a *mina* of c. 500–510 g, which would have been worth 116–118 Attic *drachms* (504.6–513.3 g; see below).

Both Weights 2 and 4 bear a wedge sign, which most certainly symbolized 'one half', as evidenced elsewhere (for discussion and parallels, see below). Weight 3 is devoid of any inscription, but its size and weight matches that of Weights 2 and 4. The mass of each of the three weights, when doubled, reaches 478.4 g (239.2 × 2), 482 g (241 × 2) and 488.8 g (244.4 × 2), i.e., about 3–5% less than the mass of Weight 6. Weight 6, being thicker, may have been less affected by corrosion than Weights 2, 3 and 4. Another explanation could be that the two button-like protrusions, one on either side of Weight 6, might have been added to adjust the weight to one of the known weight standards, which added up to slightly more than 500 g.

Although it should be mentioned that the weight standard of the Phoenician *mina* used in the cities of Tyre, Arados and Marathos in the Hellenistic period (about 465 g) approached in value the theoretical standard of Weights 2–4, the style of Weights 2 and 4 at least, precludes such an interpretation. Moreover, the masses of the three weights are consistently higher than that of the Phoenician standard by 3–5% (Finkielsztejn 2007; 2015; Wolff and Finkielsztejn 2009).

Weight 5 is different from the others, both in appearance and mass (318.8 g). There is no clear explanation concerning the symbol or letter it bears. If it is indeed simply the Greek letter N, it may represent "50" in the Greek alphabetical numeral system, indicating fifty times a standard of more-or-less 6.38 g (depending on the degree and type of corrosion). The latter value roughly recalls the weighing system(s) used in northern Phoenicia (the area of Byblos): a *drachm* of 3.6 g and a *sheqel* of 14.4 g (an intermediate standard of c. 7.2 g, although unattested, is not unlikely). A *sheqel* of slightly over 13 g was also used in Arados. Weight 5, weighing 318.8 g, could be half of a *mina* of about 643 g., also recognized in northern Phoenicia or Syria.[12] Of course, these suggestions are only tentative, since the numerical interpretation of the monogram is not certain.

Alternatively, it is perhaps relevant that the value of Weight 5 approaches that of the Roman *libra* (pound), which was 326–327.45 g (Hultsch 1864:190, s.v. λίτρα, 3.a, with references; 228, l. 25; 1882:706, Table XIII:A, 715, Table XXII; Seyrig 1946–48:74, Table I, Seleucia, Nos. 15 and 16; Kushnir-Stein 1995:48–50). Finally, it may be that this artifact originated in a different location in the eastern Mediterranean (Cyprus?), but an inquiry into

such a possibility is beyond the scope of this report.

No clear-cut conclusion can be reached regarding the lighter mass of Weight 1 (46.5 g). It may have been a fraction of a *mina*, but this is conjectural, because, as is usually the case on small denominations, there is no device that helps locate its possible origin. The fractions for this type of weight would be expected to follow the progression of one, a half, a quarter, one-eighth and one-sixteenth, etc., none of which fits the weighting system of the Southern Levant *mina* (see above). On the other hand, the mass of Weight 1 is one-sixteenth of 744 g, close to 752 g, which was a Phoenician and Syrian standard (Finkielsztejn 2014; 2015). Another possibility is that Weight 1 may be an eighth of a local Roman *litra*, i.e. 372 g, for 376 g, evidenced in the Levant (Rahmani 1980; 1986; Finkielsztejn 2015).

The Wedge Symbol (∠) *on the Scale Weights*.— As already suggested above, the wedge appearing on Weights 2 and 4 most probably signifies "half". We know of only three other examples of a similar sign on weights.[13]

1. On a weight from Tyre, double-dated 144 SE and 106 (or 107) in the era of "the People of Tyre," i.e., 169 BCE (*Reinhart Estate* 1997:171, No. 5550A; Finkielsztejn 2003:478–484), the last line of the inscription displays an *alpha* preceded by a wedge with symmetrical arms. The weight's mass is 750 g, placing the Tyrian weight standard at either 1500 g, if the signs are to be read "one half unit," or 500 g, if they signify "one unit and a half" (see the following examples). It is noteworthy that the weight mentioned in n. 9, is probably also Tyrian and weighs 1497 g, i.e., the same mass.

2. On a weight from Tel Sos, bearing the name of the city "Gaba" and dated to Year 218, probably according to the Pompeian era starting in c. 63 BCE, corresponding to c. 155 CE (Siegelmann 1989), the sign of the wedge is more open, with both arms symetrical (<). In this case, the sign may have stood for something else rather than "half". The weight value seems to be represented by the letter H, standing for "eight" or "one eighth." Although the expression "ἡμιόγδοον" ("half an eighth", i.e., one-sixteenth) may be seen on at least one weight from Maresha (Finkielsztejn 2010a:177, 189), such a meaning on the Tel Sos example seems doubtful. Its mass being 212.3 g, the standard would have been 13.27 g, a mass known for a *sheqel* in Arados and perhaps Byblos in the Hellenistic period (Finkielsztejn 2015:56, 74), but not demonstrated to have been in use in the mid-Roman period. The meaning of the association of both signs, H and ∠, could also be "eight and a half", as suggested by Seyrig regarding a weight attributed to Seleucia Pieria (see next example).

It is also possible that the wedge on the Tel Sos weight may have been something else entirely, perhaps a badly engraved *gamma* (Γ), the symbol for "ounce" in the Roman-Byzantine period. This would better fit the mass, which is the equivalent of eight 26.5 g ounces. Countering this theory could be the normally formed initial *gamma* that appears in the name of the city Gaba on this same weight. Nonetheless, the differing quality of the engraving could be a reflection of different usages of the letter, i.e., in an official name as opposed to a technical sign.

3. On a weight attributed by Seyrig to Seleucia Pieria, and dated to the year 313 of the "Freedom of Seleucia," which corresponds to 204/5 CE, the sign of the wedge also appears at the end of the inscription. Seyrig interpreted it as meaning "half," suggesting a reading of "half a *litra* of 10 ounces and a half" (Seyrig 1946–48:51, 52, 74, Pl. 4). No supporting evidence is given for that suggestion. As the word "ounces" is written in full, the wedge cannot represent that unit itself.

In summary, despite the metrological problem resulting from the state of preservation of the weights under discussion, it seems quite safe to suggest that the wedge sign appearing on them means "half," as on weights elsewhere.

Aspects of the Administration of Weights and Measures

During the Hellenistic period in the Southern Levant, the following data may have appeared on lead scale weights: (1) the date; (2) the name of the *agoranomos*, the magistrate responsible for the accuracy of the measures based on the accepted standards, with or without mention of the office itself; (3) a device, generally centered on the weight, but not necessarily; (4) the value of the weight, based on a given standard—*mina*, *drachm* or *sheqel*—for the Levant.

Not all elements of information necessarily appeared, and, interestingly, the value of the weight is generally missing. It would seem that the customer was able to identify the value of the weight by its size and appearance, something possible mainly for a resident of the city that produced the weight.

The name of the city never appears on the weights from the Southern Levant, in contrast to those of Antioch, Seleucia Pieria, and Laodicea in Syria (Seyrig 1946–48), as well as some Phoenician cities, which do mention the city name.[14] Although each city—*polis* or Greek-styled town—would have had its local administrative magistrates, or more specifically in our case, *agoranomos* (see Finkielsztejn 1998a:34–37; 1999:55, 58–60; 2010b; 2012), it seems that the system of weights and measures was somehow unified. This hypothesis is based upon the similarity both in general characteristics and in standard units among these weights. Apparently, the *agoranomos* would choose his own motif for the device, much as the devices on amphora stamps were chosen by the fabricant responsible for the workshop, as in Rhodes or Knidos, or the yearly comptroller (termed "pseudo-eponym" by scholars, as opposed to the actual eponym, whose name would date all documents written during his term), as in Thasos and Sinope.

If our three dated weights were manufactured in the same city, then clearly, each (yearly) *agoranomos* chose a different device (presented here in chronological order): on Weight 6, one of the *alphas* may represent the initial of his name or the title of his office; on Weight 4, a monogram possibly represents the name of the *agoranomos* himself; and on Weight 2, a ship's prow is depicted. At Maresha, *agoranomoi* also chose different motifs: simply the name with the patronymic—with or without a device, a simple or double cornucopia, a star or rosette, two piloi, a Macedonian shield, etc. (Finkielsztejn 1998a; 2010a: *passim*).

It should be noted that such observations apply only for the second century BCE Levant. Indeed, the earliest known weight is dated to 140 Seleucid Era (SE), which corresponds to 173/2 BCE (found at Maresha: Finkielsztejn 2010a:177–178, 184, 188). Interestingly enough, no dated weight found in the Southern Levant can be associated with Ptolemaic administration.[15]

Among the devices used, ship's prows (and at times, the entire ship) were common motifs. They may have represented a port city, as is certainly the case for Tyre (Dunand and Duru 1962: Pl. LX, 1, 2; Bordreuil and Gubel 1990:491–492, Fig. 9, A, B[16]), and probably for the weight wrongly attributed to Dor (see n. 14). More unpublished examples are known, including one from Eliezer Oren's excavations in ʻAkko-Ptolemais (Finkielsztejn and Gatier, forthcoming).

The Pyramidal and Conical Lead Fishing Sinkers

The fifteen lead artifacts of this group, although previously categorized as scale weights in the literature (until the publication of Galili, Rosen and Sharvit 2010), differ in shape and function from the square scale weights discussed above; twelve (Nos. 1–12) are pyramidal in shape and three (Nos. 13–15) are elongated cones (Figs. 8, 9; see Table 2, below).

Description (Fig. 8)

Of the pyramidal-shaped artifacts, eleven are perforated just below the apex, their holes non-symmetrical, measuring 1.0–3.5 mm in diameter; only one (No. 4) is unperforated (see

Fig. 8. Lead pyramidal fishing sinkers.

Fig. 8. (cont.).

below). Regarding the mass of the pyramidal artifacts, eleven (Nos. 1–10, 12) weigh between 155 and 166 g; No. 11, bearing a monogram, weighs 136 g. These objects correspond to Type L1.1.3 of Galili, Rosen and Sharvit (2010:88, Fig. 38) and appear to have been cast in four different molds (Table 2: Types A, B, C and D). In particular, Nos. 1–8 are definitely from a single mold (A), as are Nos. 9 and 10 (B). On the probable technique of molding this type of weights, see Elayi 1991:35.

The square bases of seven of the pyramidal objects are marked with a monogram or a device (Nos. 1–4, 9–11), most probably molded. The

Table 2. Characteristics of the Pyramidal Lead Fishing Sinkers

No.	IAA No.	Shape	Mold	Measurements H × L × W (cm)	Base (device, inscription, form)	Apex (hole or groove)	Weight (g)	Suggested Weight Standard (g)
1	2000-1040	High pyramid	A	5.80 × 2.35 × 2.35	Flower?	Hole	166	664
2	2000-1051	High pyramid	A	5.70 × 2.35 × 2.35	Flower?	Hole	160	640
3	2000-1044	High pyramid	A	5.65 × 2.35 × 2.30	Flower?	Hole	164	656
4	2000-1043	High pyramid	A	5.70 × 2.40 × 2.30	Rhodian rose	No Hole	155	620
5	2000-1046	High pyramid	A	5.80 × 2.35 × 2.30	No device	Hole	158	632
6	2000-1042	High pyramid	A	5.70 × 2.30 × 2.25	No device?	Hole	158	632
7	2000-1041	High pyramid	A	5.80 × 2.35 × 2.35	Melting hole	Hole	158	632
8	2000-1049	High pyramid	A	5.70 × 2.40 × 2.35	Melting hole	Hole	161	644
9	2000-1048	Squat pyramid	B	4.40 × 2.70 × 2.60	Sign of Tanit	Hole	166	664
10	2000-1045	Squat pyramid	B	4.55 × 2.70 × 2.60	Rhodian rose	Hole	162	648
11	2000-1047	Pyramid	C	4.80 × 2.45 × 2.35	KPA(? 	Hole	136	544
12	2000-1050	Pyramid	C	5.20 × 2.50 × 2.40	No device	Hole	158	632
13	2000-1061	Conical	D	5.25 × 1.65 × 1.40	Convex with melting hole	Two grooves	40	640
14	2000-1052	Conical	D	4.25 × 1.90 × 1.75	Pyramidal	One groove	40	640
15	2000-1053	Conical	D	4.90 × 2.40 (base diam.)	Circular with frame	One groove	71	568

base of No. 7 is marred by a melting hole and it is therefore impossible to ascertain whether it bore a device. That of No. 11 depicts a monogram with the Greek letters P, A inserted in a K (*alpha*, *rho* and *kappa*), maybe Κρα(or Καρ(. Number 9 bears a stylized Sign of Tanit. The device on Nos. 4 and 10 is most probably an imitation of the Rhodian rose. A similar flower may have been depicted on Nos. 1–3.

The three conical examples (Nos. 13–15) are not perforated, but rather, have one or two narrow grooves circumscribing the apex. They correspond to Type L1.1.1 ("with groove") of Galili, Rosen and Sharvit (2010:88, Fig. 38), but bear a strong similarity in their conical shape to Type L1.1.2 ("with tail"), albeit without the upper "tail" proper. Number 13 is an irregular elongated cone with a convex base; No. 14 is an irregular elongated cone with a protruding, somewhat pyramidal base (this shape may result from corrosion); No. 15 is a cone with a concave profile and a wide circular base, slightly thickened at the edge and with a small depression in the center. The conical weights are of a workmanship different from that of the pyramidal artifacts and were made each in a different mold. In addition, they are much lighter in weight than the others (40, 40 and 71 g respectively).

Function

Since these artifacts have a tying arrangement at the apex, a perforation or a groove, they may have been used either as sinkers for a "hook-and-line" fishing system (Galili, Rosen and Sharvit 2010:88–89, Types L1.1.3 and L1.1.2), or as scale weights, similar in purpose to the square scale weights presented above, but for a different type of scale. The fact that No. 4 has no hole is presumably due to a flaw in the manufacture of the object, as it cannot be hung or attached in any way. How it came to be included in the Assemblage 4 group is not clear: (1) it may have been sold, through negligence,

together with a whole set, or less likely, (2) these objects may have been cast on the ship, and our particular item was not finished.

In studying such items originating in Lebanon and Syria, Josette Elayi (Elayi 1991:31–35; Elayi and Elayi 1997:77–114 [catalogue], 314–315 [discussion]) came to the conclusion that they were scale weights for the following reasons: (1) they were chronologically and geographically well-defined; (2) some of the features molded at their base appeared on actual lead scale weights; (3) similar objects made of bronze that were "most likely" scale weights were found in Ibiza; and (4) nine such items made of lead that were most probably scale weights (i.e., with a coherent graduated scale of mass values), were found with two bronze scale pans in a tomb at Carthage (Elayi and Elayi 1997:314–315). Elayi did not discuss the possibility that the lead items may be fishing sinkers, yet mentioned that some were reused as such by modern fishermen (Elayi and Elayi 1997:314).

As demonstrated in Elayi's second point, some of the devices found on our pyramidal objects also appear on actual scale weights. For example, the stylized Sign of Tanit (No. 9) appears on both pyramidal sinkers and scale weights attributed to the city of Arados.[17]

The inconsistency that is raised by Elayi's fourth point lies in the questionable need for a tying system on weights aimed at being used on scales using pans. Other conjectures should be considered; for instance, the person interred in the Carthage tomb may well have been a merchant linked with the fish trade, or an inspector responsible for the making of the sinkers.

Two features—the molded devices and the relatively uniform masses—indicate that the manufacturing process of these pyramidal artifacts was certainly regulated according to the same rules that guided the manufacturing of the actual scale weights. This may suggest that the administration maintained control of the quantity of lead circulating in a given area or town by marking the lead objects, whatever their shape and function. Yet, it appears that quantity control was not entirely systematic, neither for the (small) scale weights nor for the pyramidal and conical artifacts, since some seem to be devoid of any device.[18]

Nonetheless, in my (Finkielsztejn) opinion, considering the marine context of the 'Atlit pyramidal and conical objects, it seems plausible that they were used for fishing, rather than as scale weights. In at least one more case, a group of pyramidal artifacts of homogeneous weights was found offshore: seven items found near the mouth of the river Nahr el-Barid, north of Tripoli (Lebanon). In that assemblage, six items weigh between 176.64 and 185.08 g (average 180.52 g), and one weighs 109.74 g (Elayi 1991:31–35; Elayi and Elayi 1997: Nos. 144, 146, 176, 206, 209, 216, 251). These two find contexts, from 'Atlit and Tripoli, indicate that such items (1) could have been fishing sinkers, (2) were used together as a group of identical objects, and (3) probably did not function as scale weights, as the majority of objects in each group are uniform in weight rather than of different denominations (*contra* Elayi and Elayi 1997:314).

Decorated and inscribed ancient fishing sinkers of various shapes and specialized functions are commonly found in underwater surveys along the Israeli coast (Galili, Rosen and Sharvit 2002:190–192; 2010:88–94). Of special note are those made of folded lead sheets, with molded geometrical decorations, marks or inscriptions (Galili, Rosen and Sharvit 2010:88, 92–93, Type L2.3). A similar folded lead sheet, uncovered in the excavations of Ḥ. Qasṭra (Kh. Kafr Samir), is decorated with a network of lines within a frame, and bears a Greek name. The general style of the object and the script date this find to the Hellenistic period (Gerald Finkielsztejn, personal observation), and its findspot, in a settlement approximately one kilometer from the coast, makes its identification as a fishing sinker most plausible.

One may wonder why such common objects, which functioned under the sea and were not

meant to be seen, frequently bore identifying inscriptions or decorations obtained by casting lead in an engraved mold. One possible reason may have been, as mentioned above, administrative control over the metal. For instance, a fabricant's device, identifying the manufacturer of the folded sheet sinkers or pyramidal/conical sinkers, could also be appropriate for taxation purposes. Another reason might have been statement of ownership of the fishing gear or of the boat. As fishing equipment is often left unguarded at sea, it is important to mark it in order to prevent theft (Galili, Rosen and Sharvit 2002), or simply to enable the returning of equipment that must inevitably get lost, due to tangled nets, broken lines, bad weather, etc.[19]

To summarize, the ʻAtlit pyramidal and conical artifacts most probably were used as sinkers for long-line fishing, either in clusters, holding several hooks at the bottom of the sea, or in a number of single hook-and-line sets. These functions were suggested by Galili, Rosen and Sharvit (2002), regarding similar objects recovered among some 1200 lead sinkers of various types from a Roman shipwreck assemblage off the Carmel coast approximately 10 km north of ʻAtlit. More recently, in a detailed study of such pyramidal objects, Kletter (2013) came to the same conclusion.[20]

Metrology

The weights of eleven out of the fifteen ʻAtlit sinkers (Nos. 1–10, 12) range between 158 and 166 g (average 162 +/- 4 g, i.e., 2.5%), indicating that they are definitely based on one and the same standard. Perhaps Nos. 13 and 14, which are approximately a quarter of the weight of the other sinkers (40 × 4 = 160 g, i.e., 1.3% less than the average), represent a fraction of this same standard. Numbers 11 and 15, weighing 136 and 71 g respectively, do not belong to the above series; however, as the latter represents about half the mass of the former (71 × 2 = 142 g), they could be related to one another.

The ʻAtlit fishing sinkers may be compared with 130 similar objects from the northern Levant published by Elayi and Elayi (1997): five assemblages of known provenance and a large group of unprovenanced pieces. The distribution of the sampling by mass and by height (Figs. 9, 10) shows that the homogenous features displayed by the majority of the ʻAtlit sinkers (eleven out of fifteen) is significant. On the graph showing weight distribution (Fig. 9), the group of eleven sinkers from ʻAtlit occupies a unique position between two major clusters: the 100–150 g block and the 165–200 g block. On the graph showing height as the representative factor (Fig. 10), it is evident that over half the sinkers from ʻAtlit (Nos. 1–8) are 5.5–5.9 cm high, a module of pyramidal sinkers that is relatively rare in the Levant as a whole, but is present at all the northern Phoenician sites that yielded these objects.

It would seem that the ʻAtlit fishing sinkers had common production origins, and eleven of them were probably made in three very similar molds (Table 2: A, B, D). They also shared the same deposition and post-deposition processes on the sea bottom, resulting in similar states of preservation. Although different in shape, Nos. 13 and 14 may also be included in the same fishing-gear kit, their weight being one quarter of the others. These sinkers were probably intended for smaller hooks, much as modern-day sinkers (as seen in fishing tackle stores), graded by specific weights and their fractions, in accordance with the different-sized hooks.

Indeed, it is possible to estimate upon which of the weight standards, among those known in the Levant, the fishing sinkers may have been based (for details and references, see Finkielsztejn 2007; 2015). There is evidence that in Syria and northern Phoenicia, a "heavy *mina*" of c. 643 g was used (e.g., probably in the area of Byblos; see n. 12), as well as "heavier *minas*" of c. 700–800 g (Finkielsztejn 2014; 2015). In the Southern Levant, a "light Syrian" *mina* of c. 550–560 g was used during the Seleucid period, and perhaps also an additional,

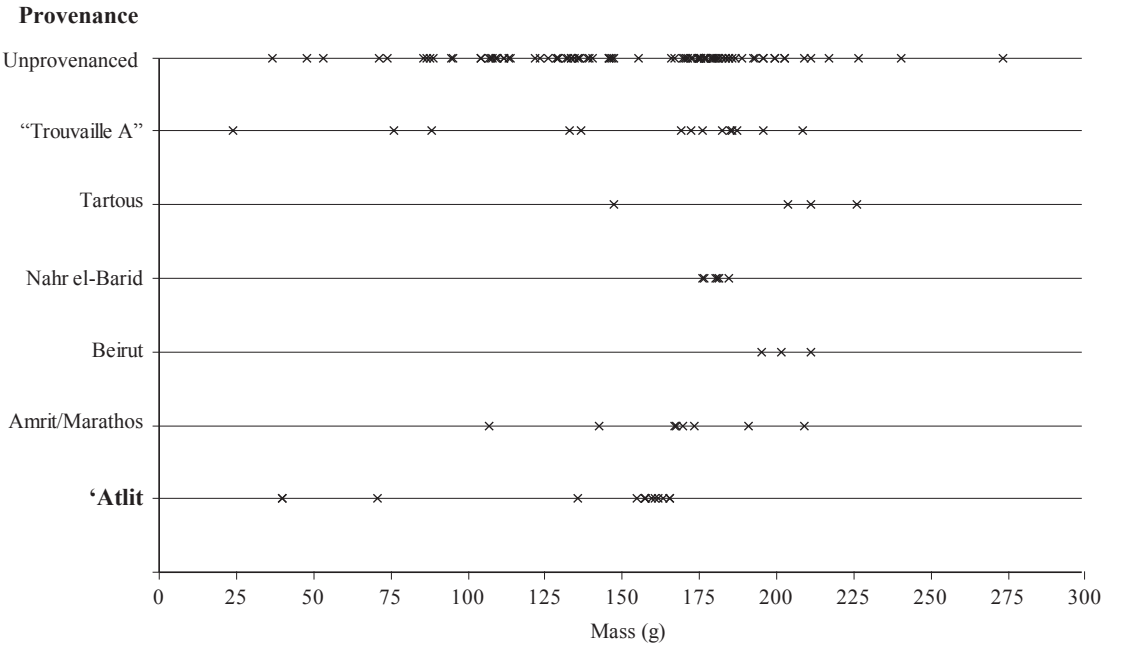

Fig. 9. Lead pyramidal fishing sinkers from the Levant: distribution by weight.

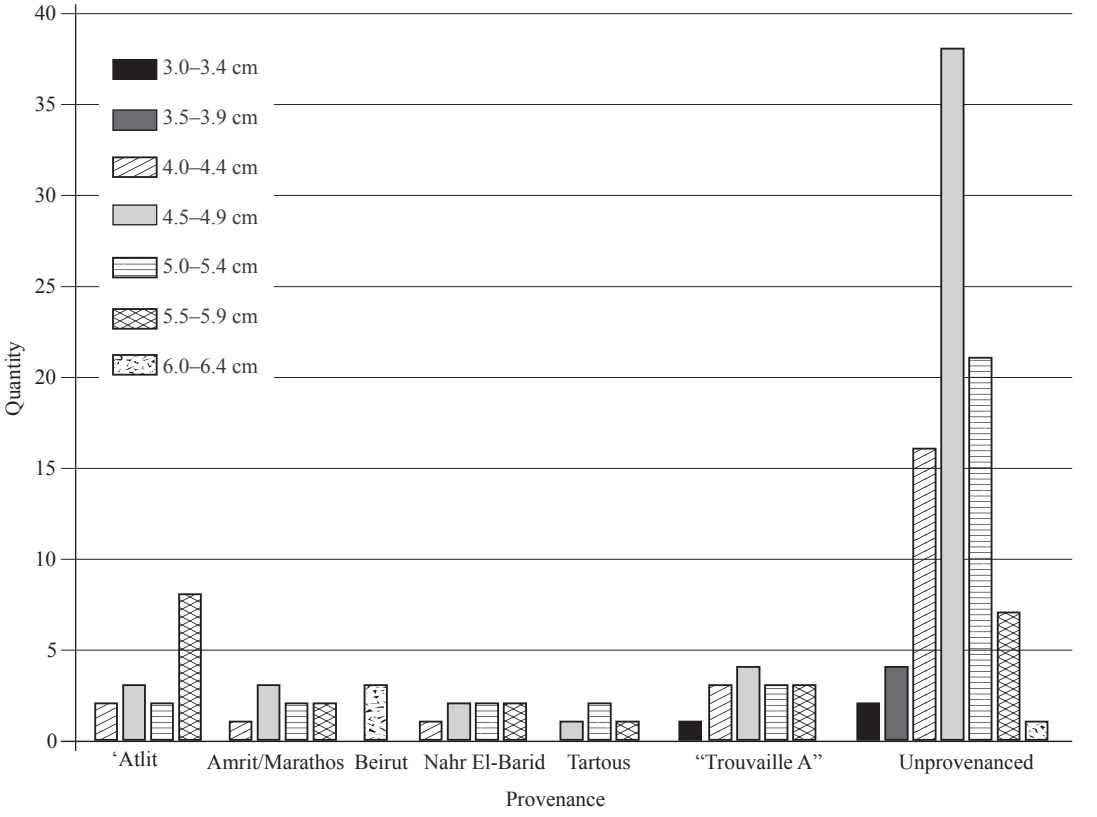

Fig. 10. Lead pyramidal fishing sinkers from the Levant: distribution by height.

even lighter standard, which was slightly above 500 g: see Weight 6, above, and n. 12.

Among the Levantine pyramidal artifacts identified as weights by Elayi and Elayi (1997), combined with the sinkers from ʿAtlit, 30 may be associated with a theoretical weight standard ranging from 614 g to slightly less than 700 g (of which they would be either a quarter, an eighth or a sixteenth). These include Nos. 1–10 and 12–14 from ʿAtlit, which seem to have been based on the lightest standard of this series (i.e., a calculated standard of 620 to 664 g, reaching an average of c. 642 g), very close to the above-mentioned "heavy *mina*" of c. 643 g that was probably used in Byblos (see n. 12). Of the collection published by Elayi and Elayi (1997), 52 weights may be associated with a "heavier *mina*," weighing between 700 and 800 g (of which they would be a quarter, an eighth, a sixteenth or a thirty-second part), and 33, with a very light *mina*, weighing between 400 and 500 g, used in Tyre (470 g, of which they would be either a half or a quarter). Judging by the devices at the bases of the sinkers, it is unlikely that many (if any) of the weights published by Elayi and Elayi (1997) were actually produced in the Tyrian domain, where the three commonly used devices on weights were the closed or full-fledged (i.e., with a base line) Sign of Tanit, the club and the palm-tree. However, the standard used in Tyre was also used in Arados and Marathos, at the border between northern Phoenicia and Syria, where the open Sign of Tanit (i.e., without a base line, as on No. 9 from ʿAtlit), was sometimes used. No examples from the ʿAtlit assemblage seem to fit those two "light" standards. Finally, the Elayi and Elayi catalogue includes 30 pyramidal sinkers weighing between 500 and 595 g, and they may be associated with a "light Syrian" *mina*, of which they would be fractions (either a half, a quarter or an eighth). ʿAtlit sinker Nos. 11 and 15 would be respectively one-quarter and one-eighth of that weight standard (i.e., a calculated weight standard of 544 and 568 g respectively, with an average of 556 g).[21]

To summarize, the grouping of fishing sinkers according to mass seems secure and is borne out by the evaluation of the pyramidal sinkers from ʿAtlit: 13 of the 15 sinkers strongly relate to a weight standard common in northern Phoenicia (652.5 g), while the remaining two examples strongly relate to a weight standard common in the southern Levant (556.8 g). This differentiation has a bearing on their dating (see below).

Date and Origin

A Hellenistic-period date for these objects, as suggested by their association with the coins described above, seems to be supported by the Rhodian rose stamped at the bottom of at least two of the fishing sinkers (Nos. 4 and 10). The motif also appears on examples studied by Elayi and Elayi (1997:84, Pls. X:161, 162; XII:183), who describe it as "une fleur (de lotus?)." The sinkers bearing the Rhodian rose need not be attributed to Rhodes; rather, the motif was imitated elsewhere, for example, as a device on Cypriot and Tyrian amphora stamps dated to the Hellenistic period (Finkielsztejn 1990, II, 2:123*–124*, No. 449, found in Samaria; Kawkabani 2003:96, No. 5).

The monogram on No. 11 also suggests a Hellenistic-period date (for Greek letters or words, see Elayi and Elayi 1997: Pls. X:156–158; XIII:191, A?KA?). Such sinkers were dated by J. Elayi to the end of the Persian/beginning of the Hellenistic period, based on their find contexts in Berytus/Beirut and Amrit/Marathos (Elayi and Elayi 1997:280); at ʿAtlit, on the other hand, the association with Assemblage 1 can only date these monogrammed sinkers generally to the Hellenistic period.

The ʿAtlit sinkers share common features with pyramidal artifacts found in the northern part of central Phoenicia (Elayi and Elayi 1997:284), such as certain devices and their apparent relation to the same weight standard. These similarities, as well as general geographical distribution, seem to preclude a Cypriot or a more westerly origin in the Mediterranean, and

favor the same "northern" origin for the 'Atlit sinkers and the weights in central Phoenicia.[22]

The weight standards also assist in narrowing the dating of the larger group of sinkers. The Athenian reform of the value of the Attic *mina* took place in the last years of the second century BCE. Scale weights attributed to northern Phoenicia and southern Syria based on this new standard are dated by their inscriptions to 106/5, 105/4 and 102/1 BCE. Therefore, the main group of pyramidal sinkers appears to be among the latest finds related to the assemblages studied here. As for the standard of 556.8 g, on which the masses of the two remaining sinkers appear to be based, it was introduced into the Levant by Antiochos IV and was still in use in Maresha on the eve of that city's conquest by John Hyrcanus I, in 108/7 BCE. Since the two sinkers represent a significant minority, they may, perhaps, be earlier examples, still in use in our assemblage (Finkielsztejn 2010a:175–176, 180–182, Table 8.1; 2014:70–71, 81–84, Tables 1, 4, 5; 2015:57–59, 83, 97–100).

The Bronze Lamp

The lamp was found approximately 350 m offshore at a depth of 9 m, some 250 m west–northwest of the coin concentration.

Description (Fig. 11)
Measurements: L 12.8 cm (receptacle 4.5 cm, rear plaque 2.8 cm, nozzle 5.3 cm); W 5.2 cm; H 3.5 cm.

The receptacle is round and deep, somewhat flattened on top. It has a wide, concave disk base and an elongated nozzle. For most of its length, the nozzle is the full height of the receptacle. It is gabled and ridged on top, and rounded on the bottom, ending in a wide oval wick hole with a flat-topped, flaring rim. The filling hole is surrounded by a low molded rim. Worn hinges, which held the lid, were partially preserved next to the rim at the back end of the filling hole; the lid itself missing. At the back of the lamp, a partially preserved strap handle extends downward from the underside of the rear projection at the top of the lamp, to midway down the wall of the receptacle. This rear projection is horizontal, on level with the top of the receptacle and nozzle. At the point where it joins the receptacle, the projection widens and merges on either side into a protruding ring with a depression in the center. The element is clearly visible on the left, but only a worn trace of its counterpart can be discerned on the right. Upon the badly damaged free-standing tip of the rear projection is a shallowly drilled depression. Two pointed protrusions at the center of the body are not identical. The one on the right side is a cone resting on the shoulder, while the larger one on the left is triangular in shape and droops downward.

There are three holes that are the result of wear caused by prolonged use or corrosion. Two holes are situated on the nozzle, at its base and on the right side. The third hole is on the left wall of the receptacle; it had been mended with lead, a lump of which was preserved within the receptacle. Presumably, it was necessary to close the hole in the receptacle in order to prevent the oil from seeping out, whereas the holes in the nozzle could be left open (or perhaps simply occurred later). Within the base there is a signature—of the lamp maker, the workshop, or perhaps the owner himself. It appears to be an abbreviation beginning with the letter *gamma*.

Decorations
The nozzle is distinguished from the body by a waist consisting of two oblique, narrow ridges with rope-like indentations that become plain as they taper toward the nozzle's base and the rim. On top of the nozzle, between the two ridges, is a raised, elongated triangle. The flat strap of the rear projection is crossed by two parallel, ridged bars supporting a worn ornament.

Shipboard Use
It is very reasonable that a lamp made of bronze would have been used on a sailing

Fig. 11. Bronze oil lamp.

vessel: bronze is more durable than pottery, and the lidded filling hole would prevent the oil from spilling out when the boat was shaken by the waves. The fact that the lamp was found worn and damaged is evidence of extended usage; alternately, it might be the result of post-deposition damage. The broken free-standing ornament at its rear may well bear witness to an attempt to drill a hole at the back of the lamp, probably after the strap handle was broken, in order to provide another means of suspending it. The hinge was most likely worn out as a result of frequent opening and closing. The sealing of the hole in the side

with lead is additional evidence that the lamp was a necessary item. All in all, it may be assumed that, despite wear and tear, the sailors maintained and used this expensive lamp for a lengthy period of time.

Date

Bronze lamps such as this are rare, and the chances of finding an exact parallel would seem highly unlikely. Of special note, therefore, is a seemingly identical lamp from the anchorage of Dor, some 10 km south of ʻAtlit (Ambar-Armon 2007:187–188, Fig. 34). Comparison with metal lamps in the British Museum indicates a date in the last decades of the Hellenistic period for our lamp, on the basis of the height of the ornament at the rear, which does not exceed the height of the receptacle (Bailey, 1996:7–8). Otherwise, dating of our lamp must rely mainly on typological comparison (shape, style and decoration) with pottery lamps, some of which—it has often been suggested—were fashioned after metal prototypes.

In general, the dating of the lamp within the Hellenistic period is based on the following features:

1. The elongated gabled nozzle, widening slightly at the end, is typical of Eastern Greek lamps made after the Ephesus-type lamps dated from the second half of the second century to the first half of the first century BCE (e.g., Bailey 1975: Pl. 86:Q468, Carpathos).
2. The two different side-pointed projections appear on Egyptian pottery lamps (Bailey 1975: Pl.108:Q551EA, Q552EA), which date from the second century into the first century BCE. Pointed projections were also popular on contemporary lamps made in Pergamon.
3. Decorations in the form of triangles or masks and other patterns and symbols on the nozzle between the bands are common on Ephesus lamps, such as those from Carpathos, dated to the second half of the second century to first half of the first century BCE (Bailey 1975: Pl. 86:Q468), and from Delos (Bruneau 1965: Pls. 15:2754, 2798; 18:3036). For similar decoration on other Hellenistic lamps, see Sussman 2009: Figs. 29, 31.
4. A rope-patterned marked waist (Mlynarczyk 1997: Type E-Prime—Figs. 43; 51; 52; Type F—Fig. 60) appears on most of the locally-made Hellenistic oil lamps from the second century BCE onward (Ambar-Arnon 2007:135, 502, Type 25.1.4; Sussman 2009: Nos. 151–257).
5. The ornament at the rear of our lamp may represent a free-standing leaf above a double bar (Bailey 1975: Pl.115:Q613) or a palmette, and is dated to the first century BCE. The double bar may be equivalent to the double strip which encircled Knidian-type lamps (Bailey 1975: Pls. 62–67; Sussman 2009: Figs. 14 [Knidian] and 27, 28 [Tell Sandahanna/Maresha]). The rings at the join between the receptacle and the rear projection are a feature that appears on other Hellenistic-period lamps, such as have been found in Tel Aviv (Sussman 2006: Figs 1, 2 [bronze]) and at Tell Sandahanna (Bliss and Macalister 1902:60, Fig. 26 [bronze] and Pl. 63:5 [pottery]). They must have flanked the hinge attaching the lid, as on the identical lamp found at Dor (Ambar-Armon 2007: Fig. 34). The shape of the projection may possibly be reconstructed to end in a "crown" with three small points.

To summarize, all the aforementioned comparisons point toward a date in the second century or the beginning of the first century BCE for the ʻAtlit bronze lamp.

Origin

The possible origin of the ʻAtlit lamp can be tentatively determined. Typologically, elements that are common to the production of workshops in Eastern Greece and Alexandria, Egypt (Abdou Daoud 1998) have been identified. The ship, when it sunk, could have been on its way southward to Egypt, or from Egypt northward. ʻAtlit could have been either a stopover port or the main destination of the wrecked ship.

Although pottery lamps are very common in the archaeological record of Israel, bronze lamps from the Hellenistic period are relatively rare and only few have been found. The lamp

found at Dor, with the lid still attached (Ambar-Armon 2007: Fig. 34), may allow us speculate that the Dor and the ʻAtlit lamps were made in the same workshop. Other bronze lamps with similar features, but much more elaborately decorated and better preserved, were discovered in Tel Aviv, and have been tentatively attributed an Egyptian origin (Sussman 2006:45–46, Figs. 1–3). At Tell Sandahanna, a bronze oil lamp with a projection, a gabled nozzle and a marked waist was found (Bliss and Macalister 1902:60–61, Fig. 26). Bronze lamps were also found at Apollonia (Roll and Ayalon 1989: Fig. 79), Shekhem (Stern 1981: Fig. 6:1 and Pl. 61:1, a northern type), and in an Early Roman/ Hellenistic shipwreck off Ashqelon (Galili et al. 2010: Fig. 19).

In conclusion, based on the general shape, the parallels, and the ornamentation, it seems likely that the ʻAtlit lamp was produced in Egypt. Nonetheless, an Eastern Greek origin cannot be ruled out.

THE BRONZE HORSE BIT

The complete bronze horse bit (see above, Assemblage 3; Haifa University Underwater Survey, unpublished diving report D232) was discovered some 100 m west–northwest of the Hellenistic ram studied by Casson and Steffy (1991).

Description (Fig. 12)

Measurements: Overall: L 320 mm, W 167–174 mm. Cheek pieces: L 174 mm (side A), 167 mm (side B); lateral loops diam. 16 mm, th. 2–3 mm; central loops diam. 23 mm, th. 3 mm. Mouthpieces: L 91 mm (side A), 92 mm (side B with right angle), diam. of body 11 mm. Rein loops: diam. 32–35 mm, th. 4–5 mm.

The horse bit under discussion belongs to the snaffle type, consisting of a pair of cheek pieces that are interlocked with a two-piece jointed mouthpiece (Fig. 12). Interestingly, it appears to exhibit no attrition wear, an indication that the bit was probably never in use, and may have formed part of the ship's commercial cargo.

The Ω-shaped cheek pieces of the ʻAtlit horse bit exhibit curved sidebars, with terminals turned upward. The terminals are molded into the shape of out-turning feet, bordered by an elliptical bulbous feature. Three loops are spaced along the crescent of each sidebar. The two small lateral loops are for attaching the bridle's cheek straps. The central, not fully closed loops are hooked onto the loops at the ends of the two links that make up the mouthpiece.

The interlocked links of the mouthpiece are simple stout bars, each equipped with a loop at each end. The loops of one link are set at a right angle to each other, to enable interlocking in a straight line with the second link, whose

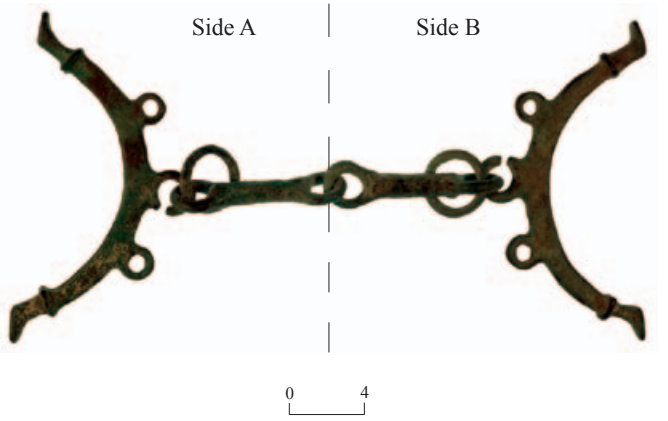

Fig. 12. Bronze horse bit.

loops were cast simply in one plane. The bases of the two interlocking loops each feature four knobs, spaced at consistent intervals around their circumference. These bumps acted as a significantly less severe version of the Greek spiked mouthpieces ('hedgehogs'). There are no rein hooks, and the reins were evidently fastened to the two large loops interlocked with the outer loops of the links.

Discussion and Parallels

> …pulling at his mouth with the bit and spurring and whipping him, by which behavior most people think they make their horses brilliant. For these people obtain a result quite contrary to their intentions (Xenophon *Eq*. 10.1-2).

Bitting is used to gain control over the horse and to direct it, although the relationship between the rider and his mount appears to be more crucial than the type of bit used (Bishop 1988:108; Hyland 1990:113ff). Two major types of bits were employed in the classical world: the snaffle and the curb (Manning 1985:66–67; Hyland 1990:139–140; Dixon and Southern 1992:63–65). The less severe device used on the horse's mouth was the snaffle bit.[23] It consists of solid or jointed bars that have loops on both ends and its design shows that the rider needed both hands in order to use it (Manning 1985:66).

Although no exact parallel is known in or outside of Israel, this horse bit appears to share structural similarities with early Near Eastern and, more importantly, Greek snaffle bits. The principal concept of curved sidebars with two loops for attaching the bridle's cheek straps can be seen on Assyrian snaffle bits (Anderson 1961: Pl. 38b) and later, on Asiatic and Persian specimens (Anderson 1961: Pls. 34a-b, 35a-c). Nonetheless, a closer parallel of crescent-shaped cheek pieces may be found in a jointed snaffle bit supposedly from Achaea (Anderson 1961:56, Pl. 34c; Drews 2004: Fig. 4:11), although it differs in featuring bridle loops that are spaced along the inner curve of the cheek piece, rein hooks and a spiked mouthpiece.[24] The interlocked construction of the 'Atlit bit appears to fall under Xenophon's category of 'flexible' bits (Xenophon *Eq*. 10.10), while he ascribed the relatively flat mouthpiece to the 'smooth' rather than the 'rough' class of bits (*Eq*. 6).

During the Hellenistic period, wealth was measured in Syria and Palestine by the number of horses owned. The Seleucids managed very large herds of horses (Strabo *Geog*. 16.2.10), and the Tobiah family had a stable suitable for over 100 mounts (Tepper 1997:237, Fig. 7, with further references therein; Netzer 1998). This Ptolemaic architectural tradition is commonly attested in underground hewn caves in the Shephelah settlements (Tepper and Shahar 1989; Tepper 1997:238, Fig. 8). Note also a mounted hunter, depicted on a wall painting in a tomb at Maresha (Peters and Thiersch 1905:23–34).

Information regarding equine accessories in Hellenistic Palestine is rather scant. Archaeological excavations at Gamla uncovered a copper-alloy halter ring, which was directly associated with an equine skeleton.[25] A pair of iron spurs was uncovered in a room adjacent to the location of the horse skeleton (Stiebel 2014:101, Nos. 112, 113, Fig. 4.26:112, 113). Two cheek pieces of a snaffle bit decorated with grapevines, which are of clear Hellenistic affinities, were uncovered in a shipwreck north of Tel Kones (Galili and Sharvit 1999b:97*–98*, Fig. 190).[26]

Evidence in the early Roman period is more abundant. Riding equipment and several harness accessories are known from Gamla (Stiebel 2014:99–103, Nos. 110–124, Figs. 4.26, 4.27),[27] Herodium (Stiebel 2003:237, Nos. 148–149, Figs. 21–22), Masada (Stiebel and Magness 2007:28–31, Pl. 30:1–10) and Siege Camp F, west of Masada.[28] In addition, an iron specimen of a two-piece jointed snaffle bit was found in the city wall of Gamla (Stiebel 2014:99, No. 111, Fig. 4.26:111). Another snaffle bit, from the period between the two Jewish revolts (73/74–132 CE), was found in a large cave in the Judean Desert, situated in

the northern cliff of the Qurunṭul ridge, north of Jericho.[29] The object was described as "made of a hinge… attached to two metal rings. Three other rings… are attached to the small ring" (Sion 2002, 1:79, Fig. 35:2; 2:63), and is in fact part of a two-piece jointed snaffle bit. The link has a collar and a mushroom-like terminal, which is identical to the construction of a bit from Newstead, Scotland (Junkelmann 1992: Abb. 7).[30] The three lateral rings of the Judean Desert specimen probably held the reins and the bridle leather straps.[31]

Summary

The unique discovery of the complete bronze horse bit from ʻAtlit adds a further link to the chain of evidence regarding the popularity and longevity of the snaffle bit in general. The Hellenistic date of the associated remains, i.e., late second century BCE, appears to accord with the bit's tradition of construction, while future archaeo-metallurgic tests might assist in establishing the origin of production.

THE LEAD SLING SHOT

A single, almond-shaped lead sling shot (or sling bullet), inscribed with what appears to be a stylized thunderbolt, was found in Assemblage 6 (Fig. 13). Unfortunately, the condition of the object precludes any speculation about its origin or exact date.

Mold-made, decorated and/or inscribed lead sling shots are commonly found in all areas of Greek or Hellenistic influence, as the sling was one of the commonest and cheapest weapons. Among the motifs appearing on them, the thunderbolt is probably the most frequent, and many such objects have been found at various sites in Israel.

Slings have been known to be associated with ships in ancient times. The Roman ships attacking the Balearic Islands were fortified above deck level by screens made of hide to protect them against sling projectiles (Morgan 1969:229). Sling shots, both singly and in hoards containing hundreds of such items, have been recovered from several Mediterranean shipwrecks (Beltrame 2002:33–35), all dated Roman contexts. Our example is the first sling shot to be recovered off the shore of Israel, and it would appear, by association, to be part of the Hellenistic assemblage (see below). It may be an indication of the kind of weaponry carried aboard or perhaps the remains of a past battle; alternatively, it could be a remnant of cargo.

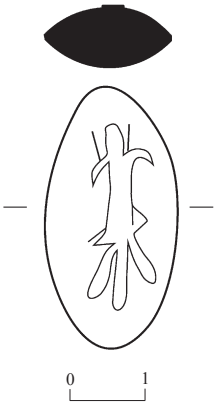

Fig. 13. Lead sling shot.

DISCUSSION AND SUMMARY

Site Formation

Because of physical conditions of the Mediterranean coast off Israel, the scarcity of natural shelters and the occurrence of unexpected storms, many ships have been wrecked and washed ashore over the millennia. Most of the wreckage events occurred in the breaker zone, some 10–200 m offshore; for the most part, the wooden hulls did not survive, and the remaining heavy remnants were concentrated in shallow waters close to the shoreline. Hence, it seems that the majority of the artifacts from underwater explorations in ʻAtlit North Bay originated from ships, which were wrecked during storms while anchoring in the bay or sailing along the Israeli coast. Among these finds were the several Hellenistic assemblages described above, which are scattered over a relatively large area. Analyzing the distribution and nature of the artifacts on the

sea bottom may shed light on the shipwrecks involved, the circumstances and nature of the wreckage events, the site formation and post-deposition processes.

The Hellenistic Assemblages and Their Association

It should now be considered whether all the Hellenistic artifacts from Assemblages 1, 2, 3, 5 and 6, discovered in shallower water, and Assemblage 4, located in deeper water west–northwest of them, are indeed associated. In this regard, the distance between the battering ram (Assemblage 5) and the coins (Assemblage 2) recovered some 100 m to the east–northeast should be examined. Did all the artifacts come from a single vessel, or do they represent several separate wreckage events?

The similarity in standard of two of the square scale weights found in the deepest site (Weights 2, 6 in Assemblage 4) to one of the weights found near shore (Weight 4 in Assemblage 2) suggests that these finds may be related. Judging by the distribution of the square scale weights and other objects in Assemblages 2 and 4, as well as by the dating of the various artifacts in these two assemblages (and possibly in Assemblages 1 and 6, too), these finds may have originated in the same wreckage event. It is probable that a ship, or several ships, sheltering in the lee side of the small island or the submerged *kurkar* reef protecting the bay from the west, drifted ashore during a western or southwestern storm. Once in the breaker zone, the ship(s) may have been grounded and crushed, the heavy metal objects scattered on the sea bottom, and the wooden parts washed ashore. The battering ram (see below) could have drifted separately with the prow and finally been deposited some 100 m southwest of Assemblage 2, where it was eventually found.

It should be noted, however, that a spear fisherman has been claiming for almost 40 years that he salvaged the ram from a sunken ship some distance offshore, at a water depth of dozens of meters, and dragged it to shallow waters. His story has never been verified, nor has it been investigated thoroughly.[32] A comprehensive study of the fouling organisms and sediments attached to the ram, as compared to the marine environment of the ʻAtlit bay, where it was found, as well as future underwater archaeological surveys, may shed light on this enigma.

The Evidence of the Lead Scale Weights and Fishing Sinkers

As far as the square scale weights are concerned, Weight 1 is too small to allow conclusions related to the Hellenistic ship. Weight 5 may have originated from a different area or even belonged to a different wreck: its mass possibly relates to a Roman weight standard and its physical aspect is not known for the Hellenistic period. However, Weights 2, 4, and 6, and probably 3, are definitely Hellenistic and southern Levantine. If the weights and the ram belonged to the same vessel, or to the same group of ships sailing together, they may provide a proximate date for the wreckage event. A *terminus post quem* of 109 BCE (from the scale weights), or more probably 106/5 BCE (from the pyramidal fishing sinkers), is proposed for the wreckage, a date that matches the conclusions drawn from the study of the coins.

Weighing equipment was commonly found on ancient Mediterranean shipwrecks (Parker 1992). It can be speculated that the presence of the scale weights indicates that the ship, or one of the ships, carried Levantine merchants. These merchants could have boarded the ship in Cyprus or somewhere on the Levantine coast. The latter is more likely considering that a coastal city (Tyre?) probably produced the scale weights, and plausibly, also the pyramidal fishing sinkers. The sinkers could also have been brought on board anywhere along the Levantine coast. Here again, the question is raised: did they reach the Southern Levant on some previous voyage from Phoenicia, where they most probably originate? Or did the ship pass through Phoenicia directly before reaching

the ʻAtlit North Bay? In other words, did it sail from Cyprus (probably Paphos) to Phoenicia (e.g. the area of Byblos), and then down the coast, to ʻAtlit?

Dating the Hellenistic Assemblages and Their Possible Association with the Ptolemies and the War of Scepters (103–101 BCE)

The dating of the construction and wreckage of the ship is construed from the following evidence: (1) square Weights 2, 4, 6 are dated to 118–109 BCE (see above); (2) the majority of the fishing sinkers appear to date to the end of the second century BCE, from 106 BCE at the earliest; (3) the bronze oil lamp is dated to the end of the second or the beginning of the first century BCE (see above); and (4) the deposition of the coins is dated to 103–101 BCE, based upon similar coins found elsewhere in Israel in contexts related to Ptolemy IX Lathyrus' invasion (see above). Thus, Ptolemy IX's reign may possibly be the date of the wreckage of the ship that carried the coins and the weights. Assuming that the lifespan of such a ship does not exceed thirty years (Murray 1991:65, n. 50), it could have been built during the reign of Ptolemy VIII (145–116 BCE).

The ʻAtlit ram has been dated to the reigns of Ptolemy V or Ptolemy VI (203 to 145 BCE), mainly on the basis of stylistic evidence (Murray 1991:65–66). Since the production of battering rams consumed much material and labor, they were consequently expensive, but also long-lasting. The 43 year gap between the date proposed for the ram and the latest possible date of the wreckage of the ship carrying the coins, can be reconciled by considering the possibility that the ram was carried as cargo or was in secondary use. Moreover, it should be kept in mind that stylistic evidence is less secure than artifactual evidence, so the ram could be of later production than that suggested by Murray.

Judging from the archaeological evidence (disregarding the fisherman's story), it is possible that the Hellenistic artifacts in Assemblages 1, 2, 4 and 6, and the ram (Assemblage 5) belonged to a Ptolemaic ship plying the coastal waters during the war of 103–102 BCE (Josephus, *War* I.86; *Antiquities* XIII.324–355). Another possibility is that these groups of artifacts belong to two, or more, such ships that sheltered in ʻAtlit North Bay simultaneously or on different occasions. It is most likely that the ship/ships belonged to the fleet of Ptolemy IX Lathyrus, considering that the bulk of the coin hoard, possibly all of it, is Cypriot, as is apparently the battering ram (Murray 1991). Another fleet active at the time was that of Ptolemy X Alexander, sent from Egypt in pursuit of Lathyrus by Cleopatra Thea, the mother of Ptolemy IX and Ptolemy X. The bronze oil lamp, which could be of Egyptian origin (see above), may suggest that the ship/ships came from Egypt. However, its characteristics may also indicate Greek origin. Thus, the lamp cannot be used as a reliable origin marker.

Josephus (*Antiquities* XIII.332) mentions that Lathyrus landed initially at Sycaminum (identified with Tel Shiqmona/Tell es-Samak, on the southern periphery of present-day Haifa). Recent surveys at Tel Shiqmona have revealed that the physical nature of this coast does not offer proper shelter or anchorage facilities for seagoing vessels (Galili and Sharvit 1999a; Galili and Rosen 2008:1931; Galili 2009). Thus, the ʻAtlit North Bay, protected from the prevailing southwesterly winds, may have provided the anchorage for vessels bound for Sycaminum. Further support for this may be found in a hoard of artifacts containing a decorated bronze standard bearing an inscription specifically mentioning Sycaminum (Ullman and Galili 1994; Galili and Rosen 2008:1931; Galili 2009). Lathyrus may have used this anchorage as well.

There can be no question that during the many months of war, Lathyrus' ships stopped at several other ports as well. The large numbers of such late Ptolemaic coins found at Dora/Dor (Gitler and Kushnir-Stein 1994–1999, *passim*) seem to prove this point. The city was held, initially at least, by the Tyrant Zoilus, who had contacts with Lathyrus (Josephus,

Ant. XIII.324–326, 334–335; *War* I.86). If one is to believe the accounts of Josephus (*Ant*. XIII.358), according to which Lathyrus finally departed for Cyprus from Gaza, such late Ptolemaic coins can be expected to turn up south of Dor as well, and all the way to Gaza, as illustrated for example by the coin from Ashqelon (Gitler and Kahanov 2002).

Summary

The available archaeological evidence cannot determine whether one is dealing with a warship or a merchant vessel carrying the ram as cargo. However, remains of the ship's prow were attached to the ram and protruded from it when found (see Fig. 4), and it is not reasonable to assume that this elongated wooden beam was kept attached to the ram while being carried onboard a merchant ship as a cargo. Similarly, the lead sling shot may be associated with military activities.

Thus the first option of a warship wreckage is more likely. Likewise, as attested by other shipwrecks investigated off the Israeli coast, many seagoing vessels—no matter what their function—carried fishing gear to supplement the food of crew and passengers (Galili, Rosen and Sharvit 2002; 2010). If, indeed, this wrecked ship was part of the above-mentioned military campaign, the presence of both the series of scale weights and fishing sinkers would most likely have been linked to the supply activities surrounding the Ptolemaic operation. The ship may later have sunk while the fleet headed south, toward Gaza (see above), which Lathyrus conquered and used as a base during the struggle which ensued.

NOTES

[1] Responsibility for the various sections of this article was divided among the authors: Ehud Galili, the description of the site and the Hellenistic assemblages (nn. 1, 2); Danny Syon, the coins (nn. 3–7); Gerald Finkielsztejn, the scale weights (nn. 8–15); Galili (typology, function and terminology) and Finkielsztejn (function, symbols, metrology, date, and origin), the fishing sinkers (nn. 16–22); Varda Sussman, the bronze oil lamp; Guy Stiebel, the bronze horse bit (nn. 23–31); Galili and Syon, the sling shot; Galili, Syon and Finkielsztejn, the final discussion (n. 32).

[2] The underwater survey was carried out from 1997 to 1999 on behalf of the IAA (Licence Nos. G-30/1977, G-29/1998, G-13/1999), under the direction of Ehud Galili, with the assistance of Jacob Sharvit, Dani Moskovits and volunteer divers. Photography was by Clara Amit (Figs. 5, 8, 12), Zeev Radovan (Fig. 11), Mariana Salzberger (Fig. 7) and Shelley Wachsmann (Fig. 4).

[3] I [Syon] gratefully acknowledge the help of Catharine Lorber with the identification of coin Nos. 77 and 78.

[4] A full historical discussion can be found in Gitler and Kushnir-Stein 1994–1999, with further references. The episode is detailed by Josephus Flavius, *War* I.4.2. (86); *Ant.* XIII 13.12.1–13.13.3 (320–355).

[5] As it turns out, Gitler and Kushnir-Stein's article went to press without some last minute corrections regarding the axes. According to information received from the authors, the following corrections apply (catalogue number-axis): 24-11; 25-11; 26-11; 30-7; 33-11; 35-11; 46-11; 57-11; 60-11.

[6] This was ascertained by measuring many of the illustrated coins on the photograph. My [Syon] own measurements are across the circle.

[7] I [Syon] wish to thank Catharine Lorber for this information.

[8] My [Finkielsztejn] thanks to Zaraza Friedman for the description of these elements of the ship.

[9] In one unclear case, on the drawing of a 1497 g weight, a sign similar to that on our Weight 4 has been interpreted as an incomplete *sigma* (Elayi and Elayi 1997:137, 178, 390; Fig. 22, No. 391). For both examples, I [Finkielsztejn] prefer to accept the identification as a "squarish" *stigma* (ϛ) or, less likely, a retrograde *zeta*(?). On Elayi and Elayi, No. 391, the Phoenician letters are retrograde with normal reading, including the word שנת ("Year"), while the Greek *stigma* or *zeta* (6 or 7), *iota* (10) and *sigma* (200) give the year 216 or 217 CE. The order of unit, tens and hundreds following the word "Year" in Phoenician would be in accordance with the Seleucid convention for Greek inscriptions on

weights, regarding the order of the numerals that follow the symbol Ⱡ for "Year." In addition, Elayi and Elayi No. 391 may bear a double dating, with the second date in Year 30 (*lambda*) according to the era of the "Freedom of Tyre" (which begins in 126/5 BCE). Thus, both Seleucid and Tyrian dates would fall in the year 97/6 (*stigma* and *lambda*) or 96/5 (*zeta*) BCE. Unfortunately, other associated signs are unclear and the weight is illegible today (see Finkielsztejn 2015:87, 92).

[10] I [Finkielsztejn] know of only one example, clearly from Phoenicia (*Münz Zentrum* 1983: No. 5105; Finkielsztejn 2015:88, 94, 96; Fig. 1:155). This 1935 g weight bears two Phoenician letters (obverse) and possibly the number '20' in Phoenician (on one lateral side of that thick example; the date is legible when one rotates the picture 90 degrees counterclockwise: Ⱡ ϵνρ΄ (155, probably in the Seleucid Era, i.e., 158 BCE). The device is a trident, probably the symbol of a coastal city (Finkielsztejn 2015:94–96).

[11] Doyen's article appeared too late to be treated here, but it has been analyzed in Part Two of my series, "The Weight Standards of the Hellenistic Levant" (Finkielsztejn 2015); for Part One, see Finkielsztein 2014.

[12] Based on the now identified use of the Attic *drachm* of 4.35 g in the Southern Levant (Doyen 2014:284–298; see n. 11 above), it should be noted that three times 4.35 g equals 13.05 g, which is the weight of a *sheqel* attested in Arados. Since a *mina* of 150 *drachms* (4.35 × 150 = 652.5.g) was used in Athens at the very end of the second century BCE, it would seem that 50 *sheqels* of 13.05 g (652.5 g) are equivalent to 150 Attic *drachms*, or one Attic *mina*. Doyen points out the equivalence of that value to two Roman pounds (λίτρα) of 326.25 g. It is most probable that these rarely used weights from southern Syria and northern Phoenicia, the mass of which is close to c. 643 g, were in fact corroded (by only 1.5%) *minas* of 652.5 g (see Doyen 2014:295, n. 76; Finkielsztejn 2014:70–71,73, 79, Fig. 6; 2015:57–58, 94, 97, 99).

[13] The wedge appears on other types of documents, where it is known to have different meanings (Ariel et al. 1985:138–139; Finkielsztejn 1998b:90).

[14] Note that the reading of the "Dora" weight, for which Kushnir-Stein 1997:90 rightly corrected the dating, was reexamined by Spaer (2000, with reference to the *editio princeps*). He found that, instead of ΔΩΡΑ, one should actually read ΑΓΟΡΑ(νομοῦντος), i.e., when Dorotheos—the name appearing on that weight—was acting as *agoranomos*. This is a better match to the corpus of weights from the Hellenistic Southern Levant, where the name of the city never appears (except in some Phoenician cities, e.g., Tyre, Marathos, Arados and perhaps Gaza, identified by local symbols, monograms, or the full name, or for cities refounded under a royal Seleucid name; Finkielsztejn 2003:473, n. 31; 2007). I [Finkielsztejn] suggest reading the word MNA (μνᾶ; *mina*) in full at the bottom of the "Dora" weight, which indeed weighs 512.5 g.

[15] Even more intriguing is the fact that—as Jean-Yves Empereur, director of the Centre d'études alexandrines, kindly informed me [Finkielsztejn]—not a single lead (or bronze) scale weight was found in the Ptolemaic layers of his excavations in the city of Alexandria. Yet, written sources mention the use of three different standards in Ptolemaic Egypt: the "Egyptian mina", the "Ptolemaic mina" and the "Alexandrian mina". Hultsch deduced that they weighed respectively 437, 491.2, and 546 grams (Hultsch 1864:196, index with references; 1882:643, 645, with references). Although the "Ptolemaic mina" is very close to the mass of our Weights 2–4, it seems highly unlikely that it was the standard upon which they were based.

[16] I [Finkielsztejn] agree with the Hellenistic dating for this item, as corrected by Elayi and Elayi 1997:176–177.

[17] See Elayi and Elayi 1997: *passim*; especially Pls. XI:165, 166, 168, 170; XII:174, 175 (pyramidal weights); XXII:316; XXVIII:379 (for the "Arados" style). Note that the attribution of this design to Arados is rejected by Josette Elayi, but accepted by other scholars, including myself (see Finkielsztejn 2007). Such is the case for a similar design on the Marathos weights. Elayi identifies these designs as the representations of scales of two different types, one type on the Arados weights and the other on weights from nearby Marathos. Both Seyrig and Bordreuil, on the other hand, identified these designs as being Phoenician monograms that include all the letters of the names of Arados (*Arwad*) and Marathos (*Marat*), respectively (for references see Finkielsztejn 2007:49, with n. 37; 2015:56, with n. 4).

[18] A parallel with Hellenistic loom weights made of clay has been suggested, but few of those found in Israel were stamped (Elayi and Elayi 1997:314). A discussion of this comparison is beyond the scope of this article.

[19] I [Finkielsztejn] thank Aviva Schwarzfeld for the latter sound suggestion.

[20] Kletter (2013) deals in depth with the question of the function of the pyramidal lead objects. Unfortunately, his article, which was published some eight years after I wrote the present contribution, came to my attention too late to be fully discussed here.

[21] It should be noted that the standard of the *mina* of the Southern Levant is 556.8 g, which is based

upon 128 Attic *drachm* (4.35 g × 128 = 556.8 g). See Doyen 2014:284–298.

[22] A group of pyramidal weights was found during the excavations at Dor. They were studied for publication by Orna Nagar-Hillman, within the framework of an M.A. thesis, directed by Ronny Reich (the University of Haifa). I [Finkielsztejn] was kindly invited to provide some expertise on the weights from Dor. The values of these pyramidal weights, not available at the time of completion of this article, may eventually contribute to the comprehension of these artifacts in all respects. In addition, such sinkers are found isolated in various sites of Israel, such as 'Akko (to be published by myself) and Gamla (Nagar-Hillman 2016).

[23] The curb bit was designed to obtain complete control by inflicting sharp and severe pain to the mount (Manning 1985:67; Hyland 1990:67). It is described in the Mishnah, Kelim 11:5 and Tosefta, Baba Mesia 4:6 (אפרומביא ,פרומביא, *frumbija*, a loan word from the Greek φορβείά).

[24] For the history of the snaffle-bit, see Drews 2004:94ff.

[25] Mounts were led by chain—in Hebrew, שיר = šeir (Mishnah, Shabbat 5:1; Tosefta, Shabbat 4:4; Jerusalem Talmud, Shabbat 7_{a-b}, 8_b; Babylonian Talmud, Shabbat 51_b, 52_a; 61_b; 64_a). In the popular book about Gamla, the halter ring was incorrectly described as a horse bit (Gutman 1994:117–118); see now the final report: Stiebel 2014:99, No. 110, Fig. 4.26:110.

[26] IAA sub-site 10-14568/24120. I [Stiebel] thank Ehud Galili for this information.

[27] The Roman-period riding equipment in Gamla includes bits, spurs, a halter and harness decorations (pendants and *phalerae*). See Stiebel 2014:99–103.

[28] The harness decorations (pendants and *phalerae*) were uncovered in the excavations conducted in 1995 by Benny Arubas, Gideon Foerster, Haim Goldfus and Jodi Magness (Goldfus and Arubas 2002), and will be published by Guy Stiebel.

[29] Jebel Abu Saraj cliff, Cave VI/52 ('Cave of the Niche'). IAA survey of 1993–Southern section, Unit 1, No. 13.

[30] Royal Museum of Scotland, Edinburgh, FRA 500.

[31] The future analysis of the yet unstudied leather scraps that were uncovered in the cave (Sion 2002, 2:62) may yield harness remains.

[32] According to the fisherman's testimony, he hid the battering ram at the spot where it was eventually found, intending one day to sell it for scrap or to smuggle it abroad (Robert Schomos, pers. comm. 2005).

REFERENCES

Abdou Daoud D. 1998. Evidence for the Production of Bronze in Alexandria. In J.-Y. Empereur ed. *Commerce et artisanat dans l'Alexandrie hellénistique et romaine: Actes de la Table Ronde organiseé par le CNRS, le Laboratoire de Céramologie de Lyons et l'EFA, Athènes, 10–12 octobre 1988 (Actes du colloque d'Athènes, 11–12 décembre 1988)* (BCH Suppl. 33). Athens. Pp. 115–124.

Ambar-Armon E. 2007. *Oil Lamps in the Land of Israel during the Hellenistic Period in Light of the Finds from the Maresha Excavations: Conservatism and Tradition alongside Creativity and Innovation* (2 vols.). Ph.D. diss., Bar-Ilan University. Ramat Gan (Hebrew; English summary, pp. I–VI).

Anderson J.K. 1961. *Ancient Greek Horsemanship*. Berkley–Los Angeles.

Ariel D.T., Sharon I., Gunneweg J. and Perlman I. 1985. A Group of Stamped Hellenistic Storage-Jar Handles from Dor. *IEJ* 35:135–152.

Bailey D.M. 1975. *A Catalogue of the Lamps in the British Museum* I: *Greek, Hellenistic, and Early Roman Pottery Lamps*. London.

Bailey D.M. 1996. *A Catalogue of the Lamps in the British Museum* IV: *Lamps of Metal and Stone, and Lampstands*. London.

Basch L. 1987. *Le musée imaginaire de la marine antique* (Institut hellénique pour la préservation de la tradition nautique). Athens.

Beltrame C. 2002. *Vita di bordo in età romana*. Rome.

Bishop M.C. 1988. Cavalry Equipment of the Roman Army in the First Century AD. In J.C.N. Coulston ed. *Military Equipment and the Identity of Roman Soldiers (Proceedings of the Fourth Roman Military Equipment Conference)* (BAR Int. S. 394). Oxford. Pp. 67–195.

Bliss F.J. and Macalister R.A.S. 1902. *Excavations in Palestine during the Years 1898–1900*. London.

Bordreuil P. and Gubel E. eds. 1990. Bulletin d'antiquités archéologiques du Levant inédits ou méconnus VI. *Syria* 67:483–520.

Bruneau P. 1965. *Les lampes* (Exploration archéologique de Délos XXVI) (2 vols). Paris.

Casson L. and Steffy J.R. eds. 1991. *The Athlit Ram* (The Nautical Archaeology Series 3). College Station, Tex.

Dixon K.R. and Southern P. 1992. *The Roman Cavalry: From the First to the Third Century AD*. London–New York.

Doyen C. 2014. Le système monétaire et pondéral d'Antiochos IV. In C. Feyel and L. Graslin-Thomé eds. *Le projet politique d'Antiochos IV (Journées d'études franco-allemandes, Nancy, 17–19 juin 2013)* (Études anciennes 56; Études nancéennes d'histoire grecque II). Nancy. Pp. 261–299.

Drews R. 2004. *Early Riders: The Beginnings of Mounted Warfare in Asia and Europe*. New York–London.

Dumont A. 1892. Monument métrologique découvert à Naxos. *Mélanges d'archéologie et d'épigraphie*. Paris. Pp. 120–125 (= *Revue Archéologique* 26, 1873:43–47).

Dunand M. and Duru R. 1962. *Oumm el-ʻAmed: Une ville de l'époque hellénistique aux Échelles de Tyr* (Études et documents d'archéologie IV). Paris.

Elayi J. 1991. Quelques poids nord-ouest sémitiques inédits. *Semitica* 40:31–38.

Elayi J. and Elayi A.G. 1997. *Recherches sur les poids phéniciens* (*Transeuphratène* Suppl. 5). Paris.

Finkielsztejn G. 1990. *Amphores et timbres d'amphores importés en Palestine à l'époque hellénistique: Orientations de recherches et premiers résultats* (2 vols.) (Mémoires de l'Académie des Inscriptions et Belles-Lettres. École biblique et archéologique française de Jérusalem). Jerusalem (unpublished).

Finkielsztejn G. 1998a. More Evidence on John Hyrcanus I's Conquests: Lead Weights and Rhodian Amphora Stamps. *BAIAS* 16:33–63.

Finkielsztejn G. 1998b. Timbres amphoriques du Levant d'époque hellénistique. *Transeuphratène* 15:83–121.

Finkielsztejn G. 1999. A Standard of Volumes for Liquids from Hellenistic Marisa. *ʻAtiqot* 38:51–64.

Finkielsztejn G. 2003. Administration du Levant sud sous les Séleucides: Remarques préliminaires. In M. Sartre ed. *La Syrie hellénistique (Actes du I^er^ colloque de Tours, octobre 2000) (Topoi* Suppl. 4). Lyon. Pp. 465–484.

Finkielsztejn G. 2007. Poids de plomb inscrits du Levant: Une réforme d'Antiochos IV? In M. Sartre ed. *Productions et échanges dans la Syrie grecque et romaine (Actes du colloque de Tours, juin 2003)* (*Topoi* Suppl. 8). Lyon. Pp. 35–60.

Finkielsztejn G. 2010a. The Maresha Scale Weights: Metrology, Administration and History. In A. Kloner, E. Eshel, H.B. Korzakova and G. Finkielsztejn. *Maresha Excavations Final Report* III: *Epigraphic Finds from the 1989–2000 Seasons* (IAA Reports 45). Jerusalem. Pp. 175–192.

Finkielsztejn G. 2010b. The *Sekoma*: A Volume Standard for Liquids. In A. Kloner, E. Eshel, H.B. Korzakova and G. Finkielsztejn. *Maresha Excavations Final Report* III: *Epigraphic Finds from the 1989–2000 Seasons* (IAA Reports 45). Jerusalem. Pp. 193–203.

Finkielsztejn G. 2012. Témoignages sur les agoranomes du Levant à l'époque hellénistique. In L. Capdetrey and C. Hasenohr eds. *Agoranomes et édiles: Institutions des marchés antiques* (Scripta Antiqua 44). Bordeaux. Pp. 131–154.

Finkielsztejn G. 2014. The Weight Standards of the Hellenistic Levant 1: The Evidence of the Syrian Scale Weights. *INR* 9:61–94.

Finkielsztejn G. 2015. The Weight Standards of the Hellenistic Levant 2: The Evidence of the Phoenician Scale Weights. *INR* 10:55–103.

Finkielsztejn G. Forthcoming. The Weight Standards of the Hellenistic Levant 3: The Evidence of the Southern Levant Scale Weights. *INR*.

Finkielsztejn G. and Gatier P.-L. Forthcoming. Un poids inscrit hellénistique à Ptolémaïs-Aké.

Friedman Z., Galili E. and Sharvit J. 2002. Lead Weights for Balancing Wooden Gear of Hellenistic Ships: Finds from the Carmel Coast, Israel. In H. Tzalas ed. *Tropis* VII *(Proceedings of the 7th International Symposium on Ship Construction in Antiquity, Pylos, August 1999)*. Athens. Pp. 345–359.

Galili E. 2009. Ancient Ports and Anchorages along Israel's Coastline in Light of Five Decades of Marine and Coastal Archaeological Activity and Excavation. *Qadmoniot* 137:2–21 (Hebrew).

Galili E. and Rosen B. 2008. Marine Archaeology. *NEAEHL* 5. Jerusalem. Pp. 1925–1934.

Galili E., Rosen B. and Sharvit J. 2002. Fishing-Gear Sinkers Recovered from an Underwater Wreckage Site, off the Carmel Coast, Israel. *IJNA* 31:182–201.

Galili E., Rosen B. and Sharvit J. 2010. Artifact Assemblages from Two Roman Shipwrecks off the Carmel Coast. *ʻAtiqot* 63:61–110.

Galili E. and Sharvit J. 1999a. Haifa, Underwater Surveys. *HA–ESI* 110:15*–20*.

Galili E. and Sharvit J. 1999b. Underwater Survey in the Mediterranean 1992–1996. *ESI* 19:96*–101*.

Galili E., Sussman V., Stiebel G. and Rosen B. 2010. A Hellenistic/Early Roman Shipwreck off Ashkelon, Israel. *IJNA* 39:125–145.

Gitler H. and Kahanov Y. 2002. The Ascalon 1988 Hoard (CH 9.548)—A Periplus to Ascalon in the Late Hellenistic Period? In A. Meadows and U. Wartenberg eds. *Coin Hoards* 9 (Royal Numismatic Society Special Publications 35). London. Pp. 259–268.

Gitler H. and Kushnir-Stein A. 1994–1999. The Chronology of a Late Ptolemaic Bronze Coin-Type from Cyprus. *INJ* 13:46–53.

Goldfus H. and Arubas B. 2002. Excavations at the Roman Siege Complex at Masada—1995. In P. Freeman, J. Bennett, Z.T. Fiema and B. Hoffmann eds. *Limes XVIII (Proceedings of the XVIIIth International Congress of Roman Frontier Studies held in Amman, Jordan, September 2000)* I (BAR Int. S. 1084). Oxford. Pp. 207–214.

Gutman S. 1994. *Gamla—A City in Rebellion*. Tel Aviv (Hebrew).

Hultsch F. ed. 1864. *Metrologicorum scriptorum reliquiae* I. Leipzig.

Hultsch F. 1882. *Griechische und römische metrologie* (2nd ed.). Berlin.

Hyland A. 1990. *Equus: The Horse in the Roman World*. London.

Hyland A. 1992. The Roman Cavalry Horse and Its Efficient Control. *Journal of Roman Military Equipment Studies* 3:73–79.

Junkelmann M. 1992. *Die Reiter Roms* III: *Zubehör, Reitweise, Bewaffnung* (Kulturgeschichte der antiken Welt 53). Mainz am Rhein.

Kawkabani I. 2003. Les anses timbrées de Jahl el-Bahr. *Archaeology and History in Lebanon* 17: 95–99.

Kletter R. 2013. Pyramidal Lead Objects: Scale Weights, Loom Weights, or Sinkers? *Journal of the Economic and Social History of the Orient* 56:1–28.

Kushnir-Stein A. 1995. Two Inscribed Weights from Banias. *IEJ* 45:48–51.

Kushnir-Stein A. 1997. On the Chronology of Some Inscribed Lead Weights from Palestine. *ZDPV* 113:88–91.

Manning W.H. 1985. *Catalogue of the Romano-British Iron Tools, Fittings, and Weapons in the British Museum*. London.

Merhav R. 1996. A Bronze Leg from a Piece of Hellenistic Furniture—a Find from the Seabed near ʻAtlit. *Eretz-Israel* 25:427–433 (Hebrew; English summary, pp. 104*–105*).

Młynarczyk J. 1997. *Alexandrian and Alexandria-Influenced Mould-Made Lamps of the Hellenistic Period* (BAR Int. S. 677). Oxford.

Morgan M.G. 1969. The Roman Conquest of the Balearic Isles. *California Studies in Classical Antiquity* 2:217–231.

Münz Zentrum 1983. *Auktion XLIX: Gewichte aus drei Jahrtausenden* IV. Köln.

Murray W.M. 1991. The Provenience and Date: The Evidence of the Symbols. In L. Casson and J.R. Steffy eds. *The Athlit Ram* (The Nautical Archaeology Series 3). College Station, Tex. Pp. 51–66.

Nagar-Hillman O. 2016. Metal Weights and Similar Artifacts. In D. Syon. *Gamla* III, 2: *The Shmarya Gutmann Excavations 1976–1989; Finds and Studies* (IAA Reports 59). Jerusalem. Pp. 213–224.

Netzer E. 1998. The Enchanted Palace Built by Hyrcanus the Tobiad in Transjordan. *Qadmoniot* 116:117–122 (Hebrew).

Oron A. 2006. The Athlit Ram Bronze Casting Reconsidered: Scientific and Technical Reexamination. *JAS* 33:63–76.

Parker A.J. 1992. *Ancient Shipwrecks of the Mediterranean and the Roman Provinces* (BAR Int. S. 580). Oxford.

Peters J.P. and Thiersch H. 1905. *Painted Tombs in the Necropolis of Marisa (Marêshah)*. London.

Raban A.1992. A Group of Objects from a Wreckage Site at Athlit. *Michmanim* 6:31–53 (Hebrew; English summary, pp. 41*–42*).

Rahmani L.Y. 1980. Miscellanea—Roman to Medieval. *ʻAtiqot* (*ES*) 14:103–113.

Rahmani L.Y. 1986. A Late Roman Period Libra Weight from Hanita. In M. Yedaya ed. *The Western Galilee Antiquities*. Tel Aviv. Pp. 483–484 (Hebrew).

Reinhart Estate 1997: *The Philip Y. Reinhart Estate of World and Ancient Coins, including Foreign Currency and a Fine Selection of Antiquities, June 3, 4, 1997* (*Superior Stamp & Coin Auction Catalog)*. Beverly Hills.

Roll I. and Ayalon E. 1989. *Apollonia and Southern Sharon: Model of a Coastal City and Its Hinterland*. Tel Aviv (Hebrew).

Seyrig H. 1946–48. Poids antiques de la Syrie et de la Phénicie sous la domination grecque et romaine. *BMB* 8:37–79.

Sharvit J., Galili E., Rosen B. and Brink E.C.M. van den. 2002. Predynastic Maritime Traffic along the Carmel Coast of Israel: A Submerged Find from North Atlit Bay. In E.C.M. van den Brink and E. Yannai eds. *In Quest of Ancient Settlements and Landscapes*: *Archaeological Studies in Honour of Ram Gophna*. Tel Aviv. Pp. 159–166.

Siegelmann A. 1989. Two Lead Weights from Tēl Šoš (Tell Abū Šūše). *ZDPV* 105:123.

Sion O. 2002. Regions IV and VI: Survey and Excavations of Caves along the Jebel Abu Saraj Cliff. *ʻAtiqot* 41, 1:45–84 (Hebrew); 2:43–70 (English).

Spaer A. 2000. Dor—Ruler of the Seas and a Lead Weight Attributed to It. *The Celator* 14/1:17–21.

Stern E. 1981. Achaemenid Tombs at Shechem. *Eretz-Israel* 15:312–330 (Hebrew; English summary, p. 86*).

Stiebel G.D. 2003. The *Militaria* from Herodium. In G.C. Bottini, L. Di Segni and L.D. Chrupcała eds. *One Land—Many Cultures: Archaeological Studies in Honor of Stanislao Loffreda OFM* (*Collectio Maior* 41). Jerusalem. Pp. 214–244.

Stiebel G.D. and Magness J. 2007. The Military Equipment from Masada. In J. Aviram, G. Foerster, E. Netzer and G.D. Stiebel eds. 2007. In *Masada* VIII: *The Yigael Yadin Excavations 1963–1965, Final Reports*. Jerusalem. Pp. 1–94.

Stiebel G.D. 2014. Military Equipment. In D. Syon. *Gamla* III, 1: *The Shmarya Gutmann Excavations 1976–1989; Finds and Studies* (IAA Reports 56). Jerusalem. Pp. 57–107.

Strabo. *Geography* (H.L. Jones transl.; Loeb Classical Library 241). London 1930.

Sussman V. 2006. A Unique Bronze Oil Lamp and Bowl of the Hellenistic Period. *IEJ* 56.1:39–50.

Sussman V. 2009. *Greek and Hellenistic Wheel- and Mould-Made Closed Oil Lamps in the Holy Land: Collection of the Israel Antiquities Authority* (BAR Int. S. 2015) Oxford.

Svoronos J.N. 1904. *Ta Nomismata tou kratous tōn Ptolemaiōn* I–III. Athens.

Tepper Y. 1997. Stables in the Land of Israel in the Roman and Byzantine Periods. In S. Dar and Z. Safrai eds. *The Village in Ancient Israel*. Tel Aviv. Pp. 229–274 (Hebrew).

Tepper Y. and Shahar Y. 1989. Underground Stables in the Judean Shephelah. *Niqrot Zurim* 15:75–94 (Hebrew; English summary, p. 184).

Ullman L. and Galili E. 1994. A Greek Inscription Mentioning ΣΥΚΑΜΙΝΩΝ Discovered off the Carmel Coast. *SCI* 13:116–122.

Wolff S.R. and Finkielsztejn G. 2009. Two New Hellenistic Lead Weights of the Tanit Series. In J.D. Schloen ed. *Exploring the Longue Durée: Essays in Honor of Lawrence E. Stager*. Winona Lake. Pp. 497–506.

Xenophon *Eq*. J.K. Anderson. *Ancient Greek Horsemanship, with a transl. of Xenophon's* Περὶ ἱππικῆς. Berkeley 1961.