

THE YIGAEEL YADIN MEMORIAL FUND

under the auspices of

THE HEBREW UNIVERSITY OF JERUSALEM • THE ISRAEL EXPLORATION SOCIETY

**MASADA VIII**

The Yigael Yadin Excavations 1963–1965

Final Reports

# THE MASADA REPORTS

## *Editors*

Joseph Aviram, Gideon Foerster, Ehud Netzer, Guy D. Stiebel

## *Associate Editor*

Alan Paris

## *Trustees of Yadin's literary legacy*

N. Avigad, J. Aviram, A. Ben-Tor

# MASADA VIII

The Yigael Yadin Excavations 1963–1965  
Final Reports

THE MILITARY EQUIPMENT FROM MASADA

GUY D. STIEBEL AND JODI MAGNESS

THE MIKVA'OT (RITUAL BATHS) AT MASADA

ASHER GROSSBERG

HYGIENE AND INSECT DAMAGE OF CROPS AND  
FOOD AT MASADA

MORDECHAI KISLEV AND ORIT SIMCHONI

SPINDLE WHORLS AND SPINNING AT MASADA

STONE MUGS FROM MASADA

STONE SCALE-WEIGHTS FROM MASADA

RONNY REICH

THE GEMS FROM MASADA

MALKA HERSHKOVITZ AND SHUA AMORAI-STARK



ISRAEL EXPLORATION SOCIETY  
THE HEBREW UNIVERSITY OF JERUSALEM  
JERUSALEM 2007



Publication of this volume was made possible by grants from  
The Dorot Foundation, U.S.A.  
The Richard and Joan Scheuer Family Foundation  
The Reuben and Edith Hecht Trust

© 2007 by the Israel Exploration Society  
ISBN 978-965-221-067-8

All inquiries relating to the reproduction of any part of this book should be referred to  
Israel Exploration Society, Jerusalem

Layout: A. Pladot  
Typesetting: Marzel A.S. — Jerusalem  
Plates and printing: Old City Press Ltd., Jerusalem



Yigael Yadin (1917–1984) examining pottery awaiting restoration.



# CONTENTS

Foreword— <i>Joseph Aviram</i> . . . . .	ix
Preface to “The Military Equipment from Masada”— <i>Israel Shatzman</i> . . . . .	x

## THE MILITARY EQUIPMENT OF MASADA—*Guy D. Stiebel and Jodi Magness*

Introduction . . . . .	1
Armor . . . . .	1
Scale armor ( <i>lorica squamata</i> ). . . . .	1
Laminated armor ( <i>lorica segmentata</i> ). . . . .	2
Girdle-plate tie-hoops	
Buckle hinge plates	
Edged arms . . . . .	3
Sword handgrips . . . . .	5
Sword handguards . . . . .	6
Sword pommels . . . . .	7
Scabbards and scabbard fittings . . . . .	8
Belt ( <i>balteus</i> ) fittings . . . . .	11
Helmets . . . . .	12
Shields . . . . .	16
Arrowheads and arrow shafts. . . . .	22
Bows . . . . .	26
Spears, lances and javelins . . . . .	26
Riding equipment. . . . .	28
Conclusion . . . . .	31
<i>Abbreviations</i> . . . . .	33
<i>Bibliography</i> . . . . .	33
Catalogue of arrowheads . . . . .	39
Catalogue of scale armor . . . . .	52
<i>Plates</i> . . . . .	65

## THE MIQVA'OT (RITUAL BATHS) AT MASADA—*Asher Grossberg*

Introduction. . . . .	95
The halakhic principles for constructing a rain-water based <i>miqveh</i> . . . . .	95
Immersion in the <i>miqveh</i> . . . . .	96
The <i>miqveh</i> structure . . . . .	96

Water rendered suitable for a <i>miqveh</i> . . . . .	96
The minimum amount of water required for a <i>miqveh</i> . . . . .	97
The halakhic basis for rendering drawn water suitable for immersion. . . . .	98
Validating <i>miqva'ot</i> of the single-pool type. . . . .	98
The single-pool type <i>miqva'ot</i> at Masada . . . . .	100
Validating the <i>miqva'ot</i> of the double-pool type . . . . .	109
The double-pool type <i>miqva'ot</i> at Masada. . . . .	112
Water basins at Masada that may have been used as <i>miqva'ot</i> for immersing hands . . . . .	118
Summary . . . . .	122
<i>Glossary</i> . . . . .	124
<i>Abbreviations</i> . . . . .	125
<i>Bibliography</i> . . . . .	125
Appendix: The Chemistry of Plasters and Carbonate Crusts from Some <i>Miqva'ot</i> and Another Water Installation at Masada— <i>Aryeh E. Shimron</i> . . . . .	127

HYGIENE AND INSECT DAMAGE OF CROPS AND FOOD AT MASADA—*Mordechai  
Kislev and Orit Simchoni*

Introduction . . . . .	133
The preservation of insects and their taphonomy . . . . .	135
The advantage of larval finds . . . . .	136
The larvae habitats . . . . .	138
The pupa . . . . .	139
The minimal number of insects . . . . .	139
Description of stored-product insects . . . . .	139
Major pests . . . . .	140
Minor pests . . . . .	144
Field pests . . . . .	152
Refuse insects . . . . .	156
Stored-grain ecosystem . . . . .	158
The humidity factor in storage . . . . .	158
Humidity in grain . . . . .	158
The temperature factor in the storage of grain . . . . .	158
Microflora in the storage of cereals . . . . .	159
The heating in a pile of grain . . . . .	159
Hermetic storage . . . . .	159
Losses caused by insects in stored foods . . . . .	160
Storehouses and store pests in the Roman Empire . . . . .	160



Discussion . . . . .	162
Conclusions . . . . .	165
<i>Bibliography</i> . . . . .	166

SPINDLE WHORLS AND SPINNING AT MASADA—*Ronny Reich*

Definitions . . . . .	171
Typology . . . . .	184
Types of stone . . . . .	185
Mass. . . . .	185
Spatial distribution . . . . .	186
Spinning in literary sources—a woman’s occupation. . . . .	187
Women at Masada. . . . .	188
Spindles and looms . . . . .	188
Comparative material . . . . .	191
On the different types of whorls . . . . .	192
<i>Bibliography</i> . . . . .	193

STONE MUGS FROM MASADA—*Ronny Reich*

Description . . . . .	195
Typology . . . . .	196
Distribution . . . . .	196
Metrology of the Masada mugs . . . . .	201
<i>Bibliography</i> . . . . .	206

STONE SCALE-WEIGHTS FROM MASADA—*Ronny Reich*

Material . . . . .	210
Shape . . . . .	210
Physical condition. . . . .	210
Recalibration . . . . .	211
Origin of weights . . . . .	212
Distribution . . . . .	212
Chronology . . . . .	212
Metrology . . . . .	214
Metrological attribution of the weights . . . . .	214
Summary . . . . .	214
<i>Bibliography</i> . . . . .	214

THE GEMS FROM MASADA—*Malka HersHKovitz and Shua Amorai-Stark*

Introduction . . . . .	217
Catalogue . . . . .	218
Summary . . . . .	224
<i>Bibliography</i> . . . . .	225
<i>Color plates</i> . . . . .	228

# FOREWORD

We are pleased to present the current volume, which includes the weapons found at Masada, together with other important finds, without which this series would not be complete. Due to the quantity of the artifacts involved and technical difficulties, the preparation of this volume extended over a considerably longer period of time than originally intended.

A special team is currently preparing the ninth and final volume of the Masada reports series, which will be entirely devoted to textiles found at the site. That volume is scheduled for publication in 2008. There will remain several classes of artifacts not included in this series, such as glassware, leather, floral remains, bone implements and various small finds. These will undoubtedly be published in forthcoming studies of the ongoing excavation and research constantly underway at Masada.

On behalf of the Yigael Yadin Memorial Fund of the Hebrew University of Jerusalem and Israel Exploration Society, and in the name of the trustees of the scientific legacy of Yigael Yadin (Amnon Ben-Tor, Joseph Aviram and the late Nahman Avigad), we thank all those who participated in the analysis and processing of the numerous finds from the archaeological excavations conducted by Yadin at Masada in the 1960s and in the preparation of this publication.

We are now nearing the completion of the publication of the full scientific legacy of Yigael Yadin, 23 years after his death. We did not expect that the finds from his excavations at Masada would fill nine volumes. Although upon completion of his fieldwork there, Yadin believed that 97% of the site had been excavated, it is now clear that there were larger unexcavated areas than thought at the time. Today, a team continues to conduct occasional excavations at the site and has made important new discoveries. They will undoubtedly undertake future publications of their findings and may also deal with material from the remaining unpublished material from Yadin's excavation. As those responsible for Yadin's scientific legacy, we see the fulfillment of our obligation to make the rich material from the excavation available to all who might be interested in it.

Through the uncompromising devotion of time and energy by countless volunteers, Masada has revealed its treasures to all those interested in learning its history. Special thanks go to the Israel Nature and Parks Authority, which has made Masada easily accessible to millions of visitors from around the world.

A new museum has recently been inaugurated at Masada in memory of Yigael Yadin that, together with the publications of his scientific legacy, including the Hazor reports, the Judean Desert Studies publications, the Temple Scroll volumes and the Masada reports, serves as a fitting memorial to Yigael Yadin for future generations.

Joseph Aviram

## PREFACE TO “THE MILITARY EQUIPMENT FROM MASADA”

A great number of various items of Roman and other military equipment were discovered in the extensive excavations at Masada which were conducted under the direction of the late Professor Y. Yadin in two long seasons in 1963/4 and 1964/5. Yadin referred to several of those military finds, e.g. armor scales, arrowheads and *ballista* balls, in his preliminary report on the first season of the excavations in the *Israel Exploration Journal* 15 (1965), pp. 1–120 (pp. 16, 80, Pls. 15b and 21a and b). Ancient warfare was one of the many subjects in which he took interest and studied and on which he wrote—witness his *The Art of Warfare in Biblical Lands in the Light of Archaeological Discovery* (Jerusalem 1963). Yadin’s *The Scroll of the War of the Sons of Light Against the Sons of Darkness* (Oxford 1962) includes a meticulous study of the military details described in the War Rule, one of the scrolls found at Qumran, demonstrating his thorough acquaintance with the institutions and weapons of the Roman army. There can be little doubt that a study of the remains of offensive and defensive weapons found at Masada would have attracted Y. Yadin, but, as is well known, his engagement in so many other projects, not to mention his political activity, did not leave him time to work on the military finds of Masada.

Professional study of Roman military equipment, mainly of arms and armor, began in the nineteenth century. Those scholars interested in this field have always tried to base their research on physical remains and artistic depictions of the weapons, mostly uncovered in archaeological excavations, in addition to literary accounts. The vast majority of the published material comes from Europe, not only from countries once under direct Roman rule but also from regions beyond the erstwhile administered provinces of the Roman Empire. This holds true both for the old relevant literature and for recent publications, as can be easily learnt even by a cursory inspection of the volumes of the recently founded (1990) *Journal of Roman Military Equipment Studies* and the two basic books on the subject: M.C. Bishop and J.C.N. Coulston, *Roman Military Equipment from the Punic Wars to the Fall of Rome*, London 1993, and M. Feugère, *Weapons of the Romans*, Stroud, Gloucestershire 2002 (French original 1993). The Roman provinces of the Near East have yielded much less Roman military equipment, or at least published material, and particularly so the Roman province of Judaea, later Syria-Palaestina, and still later Palaestina Prima, Secunda and Tertia, an area ruled by Rome for more than six centuries. This imbalance in the published material has much to do with imbalance in research, but is also a reflection of the concerns and interests of the archaeologists who have explored the antiquities of the Holy Land since the 19<sup>th</sup> century.

The present report by G.D. Stiebel and J. Magness of the assemblage of the weapons found at

PREFACE TO “THE MILITARY EQUIPMENT FROM MASADA”

Masada, following the publication of the *ballista* balls by A.E. Holley in *Masada IV* (1994) is, therefore, a veritable advancement for the study of Roman military equipment. One should also mention G.D. Stiebel, “The *Militaria* from Herodium”, in G.C. Bottini *et alii* (eds.), *One Land—Many Cultures. Archaeological Studies in Honour of S. Loffreda* (Jerusalem 2003), 215–244. It is in these three studies that finds of this kind of material uncovered in this country are published with such a full-scale treatment for the first time, to the gratification and benefit of those who are interested in the study of the Roman army and its operation in Judaea.

Israel Shatzman  
The Hebrew University of Jerusalem



# THE MILITARY EQUIPMENT FROM MASADA

Guy D. Stiebel and Jodi Magness

## INTRODUCTION

A large and diverse assemblage of military equipment was found in Yadin's 1963–1965 excavations at Masada.<sup>1</sup> It includes arrowheads and arrow shafts, bows, scale and laminated armor, shields, swords (edged arms), spears, javelins, belts, helmets, riding equipment, scabbards and scabbard chapes. Knives and military footwear (*caligae*) are not discussed here, and the *ballista* balls have been published separately.<sup>2</sup> This report consists of a catalogue of the military equipment by type, followed by a brief conclusion. Lists of all the arrowheads and scales of armor are presented in separate catalogues at the end of this report.

## ARMOR

### SCALE ARMOR (*lorica squamata*)

Hundreds of scales of armor were found at Masada, with the largest concentration coming from L162 in Building 7 (see Pls. 1–2). Over 650 scales were discovered in the rock-cut cistern under the floor of the eastern half of the room (see Pl. 2:2). The cistern was covered by a layer of collapse, beneath which was a burnt layer containing complete pottery vessels, seven coins, two bone bow fragments (see below), and the scales of armor.<sup>3</sup> Another group of about 340 scales was discovered on the lowest terrace of the Northern Palace (L8, 9, 10) (see the discussion of the arrowheads).

1 This report was initially submitted for publication in 1988 and was last updated in 2000.

2 Holley 1994.

3 *Masada III*, 24–25.

All of the scales are made of bronze with one dubious exception of iron (IN 1056-801; see Pl. 2:3). The scales can be divided into the following groups on the basis of their sizes and shapes:<sup>4</sup>

Long and narrow (measuring from 3.0×1.2 cm. to 3.4×1.5 cm.) (see Pl. 1:1, 2, 5).

Short and wide (measuring from 2.1×1.8 cm. to 2.7×1.7 cm.) (see Pl. 1:3, 4, 6).

Long and wide (measuring from 3.6×1.8 cm. to 4.0×1.9 cm.) (see Pl. 1:7, 8, 10).

Short and narrow (measuring 2.5×1.3 cm.) (see Pl. 2:2).

Except for the group from L162, the majority of the scales are long and narrow in shape, and the average dimensions are 3.2 cm. long×1.3 cm. wide×0.1 cm. thick. Most of the scales have four holes arranged in a square at the top and are strengthened by a raised medial rib and border (for exceptions see Pls. 1:9 and 2:1). It is difficult to determine whether scales of different sizes and shapes derive from a single coat of armor or whether they represent the remains of different coats. On the one hand, the group of over 650 scales from L162 are all of the same size (short and narrow) and fabric, and it may be assumed that they come from a single coat of armor (see Pl. 2:2). On the other hand, a variety of shapes and sizes is represented in the concentration of scales from the lowest terrace of the Northern Palace. The question remains then whether these scales all come from the same suit of armor or not. At Dura-Europos, scales of various sizes and fabrics

4 The distinctions between these groups are subjective and are presented here solely for descriptive purposes. "IN" is an abbreviation for "inventory number." The number preceding the hyphen is the locus in which the object was found, and the number following the hyphen is the registration number.

are thought to derive from the same coat of armor.<sup>5</sup> A closer examination of the scales from the lowest terrace of the Northern Palace suggests that this is the case at Masada. In addition to the variety of shapes and sizes represented, a distinctive feature of this group of scales is their coloration. The scales are silver, red or gold in color. An analysis of the scales has demonstrated that the colors were deliberately obtained by mixing different proportions of alloys. The silver color may be the result of patination or cleaning, but at least the red and gold colors are original.<sup>6</sup> The group of scales from the lowest terrace of the Northern Palace thus seems to represent the remains of a suit of parade armor, which was made of two-toned scales of various shapes and sizes.<sup>7</sup> The scales from L162, which are all of the same size and do not exhibit any variations in color, probably belong to a utilitarian coat of armor. On the other hand, the scales in both of these groups show no signs of wear or attrition and lack any traces of fasteners. It is therefore possible that they do not derive from complete suits of armor but instead are spare scales, perhaps taken from Herod's store-rooms on top of Masada.

Bronze and iron scales of armor have been found at Roman sites throughout Europe, and Roman soldiers wearing suits of scale armor are represented on grave stelae and on monumental columns.<sup>8</sup> The most complete examples of this type of armor are attested from Dura-Europos in the third century C.E., where suits of scale horse armor with their original housing were found.<sup>9</sup> In Israel, bronze scales from the time of the revolt virtually identical to those from Masada have been found at Gamla (Gamala) in the Golan.<sup>10</sup>

#### LAMINATED ARMOR ("*lorica segmentata*")

##### **Girdle-plate tie-hoop** IN 1169-1552/1 (Pl. 3:1)

This tie-hoop was originally attached to lesser shoulder guards. It was found in a rebel dwelling unit in the eastern section of the casemate wall.<sup>11</sup> One of the edges is chipped, and the inner end is

damaged as well. The hook still retains one of the fastening rivets. Two concentric punches encircle the rivet holes, a common feature on objects of this type. If the circles are the impressions of the tool used for piercing, they represent a production element rather than a decorative one.<sup>12</sup>

Dimensions: maximum length (damaged): 43 mm.; maximum width: 12 mm.; thickness of plate: 0.5 mm.; diameter of loop (external): 10 mm.; width of loop: 3 mm.; diameter of rivet's head: 4.5 mm.; diameter of hole: 2 mm.; diameter of large circle: 13 mm.; diameter of small circle: 5 mm.

##### **Girdle-plate tie-hoop** IN 1169-1552/2 (Pl. 3:2)

This copper alloy piece is very similar to IN 1169-1552/1, and certainly comes from the same cuirass. The two fastening rivets are still attached, but the hoop is deformed, presumably a result of its detachment from the girdle-plate.

Dimensions: maximum length (deformed): 47 mm.; maximum width: 13.5 mm.; width (inner end): 9 mm.; thickness of plate: 0.5 mm.; width of loop: 3 mm.; thickness of loop: 1.5 mm.; diameter of rivet's head: 5 mm.

##### **Girdle-plate tie-hoop** IN 126-235/2 (Pl. 3:3)

This is a fragmented tie-hoop that retained its loop and a small part of the elongated plate. The loop's tip is soldered to the plate. It has two side-by-side pierced holes instead of the usual single hole. This irregularity may have been necessary to strengthen a problematic point, or perhaps represents a secondary replacement fitting. The tie-hoop comes from a storeroom where clear evidence for post-revolt activity was observed. A 1.2-m.-high mound of refuse occupied a large part of the storeroom.<sup>13</sup>

Dimensions: length (damaged): 22 mm.; maximum width: 16 mm.; thickness of plate: 0.5 mm.; maximum diameter of loop (external): 1.5 mm.; width of loop: 4 mm.; thickness of loop: 2 mm.

##### **Lobate hinge** IN 1052-475/2 (Pl. 3:4)

This is a copper-alloy lobate hinge with no central fret, to the back of which still adhere ferrous fragments of the plate.<sup>14</sup> In Palestine, parallels are

5 Hopkins 1931, 73.

6 Maddin *et al.* 1983, 108-109.

7 *Ibid.*

8 For scale armor cf. Robinson 1975, 153-161.

9 Brown 1936, 440-448.

10 Gutman 1994, photo on p. 74.

11 *Masada* III, 556-557, Plan 56.

12 Cf. Jackson 1990, 29:29.

13 *Masada* III, 53-55, Plan 2.

14 Corbridge: Allason-Jones and Bishop 1998, Nos. 70-71, Figs. 26, 31-32; Rheingönheim: Ulbert 1969, Taf. 33:2-4, 6, 11, 15; Risstissen: Ulbret 1959, Taf. 3:61; 61:15.



## THE MILITARY EQUIPMENT FROM MASADA

known from Gamala. The object was found in a beaten earth floor of an open area or a small room to the east of Casemate 1039. The same locus yielded a harness decoration (IN 1052-1325), two knives and some 90 *ballista* balls.

Dimensions: hinge: 32×32 mm; with plate: 35×35 mm.

### **Buckle hinge plate** IN 1276-1915/4 (Pl. 3:5)

This is part of a fastening set consisting of a buckle plate and hinge plate by which the breast units of the "*lorica segmentata*" were attached to each other<sup>15</sup> and to the uppermost girdle plates.<sup>16</sup> The buckle is constructed from a double length copper alloy strap folded back on itself, fastened by a disc-headed rivet. The partial split in the rear face of the strap probably occurred during the course of the riveting. A round section pivot, placed at the axis of the folded strap, secures the rectangular section D-shaped hoop and the flat section tongue. The pivot is slightly distorted, indicating that considerable pressure must have been applied by the unit to which it was attached. The buckle was apparently still clasped to the leather strap, whose resistance caused the deformation of the pivot. The buckle plate's end was cut and bent to fit between the two bent projections of the now missing hinge plate. The tongue's tip is slightly chipped.

This type of object is very common at Roman military sites, and may be compared with numerous examples throughout the West.<sup>17</sup> The buckle under discussion is very similar to a buckle of the celebrated collar fragment from London of the first century C.E.<sup>18</sup> It was excavated in L1276, a tower room that was converted into an industrial installation during the time of the revolt. The fill in this room was rich in organic material and other finds, including military equipment, which are thought to have been looted and collected by the Roman soldiers. The *militaria* included fragments of shields, a few arrowheads and *ballista* balls.<sup>19</sup>

Dimensions: maximum length: 30 mm.; maximum width: 21 mm.; maximum length of body

(folded): 15 mm.; maximum width of body: 15.5 mm.; length of loop: 17 mm.; width of loop: 18 mm.; length of tongue: 14 mm.; maximum thickness of tongue: 2 mm.; maximum height of tongue: 5 mm.; width of hinge: 5.5 mm.; length of pin: 21 mm.; thickness of pin: 2 mm.

### **Buckle hinge plate** IN 1110-1535/3 (Pl. 3:6)

This is a D-shaped buckle secured by a round-sectioned pivot to a poorly preserved plate. The round-sectioned hoop is folded over the corroded plate, while the tongue remained in its original position. Similarly bent buckles have been documented at Corbridge (UK),<sup>20</sup> Rheingönheim (Germany),<sup>21</sup> and Exeter (UK).<sup>22</sup> This piece was discovered in tower room L1110 in the eastern section of the wall, which contained many remains associated with rebel activities.<sup>23</sup>

Dimensions: maximum length: 15 mm.; maximum width: 18.5 mm.; length of body (damaged): 13 mm.; width of body: 14 mm.; length of pin: 18.5 mm.; diameter of pin: 2.5 mm.; length of loop: 15 mm.; width of loop: 18.5; length of tongue: 14 mm.; thickness of tongue: 1 mm.; diameter of rivet's head: 2 mm.

## EDGED ARMS

### **Gladius** IN 145-1510 (Pl. 4:1)

This sheathed sword was uncovered in a conflagration layer above the floor of the western corridor (L145) of the storeroom complex. The excavators suggested that the sword fell together with numerous other objects found in its vicinity from shelves. The conflagration layer is the result of the fire that destroyed the storerooms at the end of the revolt.<sup>24</sup> The iron sword was found in a poor state of preservation, and was conserved and mended shortly after the end of the excavations. A reexamination of the sword has indicated that it was improperly restored, with some parts having been incorrectly placed.

15 Corbridge type A-C (Robinson 1975, Figs. 178, 180).

16 Corbridge type A only (*ibid.*, Fig. 17).

17 Ulbert 1969a, 45, Taf. 33:23-38 with list of references; Bishop and Coulston 1993, 13-20; Fig. 52.

18 Robinson 1975, Pl. 485.

19 *Masada* III, 440-445, Plan 40.

20 Allason-Jones and Bishop 1988, Figs. 25, 42-43, 48, 51-52, 55, 58-59.

21 Ulbert 1969a, Taf. 33:29, 35-36.

22 Holbrook and Bidwell 1991, 247:37, Fig. 110.

23 *Masada* III, 552-553, Plan 56.

24 *Ibid.*, 61-63, Plan 2.

This, however, does not prevent us from determining its type. Though initially identified as a *spatha*,<sup>25</sup> the stout rhomboid section (i.e., with two working edges) and dominant tapering tip indicate that it is a *gladius*. The versatility that the double-edged blade provided for slashing and the tapering tip for stabbing is described by Polybius.<sup>26</sup> There are several sub-types of this kind of infantry sword, which is the traditional legionary weapon.<sup>27</sup> The Mainz-type was popular during late Republican times to the mid-first century C.E. and was followed by the Pompeian-type.<sup>28</sup> The earliest sub-type, called *gladius Hispaniensis*, differs from the Mainz-type and Pompeian-type in having a longer and noticeably more waisted blade.<sup>29</sup>

Sheathed in a U-section guttering, the sword from Masada has a broken tang of ovoid section from which the blade with sloping shoulders extends. The blade is 610 mm. long and its upper, best-preserved part has a double-edged construction. Though concealed by the scabbard binding and suffering from the swelling of the iron, the blade appears to be waisted.<sup>30</sup> It terminates in a long tapering tip. Except for the length, these traits are indicative of a Mainz-type sword. However, this identification and the *terminus ante quem* of 73–74 C.E. provided by the sword's context seem to be inconsistent with what is known about the *gladius* during the second half of the first century C.E. As Feugère illustrated, this type appears to grow smaller over the course of time.<sup>31</sup> The 610 mm. length of our blade suggests that the sword antedates the time of First Revolt. Based on what is known about the evolution of the double-edged sword, our sword should be assigned to the second half of the first century B.C.E. The length of the blade falls between that of the Delos blade (631 mm.) of 69 B.C.E. and a blade from Bonn RLM (591 mm.).<sup>32</sup> Josephus's account may help resolve the apparent inconsistency in the

sword's dimensions and the date of its context. He relates that when the Jewish rebels conquered Masada, they found weapons of all kinds which had been stored by King Herod the Great, "sufficient for ten thousand men."<sup>33</sup> Perhaps our sword was originally part of Herod's arsenal of weapons, which later fell into the hands of the Jewish rebels. The long life of military equipment is a well-known phenomenon.<sup>34</sup>

Dimensions: total length: 650 mm.; length of tang (damaged): 40 mm.; length of blade: 610 mm.; length of tapered tip: 170 mm.; width of tang: 17–20 mm.; width of blade: 46/52/62 mm.; thickness of blade: 17–25 mm.; length of sheath (damaged): 385 mm. width of sheath: 13 mm.

#### **Sword blade IN 1138-1362/3 (Pl. 5:1)**

Fragments of a second sword come from L1138, a tower on the eastern side of the casemate wall which showed clear signs of rebel occupation.<sup>35</sup> This locus is of particular interest because a group of three iron objects was found just inside the entrance to the room: this sword, a spear (IN 1362/1), and a mortise chisel (IN 1362/2). The sword is very corroded and consists of one relatively large fragment and a number of tiny pieces. In shape the sword appears to have been long and flat, with no central rib discernible. Due to the poor state of preservation, it is impossible to determine whether it is a *gladius* or a *spatha*.

Dimensions (of the large fragment): maximum length: ca. 19.4 cm.; maximum width: 4.2 cm.; thickness: 20 mm.; total weight of all the fragments: 157.10 gm.

#### **Sword IN 1201-371 (not illustrated)**

The third sword comes from L1201, a casemate room on the southeastern side of the mountain that was occupied at the time of the revolt. It was rich in pottery and other finds.<sup>36</sup> The sword consists of three fragments. Its original shape and outline cannot be determined because of its poor state of preservation.

Dimensions (of the largest fragment): length: ca. 9.5 cm.; width: 4.8 cm.; total weight of all three fragments: 101.46 gm.

25 Magness 1992, 64.

26 Polybius, *The Histories* III.114.

27 Ulbert 1969b.

28 Bishop and Coulston 1993, 69, 71.

29 The *gladius Hispaniensis* is the subject of a study by Connolly (2000).

30 A sculptured example of this feature is attested on a late Augustan relief from Palazzo Ducale, Mantua; cf. Robinson 1975, Pl. 450.

31 Feugère 1993, 99 (bottom), 140 (table).

32 A group of examples is noted in Connolly 2000.

33 *BJ* VII.299; see also the discussion of the bronze arrow-head and the conclusion below.

34 Regarding swords cf. Künzel 1994, 33–58.

35 *Masada* III, 536–537.

36 *Ibid.*, 501–504.

**Sword?** IN 861-298 (not illustrated)

A group of corroded and fragmentary iron pieces from L861 might constitute the remains of a fourth sword. They come from a room constructed at the time of the revolt.<sup>37</sup>

**Dagger** IN 1204-748 (Pl. 5:2)

This is a very corroded iron dagger. The tapering blade is swollen due to corrosion. Most of its tang and part of the tip are now missing. It was uncovered in a casemate room that was occupied by the rebels.<sup>38</sup>

Dimensions: Total length: 225 mm.+; Length of blade: 190 mm.; Width of blade: 36 mm.; Thickness of blade (distorted): 200 mm.; Thickness of tang (distorted): 320 mm.; Weight: 192.47gr+

**SWORD HANDGRIPS**

Fragments of six handgrips were discovered at Masada, three of which come from the Western Palace complex. Five are made of bone and the last is of wood. The wooden grip and four of the bone ones belong to the well-defined ribbed type customarily associated with the *gladius*.<sup>39</sup> Three bone examples display the characteristic octagonal cross-section. The five bone examples are too fragmentary to determine whether they were manufactured from a cow's longbone, like those from the Roman West.<sup>40</sup> Most of the complete examples recorded throughout the Empire are made of bone, though several wooden specimens have been reported.<sup>41</sup>

**Bone handgrip** IN 443-152/2 (not illustrated)

A very small bone fragment of a *gladius* handgrip was found in Room 443, which forms part of the Side Entrance Wing I of the Western Palace.<sup>42</sup> The excavators identified "three foci of particularly fierce burning" in the room, which "may attest to the

deliberate incineration of various objects" towards the end of the Roman siege.<sup>43</sup>

Signs of burning are visible on the surface of the handgrip. Three vertical ridges along its length indicate that it originally had an octagonal cross-section. One rib is also visible; such ribs are a characteristic feature, to provide a better grip. A close inspection of the handgrip's vertical edges reveals an extremely thin section. This is presumably an unintentional result of production, and did not contribute to the grip's strength. For parallels see n. 41.

Dimensions: maximum length (damaged): 29 mm.; maximum width (damaged): 19 mm.; thickness: 1.5–7 mm.

**Bone handgrip** IN 458-69/2+3 (Pl. 3:7–8)

Two fragments of a bone handgrip were discovered in the reception room (the "Throne Room") of the Western Palace. This unique room in that palace's core was the focal point of an intense fire that consumed a considerable quantity of furniture.<sup>44</sup> The grip has the same kind of ribs and vertical ridges observed in the previous specimen (IN 443-152/2).

Dimensions: 458-69/2: maximum length (damaged): 38 mm.; maximum width (damaged): 18 mm.; thickness: 4–7 mm.

458-69/3: maximum length (damaged): 40 mm.; maximum width (damaged): 15 mm.; thickness: 2–5 mm.

**Bone handgrip** IN 458-85 (Pl. 3:9)

This is a bone fragment of another handgrip from the "Throne Room."<sup>45</sup> Like the previous specimen (IN 458-69/2+3), it is severely scorched. One of the grip's ribs is visible. It has a dominant horizontal rib but no vertical edges. A similar phenomenon can be seen on bone grips from Vindonissa (Switzerland).<sup>46</sup>

Dimensions: length (damaged): 37 mm.; width (damaged): 20 mm.; thickness: 4–6 mm.

**Bone handgrip** IN 441-1112 (not illustrated)

This small, burnt fragment of a bone handgrip was discovered in the central courtyard (L441) in the Western Palace. The rooms in this area were

37 *Ibid.*, 356–357.

38 *Masada III*, 498–499, Pl. 47.

39 Greep 1984, 122–123.

40 Greep 1989, 20; Bishop and Coulston 1993, 71, 193.

41 Bone handgrips: Unz and Deschler-Erb 1997, 15, 25–43 (with extensive bibliography); Greep 1989, 20, Figs. 3–5; Ulbert 1969b, 97–99, Taf. 17, Abb. 1a–b; Greep 1984, 122–123; Gerhartel-Witteveen and Hubrecht 1990, 99, 102, Figs. 2–4; Boube-Piccot 1994, 142–143, nos. 234–236; Vanden Berghe 1996, 84, 86, Fig. 15:2; Feugère 1997, 3–6, Fig. 2:1–3.

42 *Masada III*, 284–285, Plans 17–18.

43 *Ibid.*, 285.

44 *Ibid.*, 247.

45 *Ibid.*

46 Unz and Deschler-Erb 1997, nos. 32 and 41.

destroyed by an intense fire.<sup>47</sup> The two vertical ridges and one rib that can still be discerned indicate that it represents the same type as IN 443-152/2 (see above, with parallels).

Dimensions: maximum length (damaged): 25 mm.; maximum width (damaged): 13 mm.; thickness: 3–5 mm.

#### **Wooden handgrip** IN 1276 (Pl. 3:10)

The only example of a wooden handgrip for a sword was found in Tower Room 1276, which was converted into a workshop (apparently a tannery) during the revolt.<sup>48</sup> One of the rooms in the tower was filled with a deep layer of fill mixed with a large number of artifacts, including organic materials. Netzer suggested that the dumping of the fill is the result of looting activities by Roman soldiers.<sup>49</sup>

Only two-thirds of the grip is preserved. This fragment has two ribs, with signs of crude carving. A complete example is published from Vindonissa (Switzerland).<sup>50</sup>

Dimensions: maximum length (damaged): 53 mm.; maximum width (damaged): 23 mm.; thickness: 3–6 mm.

#### **Bone handgrip** IN 336-87 (Pl. 3:11)

This fragment of a bone handgrip comes from a room in (residential) Building 9. A rich assemblage of high quality artifacts was discovered in this room. Netzer therefore suggested that room had been inhabited by a wealthy family, or was an assembly point of valuables looted by the Roman soldiers.<sup>51</sup>

Only the lower half of this bone handgrip (including the rim) is preserved. Its original orientation can be determined based on the shape of the vertical hole, which widens to accommodate the hand that grasped it. This hole is nearly square in section, and narrows from the lower rim to the front. Its inner face still shows signs of iron oxidation, undoubtedly from the iron tang. The face of the fragment is decorated with incised vertical bands.

Dimensions: length (damaged): 41 mm.; width (damaged): 18–22 mm.; thickness: 5–7 mm.; width of vertical decorative bands: 1.5–2 mm.

### **SWORD HANDGUARDS**

Four examples of a rare type of sword handguard were found at Masada. Made of bone or ivory, these handguards feature a V-shaped decoration on the front face. In the western part of the western Empire, such handguards were also made of wood and ivory.<sup>52</sup> The Masada examples are paralleled by a nearly identical bone handguard from Rheingönheim (Germany).<sup>53</sup> Another three handguards with V-shaped decoration are published from Vindonissa (Switzerland).<sup>54</sup>

#### **Handguard** IN 1273-1787/1 (Pl. 6:1)

This is a well-preserved, carefully carved and polished bone handguard found just east of tower L1264.<sup>55</sup> It is semi-circular in section. The surviving half has a decorated band consisting of two raised ridges encircling its base. The upper part of the center has a curved, V-shape. The rectangular opening for the tang is visible on the upper and lower faces. The two side holes and the inner face are, in fact, the negative of the soft bone tissue that was removed. We have no information about how the side holes were closed (perhaps by bone plugs?).

Dimensions: width 65.5 mm.; height: 26 mm.; side hole (left): 15 mm.; side hole (right): 12 mm.; thickness 7 mm.; width of tang's hole (upper): 14 mm.; width of tang's hole (lower): 16.5 mm.; height of the decoration band: 3 mm.

#### **Handguard** IN 1054-837/1 (Pl. 6:2)

A fragment of bone handguard was discovered in a pit next to the south wall of the synagogue.<sup>56</sup> The adjacent area yielded a few *ballista* balls.<sup>57</sup> Somewhat more crudely finished than the previous object, the well-polished handguard has a schematic triangular mark, while remains of the soft tissue are

47 Netzer 1991, 28.

48 *Masada* III, 440–445, Plans 17, 40.

49 *Ibid.* Netzer compares the composition of this assemblage to that from L1039 (“the Casemate of the Scrolls”). Unfortunately, there is no record of the exact findspot of this object, other than its locus number.

50 Unz and Deschler-Erb 1997, 15, no. 44.

51 *Masada* III, 208.

52 Bishop and Coulston 1993, 71, Fig. 37.

53 Another V-shaped handguard has also been reported; see Ulbert 1969a, 56; Abb. 6:1; Taf. 60:1–2.

54 Unz and Deschler-Erb 1997, 14–15, nos. 22–24, with references.

55 *Ibid.*, 450, Plan 41.

56 *Masada* III, 413; Plans 34, 36.

57 *Ibid.*, 413; Holley 1994, 365.

visible on its inner face. The removal of the latter left the piece with two holes in its sides. The hole for the sword tang is circular. See above for parallels.

Dimensions: width: 62 mm.; height (damaged): 25 mm.; thickness: 10 mm.; diameter of tang's hole: 6 mm.

**Handguard** IN 176-75/1 (Pl. 6:3)

This piece comes from a storeroom annexed to Building 7. This room is part of a three-room complex, the entrance to which was strictly controlled by guardroom L179. On the basis of an architectural analysis, Netzer has suggested that Herod's arsenal (mentioned in Josephus's account) was located in storerooms L175-177, adjacent to Building 7.<sup>58</sup>

This small fragment of a bone handguard still bears the marks of a triangular decorative motif. The decoration of the more complete example represented by IN 1273-1787/1 (see above) suggests that this is a fragment of the upper part of a handguard. Like the previous examples, the inner soft tissue was removed, which would have left two side holes when it was complete. The hole for the sword's tang is circular. See above for parallels.

Dimensions: width: 53 mm.; height (damaged): 13 mm.; thickness: 8 mm.; diameter of tang's hole (upper): 7 mm.; diameter of tang's hole (lower): 8 mm.

**Handguard** IN 126-277 (Pl. 6:4)

This is a fragmentary ivory handguard with triangular decoration from storeroom L126.<sup>59</sup> Only the right part, in high relief, and a section of the triangular decoration have survived. The selection of ivory as the raw material might account for the visual differences between this object and the handguards described above. For example, since this object had no soft tissue like the bone handguards, it has no side holes. The inner face of the rectangular tang hole has traces of iron patina, undoubtedly from the oxidized sword's tang.

Dimensions: width (damaged): 38 mm.; height (damaged): 28 mm.; thickness (damaged): 16 mm.; internal length of tang's hole (damaged): 8 mm.; internal width of tang's hole (damaged): 8 mm.

58 *Masada* III, 175-176; Plan 1.

59 *Ibid.*, 53-55; Plan 2.

**SWORD POMMELS**

The two sword pommels found at Masada share the same characteristics: main and small crossing holes and decoration consisting of an incised horizontal groove. The horizontal groove might have been used as a means of strengthening the attachment of the pommel to the tang. Both examples were blackened by an intense fire.

**Pommel** IN 456-396 (Pl. 6:5)

This round pommel is made of fine polished bone with two flat ends. It was found in the heart of the Western Palace, in a room that was destroyed by a strong fire (a 50-cm.-thick conflagration layer covered the mosaic floor).<sup>60</sup> The room also contained dozens of iron arrowheads and several wooden foreshafts (see below). Little more than half of the originally circular pommel has survived. It has two holes; the main one is a result of the removal of the natural soft tissue of the bone shaft's center, while the horizontal one has been drilled through. The main hole was designed to accept the sword's tang. A groove was incised around the object's center as a decorative element.<sup>61</sup>

Pommels of similar proportions can be found in the West. In the Netherlands, two swords are crowned by small round pommels, as is a *gladius* from Pompeii.<sup>62</sup> The use of bone for hilt assemblages was popular in the early Empire, though such elements were often made of wood or ivory.<sup>63</sup> At Masada, there is only one example of a wooden grip (see above IN 1276). Most of the hilt elements from Masada are made of bone and one is of ivory.

Dimensions: height: 24 mm.; maximum width: 24 mm.; diameter of main hole: 11-12 mm.; diameter of horizontal hole: 6.5-8 mm.

**Pommel** IN 1039-305/3 (Pl. 6:6)

The "Casemate of the Scrolls"<sup>64</sup> yielded a bone pommel, broken in half and badly burnt. It has a

60 *Ibid.*, 249-250.

61 For similar decorative motif: River Waal (Netherlands), cf. Gerhart-Witteveen and Hubrecht 1990, Fig. 1; Rheingönheim (Germany), cf. Ulbert 1969a, 44-45; Taf. 32:1, 56:1; Vindonissa (Switzerland), cf. Fellmann 1966, Abb. 1-3.

62 Gerhart-Witteveen and Hubrecht 1990, 99, 102, Figs. 3-4; Ulbert 1969b, Taf. 17.

63 Bishop and Coulston 1993, 71.

64 *Masada* III, 416-422.

horizontal hole piercing the pommel's body. An incised line encircling the center of the pommel connects the holes. The same kind of incised lines adorn wooden pommels from Vindonissa (Switzerland).<sup>65</sup>

Dimensions: height: 21.5 mm.; maximum width: 26.5 mm.; thickness: 7 mm.; diameter of main hole: 11–13.5 mm.; diameter of horizontal hole: 6 mm.

## SCABBARDS AND SCABBARD FITTINGS

### Leather scabbard IN 1244-210 (Pl. 7:1)

A unique leather scabbard was unearthed in a rebel dwelling in the western section of the casemate wall.<sup>66</sup> Its exceptional state of preservation provides us with rare details about the construction of such items. The scabbard is composed of two elongated trapezoidal—nearly triangular—parts. Originally sewed together, the two parts created a pouch. What appears to be the front part, dyed crimson, is decorated by an openwork, netlike pattern on its lower section. The decoration consists two series of three vertical registers with a narrow rectangular pattern, flanking an unpierced vertical band. The lower part of the object is ornamented by an additional horizontal register that frames it. As noted above, the lower part of this object is straight instead of triangular, as one might expect. This shape was perhaps intended to allow the attachment of a metal scabbard chape to its tip. The netlike motif in openwork technique is characteristic of the Mainz-type scabbards. For example, two elements belonging to a Mainz-type scabbard from Vindonissa (Switzerland) exhibit this pattern.<sup>67</sup> In the light of this resemblance, this leather object might have adorned a Mainz-type scabbard. This, however, is only a suggestion, as no similar finds exist.

The back part of our specimen is not as well preserved as the front. Nevertheless, it appears to have a similar cutout net-like design. Unlike the front part described above, it lacks any traces of color. There are also a few more (non-joining) painted fragments with the remains of bound seams that fastened the two faces to each other. Several Roman sheathed swords are preserved with parts of wood or leather.

65 Unz and Deschler-Erb 1997, nos. 8–11; cf. P. 15 for parallels.

66 *Masada* III 465, 467, Plans 43–44.

67 Unz and Deschler-Erb 1997, nos. 49, 51.

However, to the best of our knowledge, only one example of a leather sheath (*vagina*) was previously published.<sup>68</sup>

Dimensions: length (damaged): 102 mm.; maximum width (damaged): 60 mm.; thickness: 0.5–1.5 mm.

### Scabbard chape IN 1196-296 (Pl. 8:1)

The bronze chape of a sword sheath was found in a tower room of the southeastern casemate wall. The room was filled with collapse and contained a number of installations from the time of the revolt.<sup>69</sup> The front of the chape is decorated with a delicate cutout design and lightly incised lines, and the back is partially open. There is a hole in the upper edge of the front side to provide for its attachment to a leather-covered wood sheath. Despite the strong chemical treatment the object underwent in the 1960s, traces of tinning are still observable on its reverse side.<sup>70</sup>

The chape belongs to a type of *gladius* sheath found in the Villa of the Mysteries at Pompeii and at Roman sites elsewhere in Europe.<sup>71</sup> The bronze, which was originally tinned or silvered, is decorated with delicate cutout designs. The details are incised and would have been gilded. The cutout designs formed either purely ornamental patterns such as vegetal motifs, or depicted figures such as griffons, *tropaia*, gods and soldiers.<sup>72</sup> The dark leather backing would have been visible through the cutout areas and would have created a strong contrast with the silvered and gilded bronze overlay.<sup>73</sup> Like some of the Pompeian-type sheaths, the sides of the chape from Masada terminate in palmettes (such as IN 491-2082/2 below).<sup>74</sup>

Although the bronze overlays of some sheaths of Pompeian-type are decorated with cutout designs, most are not decorated in this manner.<sup>75</sup> Ulbert

68 This undecorated sheath was found in Vindonissa; cf. Gansser-Burckhardt 1942, 73, Abb. 34c.

69 *Masada* III, 514–516.

70 *Ibid.*, 514–517, Plan 50.

71 Cf. Ulbert 1969b; Bishop and Coulston 1993, 71.

72 It is difficult to identify the pattern on the Masada chape, though the symmetry of the design suggests a floral or vegetal motif.

73 Ulbert 1969b, 99–102.

74 *Ibid.*, 114; Pls. 17–19, 26; Brailsford 1962, 1 nos. A14–A15; Fig. 1.

75 Ulbert 1969b, Pls. 17–19.

illustrates one specimen from Rottweil (Germany) that is decorated with a cutout pattern.<sup>76</sup> This chape closely resembles the Masada piece in size, in the manner of decoration, and in the way the sides terminate in palmettes. Presumably the Masada chape also once had a bulbous tip. However, the chape from Rottweil is angular in form, while the one from Masada has straight sides, reflecting a difference in the proportions of the tips of the swords they once held.<sup>77</sup> A closer parallel from Mainz am Rhine (Germany) is illustrated by Bishop and Coulston.<sup>78</sup>

The sheaths with cutout designs are associated with Pompeian-type *gladii*, which date from the reign of Claudius through the time of Domitian.<sup>79</sup> Therefore, the chape from Masada was manufactured either shortly before or during the revolt. Perhaps it represents booty taken by the rebels following a skirmish with Roman troops.

Dimensions: length: 85 mm.; maximum width: 33 mm.; thickness: diameter at top (front to back): 25 mm.; weight: 24.88 gm.

#### Scabbard chape IN 1186-2385/2 (Pl. 9:1)

This tip of a scabbard chape comes from a rebel room in the eastern section of the casemate wall.<sup>80</sup> It retains a small portion of the U-shaped binding that terminates in a semi-circular tip, decorated by incised lines. Such tips, which adorned sword

scabbards, exhibit some variations.<sup>81</sup> The pattern on our piece, which resembles a flower, is closely paralleled by an object from Aislingen (Germany),<sup>82</sup> and a large group from Vindonissa (Switzerland).<sup>83</sup>

Dimensions: length (damaged): 29 mm.; width of binding: 5 mm.; height of domed tip: 8 mm.; diameter of domed tip: 12.5 mm.; thickness of binding: 0.05 mm.

#### Decoration of scabbard chape IN 491-2082/2 (Pl. 9:2)

This thin copper alloy object, shaped as a palmette, adorned the mid-upper section of a Pompeian-type sword scabbard. The palmette motif was created by fourteen incised lines. Such ornaments crowned scabbard chapes, as seen on complete examples from Pompeii.<sup>84</sup> This neatly designed object was originally accompanied by a scroll-like pattern on its base, and was crowned by a loop for its attachment to the scabbard.<sup>85</sup> The palmette from Masada, one from Oberstimm (Germany),<sup>86</sup> and few palmette decorations from Vindonissa (Switzerland) lack both elements.<sup>87</sup>

The Masada piece comes from a courtyard in the Western Palace, where a 50-cm.-thick conflagration layer attests to an intense fire. The fire appears to have consumed a group of objects collected here during the final hours of the revolt.<sup>88</sup>

Dimensions: length (damaged): 23 mm.; width: 18.5 mm.; thickness: 1 mm.

#### Ornamental locket of a *gladius* IN 334-183/1 (Pl. 9:3)

A fragment of a copper alloy locket that sheathed a Pompeian-type *gladius* was discovered in one of the

76 *Ibid.*, 125; Fig. 4.

77 The chape from Masada has the proportions characteristic of Ulbert's "Pompeian-type," which means that the *gladius* it held had parallel edges and a relatively short point (cf. Ulbert 1969b, 97-128; Lang 1988, 200; Bishop and Coulston 1993, 71). In an email communication of 12 February 2000, Michael Mackensen stated that, "according to the small dimensions, that means also the ratio between width and length, but in particular the width of the blade, it seems most improbable to me that the scabbard chape was part of a normal Roman *gladius* of the Pompeii type with a width of the blade normally varying between ca. 30/35-60 mm; for me the scabbard chape from Masada belongs to a smaller weapon, probably similar to a dagger or something between a dagger and a sword..." We are grateful to Professor Mackensen for his comments. However, we still prefer to identify the scabbard chape as belonging to the Pompeian-type, since it falls within the normal dimensions (admittedly at the lower end of the range).

78 *Ibid.*, 73, Fig. 37:4.

79 Ulbert 1969b, 118-119; Manning 1985, 152; Lang 1988, 200.

80 *Masada* III, 546, Plan 54.

81 Rheingönheim (Germany), cf. Ulbert 1969a, 43, Taf. 31:4-6 (with list of references to other European sites); Oberstimm (Germany), cf. Schönberger 1978, Taf. 21:B124; Kempten (Germany), cf. Krämer 1957, Taf. B:26.

82 Ulbert 1959, 10.

83 Unz and Deschler-Erb 1997, nos. 131-132, 141-147; p. 17 includes a comprehensive bibliography.

84 Ulbert 1969b, Taf. 17:1, 3; 19:1b, 2b, 3; for the representation of this element cf. *ibid.*, Pl. 29.

85 *Ibid.*, 111-115; Abb. 2; Taf. 25.

86 Schönberger 1978, Taf. 21:B 130.

87 Unz and Deschler-Erb 1997, nos. 149, 155; for more complete examples, cf. nos. 150-154, 156-160, 163-164; additional parallels are listed on p. 17.

88 *Masada* III, 295; Plan 17.

rooms on the east side of the central courtyard in (residential) Building 9.<sup>89</sup> The room was constructed during the early phase of the Herodian period at Masada and underwent some minor changes during the revolt.

Although much corroded, the object still reveals the typical decoration of this type: cut-out body parts of figures associated with warfare (such as Mars, Victory, etc.).<sup>90</sup> Unfortunately, due to its state of preservation the decorative motif cannot be identified. Two parallel copper alloy bands were soldered horizontally to the upper section of the locket's body. One band has two raised, incised perimeters. The other band is slightly wider. In addition to the raised, incised perimeters, it has a raised band with a line of dots. The two bands divide the locket's face into two fields, one of which retains the typical voids that were part of the original decoration. A comparison with complete examples indicates that our fragment, with the two adjacent bands, represents the medial part of the locket.<sup>91</sup> The burnt remains of an organic substance are attached to the back face of our piece. The substance appears to be wood from the body of the scabbard.

Dimensions: 49×79 mm.; thickness: 1–1.5 mm.; upper band: 6.5×32 mm.; lower band: 8×33.5 mm.

**Scabbard mount** IN 245-552/1<sup>92</sup> (Pl. 9:4)

This is a scabbard suspension mount with reeded decoration on its upper surface. The mount suffered an impact on its right side, which damaged the decoration. The two side loops that accommodated the rings attached to the soldier's belt are now distorted. Similar objects are reported throughout the Roman Empire.<sup>93</sup>

Dimensions: length: 82 mm.; width: 11 mm.; thickness: 1 mm.

**Scabbard mount** IN 1039-316/14 (Pl. 9:5)

This copper alloy band with four embossed ridges was found in the "Casemate of the Scrolls."<sup>94</sup> Four

attachment holes are spaced along its deformed body, which is missing both ends. Interestingly, the same basket yielded a dagger suspension loop (IN 1039-316/9) and silver stud (apron mount? IN 1039-316/11), discussed below. Embossed mounts are published from Vindonissa (Switzerland).<sup>95</sup>

Dimensions: length (damaged): 113 mm.; width: 13 mm.; thickness: 0.5 mm.; diameter of attachment holes: 1–3 mm.

**Scabbard mount** IN 489-2824 (not illustrated)

This massive copper alloy band with three attachment holes was found in room 489, which served as an entrance room to the Intermediate Wing of the Western Palace.<sup>96</sup> Four parallel lines are incised along 75 mm. of the band. Similar decoration can be seen on mounts from Vindonissa (Switzerland), which have been assigned by Unz and Deschler-Erb to Pompeian-type scabbards.<sup>97</sup>

Dimensions: length (damaged): 115 mm.; width: 12–13 mm.; thickness: 1 mm.

**Scabbard mount** IN 692-114/2-4+5 (Pl. 9:6)

These are two fragments of the loop of a scabbard mount. The face of the mount exhibits two horizontal ridges, both of which are notched. An attachment hole is spaced near the beginning of the loop. For parallels, see IN 245-552/1.

Dimensions: length (damaged): 34 mm.; width: 11 mm.; thickness: 2 mm.

**Dagger scabbard suspension loop** IN 523-344 (Pl. 9:7)

A suspension loop of a dagger was found in entrance room L523, which is part of the Side Entrance Wing I of the Western Palace.<sup>98</sup> The loop held a leather thong that attached the scabbard to the belt's frog. The elaborate suspension loop is made of copper alloy and is well-preserved. It consists of a square-sectioned bar in the form of internal scrolls that meet in the center, similar to Grew and Griffith's Group D (see n. 101 below). The bent bar's tips sheath two decorative pins. Two more pins, one partly damaged, hold the external scrolls to the bars. This embracing element has two projecting parts, with a

89 *Ibid.*, 204; Plan 17.

90 For decorative motifs cf. Künzel 1994, 52, Table 4.

91 Ulbert 1969b; Künzel 1994, 51–53, Abb. 21; Gerhartel-Witteveen and Hubrecht 1990, 102–103, Fig. 5; Unz and Deschler-Erb 1997, 15, no. 61.

92 L245 is not included in *Masada* III.

93 Unz and Deschler-Erb 1997, nos. 78–110; cf. p. 17 for bibliography.

94 *Masada* III, 416–422.

95 Unz and Deschler-Erb 1997, nos. 88, 95, 108–109.

96 *Masada* III, 294–295, Plan 17.

97 Unz and Deschler-Erb 1997, 111–114, with references (also cf. nos. 79, 82, 96).

98 *Masada* III, 282–284, Plans 17–18.



round-sectioned rod that acts as a hinge. A plain flat band folded over the latter was designed to secure the suspension loop to the dagger's sheath. This was achieved by means of a pin, now lost, whose existence is attested by a hole that pierces the band. A fine example of such a set comes from Velsen (the Netherlands).<sup>99</sup> Other examples are reported from Vindonissa (Switzerland),<sup>100</sup> and the UK.<sup>101</sup>

Dimensions: main bar: 23×16 mm.; thickness of main bar: 2×3 mm.; diameter of the decorative pins' heads: 1.5 mm.; width of external bar (damaged): 27 mm.; maximum thickness of external bar: 2 mm.; length of hinge: 15 mm.; diameter of hinge: 1 mm.; dimensions of folded securing band: 10×10 mm.; dimensions of unfolded securing band: 18×10 mm.; diameter of hole in the securing band: 1.5 mm.

**Dagger scabbard suspension loop** IN 1039-316/9 (Pl. 9:8)

This is a rhomboid section bar that was curled into a scroll design, with the ends fitted to hold studs. It is part of the suspension loop of a *pugio* scabbard (see IN 523-344 above for parallels). The loop held a leather thong that attached the scabbard to the belt's frog. A method of fastening the loop to the sheath which did not require soldering appears on a dagger sheath from northern France.<sup>102</sup> Hinges might have also been used on the Masada piece, as it lacks any signs of soldering or riveting. It comes from L1039 (the "Casemate of the Scrolls"), a casemate room that yielded some of the most significant finds from Masada. The *militaria* include shield fragments, dagger suspension loops, a silvered mount, hundreds of *ballista* balls, and several rolling stones.<sup>103</sup>

Dimensions: 17×22 mm.; thickness: 1–2 mm.

## BELT (*balteus*) FITTINGS

**Belt mount** IN 1235-499/1 (Pl. 10:1)

This is a copper alloy hinged belt mount covered with thin silver foil. Such mounts were designed to

hold the belt buckle. Three grooves were cut in the plate's narrow edge, which was then folded to create a loop for the buckle's pin.<sup>104</sup> Four holes in the mount's corners were used for its attachment to the leather belt. Two of three spike-like corroded elements undoubtedly represent the remains of the attachment pins. The third element, located next to the attachment hole, seems to be the corroded negative of a lost pin. The reverse side of the plate is very corroded. Its front face was similarly preserved until a mechanical cleaning indicated that it was plated with thin silver foil. The silver-plated, hinged mount is well-paralleled by the one buckle mount and two frog mounts of the splendid set from Velsen (the Netherlands).<sup>105</sup> Silvering and tinning were popular among Roman soldiers.<sup>106</sup> This is attested by Pliny the Elder, who refers to silver tabs that decorated soldiers' belts.<sup>107</sup> From the sources we also learn that silvered mounted belts not only had decorative value, but could be used as a substitute for money.<sup>108</sup> The Masada mount comes from a rebel complex adjacent to swimming pool L711 in the southern part of the site.<sup>109</sup>

Dimensions: width of plate: 58 mm.; length of plate: 28–29.5 mm.; thickness of plate: 2 mm.; width of hinge: 8–10 mm.; length of hinge: 30 mm.; diameter of hole 2.5 mm.; height of corroded pin: 3 mm.

**Belt buckle-tongue** IN 1271-1252/1<sup>110</sup> (Pl. 10:2)

This is a tongue of fleur-de-lis type. Decorated with a punched design, the tongue has a looped hinge and stepped tip. Such tongues are associated with the scrolled decorated buckle that is regarded as a typical military type. Parallels to this popular object include examples with tongues from Kalkriese

99 Morel and Bosman 1989, 182–183, Figs. 8, 9B.

100 Unz and Deschler-Erb 1997, 18–19: 209.

101 Grew and Griffiths 1991, 50, nos. 157–162, Fig. 15.

102 Feugère 1994, 163 (upper right).

103 *Masada III*, 416–420, Plan 36; Cotton and Geiger 1989, 18–20.

104 For similar hinged mounts cf. Unz and Deschler-Erb 1997, nos. 1045–1058, 34–36, Pl. 41, with additional bibliography.

105 Morel and Bosman 1989, 180–181:C1–C3; Figs. 5:1–3, 6:1–3.

106 Bishop and Coulston 1993, 96, 191–192. For examples of silver plated belt mounts cf. Velsen, Morel and Bosman 1989, C4–C8; Kalkriese (Germany), Franzius 1995, Abb. 8:10.

107 Pliny, *Natural History* XXXIII.LIV.152; "baltea lamnis crepitent..."

108 Tacitus, *The Histories* I.57.

109 *Masada III*, 479, Plan 45.

110 L1271 is not included in *Masada III*.

(Germany),<sup>111</sup> Kempten (Germany),<sup>112</sup> Verulamium (UK),<sup>113</sup> and Camerton (UK).<sup>114</sup>

Dimensions: length: 40 mm.; width: 18 mm.; maximum thickness: 3.5 mm.; diameter of loop: 3 mm.

**Belt buckle-tongue** IN 1039-1631 (Pl. 10:3)

This is a tongue of fleur-de-lis type. It has an asymmetrical body whose tip is adorned with a circular terminal. A close parallel is published from Kalkriese (Germany).<sup>115</sup> This object comes from L1039 (the “Casemate of the Scrolls”), which yielded numerous *militaria*.<sup>116</sup>

Dimensions: length: 37.5 mm.; maximum width: 24 mm.; thickness: 3 mm.; thickness of loop: 2 mm.; diameter of loop (external): 6.5 mm.; diameter of loop (internal): 3.5 mm.; weight: 3.23 gm.

**Silvered stud—apron mount (?)** IN 1039-316/11 (Pl. 10:4)

This is a circular copper alloy stud whose upper face was silver plated.<sup>117</sup> A short conical spike protrudes from the center of the flat rear face, on which two blurred concentric circles are visible. Similar objects have been identified in the Roman West as apron mounts.<sup>118</sup> One of the most extravagant pieces of equipment of the Roman soldier, during the Julio-Claudian period the apron consisted of three to eight straps suspended from the soldier’s belt.<sup>119</sup> A variety of circular and rectangular mounts fastened to the straps were often richly decorated. Various patterns in silver and niello are known.<sup>120</sup> The popularity of silver among the Roman soldiers is well-attested.<sup>121</sup>

Nevertheless, the identification of this stud as an apron mount is not definite because silvered studs

111 Franzius 1995, Abb. 8:6.

112 Krämer 1957, Taf. B:18.

113 Frere 1984, Fig. 13:96.

114 Jackson 1990, 32:48–49, Pl. 5.

115 Franzius 1995, Abb. 8:9; for parallels with extensive bibliography cf. Unz and Deschler-Erb 1997, 37, nos. 1186–1188.

116 *Masada* III, 416–420, Plan 36; Cotton and Geiger 1989, 18–20.

117 Found in the “Casemate of the Scrolls” (*ibid.*).

118 Camerton (UK), cf. Jackson 1990, 30; nos. 32–36; Pl. 4; Rheingönheim (Germany), cf. Ulbert 1969a, 42; Taf. 29:27–37 (with references to other European sites).

119 Grew and Griffiths 1991, 52–53; cf. the comprehensive study of Bishop 1992, 81–104.

120 *Ibid.*

121 Bishop and Coulston 1993, 97, 191–192.

adorned other types of military equipment. For example, a *gladius* sheath from Pompeii (79 C.E.) was decorated with eleven pairs of silvered studs.<sup>122</sup> The tombstone of Caius of the Legio II Adiutrix from Aquincum (Budapest) portrays a baldric ornamented with similar circular mounts.<sup>123</sup> These examples indicate that such studs could have been fastened to various military objects, including sword sheaths, baldrics, and horse harnesses. The stud from Masada, found alone, should therefore be identified simply as the decorative element of a military object.

Dimensions: diameter of stud’s head: 26 mm.; thickness of head: 1.5 mm.; length of spike: 7.5 mm.; thickness of stud: 1–3 mm.

## HELMETS

**Cheek-piece of cavalry helmet** IN 1118-1912/2 (Pl. 10:5)

This copper alloy fragment from a tower room in the eastern section of the casemate wall is the upper part of a cheek defender.<sup>124</sup> It clearly belongs to Robinson’s Cavalry Sports I, or Type Weiler-Guisborough.<sup>125</sup> These highly decorated helmets were used by the cavalry from the first to third centuries C.E. Complete examples indicate that the cheek-pieces were designed to protect the lateral face and the ears. Embossed ears are thus very popular, although a few examples lack this feature. Although supposedly used in combat, the splendor of these helmets and the flimsiness of their cheek-pieces suggest that they functioned more as parade helmets in events such as the *Hippika Gymnasia*.<sup>126</sup> The parallels to the cheek defenders indicate that the Masada fragment represents the upper part of a left cheek-piece, as attested by the pattern of the cabled border. The raised cable line that encircles the perimeter of the plate is a characteristic feature of this type. As the complete examples show, the main

122 Ulbert 1969b, Taf. 17:2; 18:2a; 19:2b.

123 Robinson 1975, Pl. 470.

124 *Masada* III, 548.

125 Robinson 1975, 133–135; Feugère 1994, 104–117.

126 For a hypothetical table of the evolution of the cavalry helmet cf. *ibid.*, 110; on the *Hippika Gymnasia* cf. Hyland 1993.

motif that decorated the object (missing on the Masada piece), which was usually mythological in nature, was placed within the bordered space. A shell, palmette, or solar design, the outline of which is framed by the cabled border, is embossed in the center of the Masada fragment (the upper part of the complete plate). This pattern was very popular on this type of helmet. It occurs on cheek-pieces from Gloucester (UK),<sup>127</sup> Brough, Nottinghamshire (UK),<sup>128</sup> Yredoorn (the Netherlands),<sup>129</sup> river Waal (the Netherlands),<sup>130</sup> Leicester (UK),<sup>131</sup> Wels (Austria),<sup>132</sup> and Theilenhofen (Germany).<sup>133</sup> A variation of this design decorates a helmet from Frankfurt-Heddernheim (Germany),<sup>134</sup> in the shape of a half-rossette. This element appears to be represented on other cheek-pieces from Theilenhofen,<sup>135</sup> Gerulata (Slovakia),<sup>136</sup> and Regensburg (Germany),<sup>137</sup> where it has become an integral part of the border.

A floral pattern flanked both sides of the shell design, only the left part of which has survived. Few remains of the main design are preserved, which are too scant to offer any clue as to the complete image. The upper and left margins indicate that the edges were folded backwards to hold the original backing. Such folds are a common feature on helmets of this type, apparently because of the thinness of the metal.<sup>138</sup> The copper alloy piece, which has a golden face, was subjected to strong chemical treatment in the 1960s. As a result, any additional features that might have been present, such as tinning, have long disappeared.<sup>139</sup> The smith used a combination of techniques including punching and incision to create the decorative motifs.

Cheek-pieces of this type are recorded from the northern and eastern *limes*.<sup>140</sup> Most are dated to the

second and third centuries C.E., although at least one cheek-piece originated in a context of the second half of the first century C.E.<sup>141</sup> The Masada piece points to the relatively early appearance of this type.<sup>142</sup>

Dimensions: 75 mm.×53.5 mm.; thickness: 0.5 mm.; weight: 7.41 gm.

#### **Crest support IN 310-250 (Pl. 10:6)**

This is a crest support of the Imperial-Gallic or Weisenau type of helmet.<sup>143</sup> The copper alloy rectangular plate has two raised parallel ridges, which were intended to hold a double-tongued slide-in crest support.<sup>144</sup> Support holders of this kind were generally riveted to the helmets.<sup>145</sup> However, a support holder from Rheingönheim (Germany), like the object under discussion, exhibits no traces of such holes. The absence of holes for attachment suggests that these pieces were originally soldered to the helmet crown. In fact, some patches of the soldering agent are visible on the rear face of the Masada piece. Although many crest-support holders were riveted to the helmet, the usage of soldering is well-attested. For example, the bronze helmet of L. Lucretius Celeris of the Legio I Adiutrix has soldering remains on its crown. The fact that holes for attachment are not visible led Robinson to suggest that a slide-on crest holder was fastened to the helmet by means of soldering.<sup>146</sup> It is worth noting that the deposition of that helmet was dated by Klumbach to 71–83 C.E.<sup>147</sup>

An examination of the ridges of the crest-support holder from Masada reveals that one end is 3 mm. high and the other is almost flat. This appears to reflect the original position of the object, with the open end designed to accept the slide-in support. This object comes from a unit of two small rooms

127 Robinson 1975, Fig. 406.

128 *Ibid.*, Fig. 401.

129 *Ibid.*, Fig. 399.

130 *Ibid.*, Fig. 269.

131 Feugère 1994, 106.

132 *Ibid.*, 114.

133 *Ibid.*, 115.

134 *Ibid.*, 117.

135 Robinson 1975, 286.

136 Krekovič 1994, 211; Fig. 1.

137 Garbsch 1978, 76 (O<sub>78</sub>), Pl. 33:3.

138 *Ibid.*, Figs. 399–404; Bennett 1985, 110.

139 Tinning was observed on the Stanwix cheek-piece (Bennett 1985, 110).

140 Abdul-Hak 1954–55, Pl. VII; Robinson 1975, 133.

141 A cheek-piece from Gloucester; cf. *ibid.*, Fig. 406.

142 A first to second century C.E. date has now been suggested for the Stanwix cheek-piece, instead of the previously proposed third century C.E. date.

143 Feugère 1994, 86–97.

144 For a reconstruction of crested helmets cf. Robinson 1975, Pls. 129, 134–135; for representational evidence cf. *ibid.*, Figs. 150–157; Peterson 1992, 29.

145 Robinson 1975, Figs. 62–63, Pls. 110, 116, 119, 125–126.

146 *Ibid.*, 46, 58; Pl. 140.

147 *Ibid.*, 58; crest holders, though of a different type, were similarly soldered to the crowns of the Imperial-Italic type (cf. Pls. 151, 156, 158).

west of Building 9 dating to the time of the revolt.<sup>148</sup> Interestingly, three more military finds were discovered in the immediate vicinity (see below, IN 311-407/1, 360-645 and 324-57/2).

Dimensions: length: 41.5 mm.; width: 34 mm.; maximum height of ridges: 3 mm.

**Helmet fastening loop (?)** IN 1273-1748/3 (Pl. 11:1)

This is a copper alloy ring held by a rectangular plate. The plate is folded in two around the ring, with its halves secured by a circular head pin. Similar objects functioned as cheek-piece fastening devices, as demonstrated by numerous helmets (mainly Robinson's Imperial-Gallic and Imperial-Italic types). A pair of loops from Vindonissa (Switzerland) are published under this category, while two more loops attached to fragmented cheek-pieces come from that site.<sup>149</sup> However, such loops also occur on the inner side of the neck guards of helmets as well as above the neck guard and the forehead, as crest fasteners on Imperial-Gallic helmets.<sup>150</sup> In addition, similar loops were placed along the edges of greaves.<sup>151</sup> The Masada piece comes from an area in front of tower room L1264 in the western casemate wall that also yielded a bone hand guard (see below IN 1273-1787/1).<sup>152</sup> Another loop was unearthed in L531 (see below IN 531-247).

The multiple uses of these objects, as detailed above—and these are the military ones only—means that their identification as helmet fastening loops is problematic.

Dimensions: length: 27 mm.; diameter of loop (external): 15 mm.; thickness of loop: 2.5 mm.; length of plate: 16 mm.; width of plate: 9 mm.; thickness of plate: 0.5 mm.; diameter of pin head: 8 mm.

**Helmet fastening loop (?)** IN 531-247 (Pl. 11:2)

This is very similar to the previous object. The plate's edges are slightly chipped, and the fastening

pin is now lost. It was found in a corridor in the Western Palace adjacent to room L443, at the entrance to which a large assemblage of copper alloy objects was discovered.<sup>153</sup>

Dimensions: length: 29 mm.; diameter of loop (external): 17 mm.; thickness of loop: 2.5 mm.; length of plate: 16 mm.; width of plate: 9 mm.; thickness of plate: 0.5–1 mm.; diameter of pin hole: 2.5 mm.

**Helmet carrying-handles (?)** (Pl. 11:3–10)

During the first century C.E., carrying-handles appeared on the neck-guards of helmets. The handles were attached by loops to the central part of the neck-guard's perimeter, and their ends were usually decorated.<sup>154</sup> The identification of isolated examples of these objects as helmet carrying-handles is uncertain.<sup>155</sup> In such cases, when the archaeological context and stylistic considerations do not indicate their original function, the commonly-found internal width of three middle fingers<sup>156</sup> usually serves as a reasonable and useful criterion for their identification as helmet carrying-handles. However, the representational evidence indicates that helmets were usually hung rather than carried by hand. Though it was necessary to carry the helmet during marches, on other occasions, when the helmet was not in use, it had to be laid down. There are numerous depictions of such instances on Trajan's Column. These show that there were two ways of handling the helmets: during marches they hung from the soldier's shoulder (scenes IV, XXXIII, XLVIII, XLIX, LXXXVI, XCVIII, CI, CII), while during construction activities in the field, they were hung from the shields (scenes XII, LVI, LXIX, CXXVII, CXXVIII). Helmets are similarly portrayed on a relief from Croy Hill (UK),<sup>157</sup> and on a Flavian column base from the *principia* at Mainz (Germany).<sup>158</sup> For this reason, the usual three-finger

148 *Masada* III, 228–229, Pl. 15.

149 Unz and Deschler-Erb 1997, nos. 584–585; for attached loops cf. nos. 571–572.

150 For early examples cf. Feugère 1994, 70–71; for early Roman occurrences cf. Robinson 1975, Figs. 28, 37; Pls. 118–119, 134–135, 194, 209, 217, 225, 230; Feugère 1994, 83, 86.

151 For greaves cf. Robinson 1975, Pls. VIII, 506–507, 523, 527; Garbsch 1978, Abb. 5 and nos. Q5, Q15.

152 *Masada* III, 450, Plans 17, 41.

153 *Ibid.*, 284–285, Plans 17–18; for Room 443, cf. p. 285.

154 *Ibid.*, 47–51, Figs. 76–80; for Chichester (UK) cf. Down 1978, 294:34; Fig. 10:31.

155 Bishop and Coulston 1993, 93. Similar handles were also attached to metal vessels such as mirrors (Hayes 1984, nos. 269, 321, 324).

156 As suggested by Bishop and Coulston (*ibid.*).

157 The most thorough study of this relief is Coulston 1988b, especially p. 9.

158 Robinson 1975, Fig. 198. In his reconstruction of a

width criterion for identifying these objects as helmet carrying-handles seems questionable. Since the helmet could have been suspended from the handle by means of leather thong, an internal width of less than three fingers could have served just as well.

All of the Masada handles were found detached from the main objects to which they were originally attached. They all appear to be slightly less than three fingers wide, though they are stylistically close to western examples. Since no definite criterion for the identification of such handles has been established, and, in fact, similar handles have been found attached to mirrors, the association of the Masada handles with helmets is uncertain.<sup>159</sup> Moreover, the relatively large number of handles, all of which come from contexts associated with Jewish rebels, and the absence of a direct association with helmets or other military equipment at Masada, suggest that they do not come from helmets.<sup>160</sup>

**Handle IN 1264-2061/1 (Pl. 11:3)**

This is a handle with a circular section that tapers to neatly decorated terminals with a pomegranate-shaped tip. Aside from the other objects from Masada described below, its ridged and grooved decoration is paralleled by finds from Corbridge and South Shields (UK), and Mainz am Rhine (Germany).<sup>161</sup> Early examples are reported from the Republican site of Cáceres el Viejo (Spain).<sup>162</sup> The handle comes from a tower room of the southwestern section of the casemate wall.<sup>163</sup> The area in front of the entrance to the room yielded the handguard of a sword (IN 1273-1787/1), and the fastening loop (?) of a helmet (IN 1273-1748/3).

Dimensions: length: 38 mm.; maximum width: 52 mm.; thickness of handle: 4.5 mm.

march, Connolly illustrates the helmets hanging from the soldiers' necks (Connolly 1988, 8–9). On the Column of Trajan, helmets are also visible laid on top of turf-cutters (scene XX).

159 For mirror handles see Hayes 1984, nos. 269, 321, 324.

160 Two handles found in Yadin's excavations are not included in the present catalogue (IN 1230-1174; 616-127). They are much too large to have been helmet carrying-handles and will be included in the copper alloy report.

161 Corbridge and Mainz am Rhine, cf. Robinson 1975, Figs. 79–80; South Shields, cf. Allason-Jones and Miket 1984, nos. 3:424–425.

162 Ulbert 1985, nos. 103–108.

163 *Masada* III, 449–450; Plans 17, 41.

**Handle IN 233-1920/1 (Pl. 11:4)**

This is a round-sectioned handle with ridged and grooved terminals. One arm is slightly twisted. For parallels see the previous object. It was found in a room used as a dwelling by the rebels.<sup>164</sup> A bow lath (IN 233-1857) and a *phalera* (IN 233-1911/6) were also discovered in this room.

Dimensions: length (distorted): 40 mm.; maximum width (distorted): 50 mm.; thickness of handle: 4 mm.

**Handle IN 1248-170/2 (Pl. 11:5)**

This is a slightly twisted, rhomboid-sectioned handle. The parts close to the ridged and grooved terminals have a round section. The object comes from casemate room L1248 in the southwestern section of the wall. The room was occupied at the time of the revolt.<sup>165</sup>

Dimensions: length: 41 mm.; width (external): 54.5 mm.; width (internal): 37.5 mm.; thickness of handle: 2–4.5 mm.

**Handle IN 1035-30/3 (Pl. 11:6)**

This is a rhomboid-sectioned handle with ridged and grooved terminals. It is wider than the other handles under discussion. It comes from a small room in the northwestern section of the wall that had clear evidence of rebel occupation.<sup>166</sup>

Dimensions: length: 31 mm.; width (external): 65 mm.; width (internal): 46 mm.; thickness of handle: 2–3 mm.

**Handle IN 542-836/1 (Pl. 11:7)**

This is a round-sectioned handle with ridged and grooved terminals. It comes from a service wing of the Western Palace that underwent changes during the time of the revolt. The room contained several typical installations from that period, including a stove and two *tabuns* (baking ovens).<sup>167</sup>

Dimensions: length: 36 mm.; maximum width: 48.5 mm.; thickness of handle: 5 mm.

**Handle IN 1021-1527/2 (Pl. 11:8)**

This is a round-sectioned handle with ridged and grooved terminals. It comes from a Byzantine residential unit.<sup>168</sup>

164 *Ibid.*, 570–571; Plan 2.

165 *Ibid.*, 461–462; Plans 42–43.

166 *Ibid.*, 425; Plan 36.

167 *Ibid.*, 316–318; Plans 17–18.

168 *Ibid.*, 434–435; Plan 38.

Dimensions: length: 37 mm.; maximum width (damaged): 40 mm.; thickness of handle: 4 mm.

**Handle** IN 232-2120/2 (Pl. 11:9)

This is a rhomboid-sectioned handle with ridged and grooved terminals. One arm is lost and the other is distorted.

Dimensions: length (damaged): 28 mm.; maximum width (damaged): 46 mm.; thickness of handle: 4 mm.

**Handle** IN 1045-1612 (Pl. 11:10)

This is a round-sectioned handle with one missing terminal. It comes from an elongated casemate in the northwestern section of the wall that yielded a rich assemblage of finds from the time of the revolt. A two-meter high conflagration layer, evidence of the intense fire that destroyed the room, contained many finds including about 70 *ballista* balls.<sup>169</sup>

Dimensions: length: 39 mm.; maximum width (damaged): 36 mm.; thickness of handle: 3.5 mm.

## SHIELDS

The remains of at least ten shields were found during Yadin's excavations.<sup>170</sup> The main assemblages come from three loci that contained rich collections of dumped objects. One set comes from the debris in Casemate Room L1039 (the "casemate of the scrolls"). The second group originated in Tower Room L1276 ("the tannery"). The third assemblage was found in L92—an open area ("the Northern Square") in front of the southern wall of the upper terrace of the Northern Palace, which was the focus of massive dumping activity.<sup>171</sup> In addition, a well-preserved painted fragment was found in one of the caves of the southern cliff—L2050.

Shields have rarely been found at Roman sites due to the perishable nature of the wood, cloth, leather and fibers from which they were made. Aside from the celebrated third century C.E. assemblage from Dura-Europos (Syria), the Masada collection represents the largest collection known in the

<sup>169</sup> *Ibid.*, 395–397; Plans 1, 34.

<sup>170</sup> Future study of the leather remains from Masada might reveal more shield fragments and other organic *militaria*.

<sup>171</sup> *Ibid.*, 112–114, Plans 2, 3.

Roman world.<sup>172</sup> The arid conditions at Masada (as at Dura-Europos) contributed to the preservation of the shields, including elements such as paint.

Two main types of shields are represented at Masada. The most common type is constructed of three layers of pressed wood or fibers, covered on both sides with leather. The shield from L1276, which had a rectangular form with leather binding, is very close in shape to the shields uncovered at Vindonissa (Switzerland). This type corresponds with the standard shield of the Legionaries—the *scutum*.<sup>173</sup> We note, however, that the corner of the leather facing (IN 1276-1785) is slightly rounded, as in the examples from Vindonissa, Doncaster (UK), and Roomburg (the Netherlands).<sup>174</sup> The fact that the well-preserved fragment of the *scutum* (IN 1276-1785) is constructed in the same manner as the rest of the associated fragments, including the use of vegetal fibers in the production of the board, suggests that they should all be identified as *scuti*. Some of the examples of this type had painted leather facing (IN 1039-139 and 1039-151).

A possible variant of this type found in L1276 and L2050 is characterized by the use of plywood planks instead of vegetal fibers. A copper alloy U-binding sheathed a board of two plywood layers laid at a 90° angle to each other (IN 1276–1802). These layers were coated on both sides by fibers (date palm?), which might have served as a base for leather facings. The fragment was too small to determine whether leather facings existed. Another specimen (IN 2050–11/4) consists of two layers of wooden planks with a pale fabric laid on top that was soaked with glue and acted as a binding agent for the painted leather facing. The group of shields that comes from Vindonissa is apparently constructed of light wood with a covering of linen and leather that was glued in place.<sup>175</sup>

In addition to the glue-soaked textile, a tiny copper alloy pin was used to attach the leather facing to the board of shield IN 2050-11. A unique construction method of wooden pins and accommodating

<sup>172</sup> Cumont 1926, 261–263; Hopkins 1931, 72, 74–75; Brown 1936, 456–63; Brown 1939, 328–331.

<sup>173</sup> Gansser-Burckhardt 1942, 74–79, Abb. 49–53.

<sup>174</sup> C. van Driel-Murray discusses the known archaeological representations of this type; see Driel-Murray 1999, 5, Fig. 8.

<sup>175</sup> Gansser-Burckhardt 1942, 73–89.

holes is visible on the plywood planks of shield IN 1039-61. The pins fastened the planks to each other.

From the above discussion, it is obvious that leather sheets were used as an integral part of the shield facings at Masada.<sup>176</sup> This clearly differentiates the Masada assemblage from those in the West, where leather fragments associated with shields are generally interpreted as covers. The different climatic conditions may account for this variation, as the arid climate in the East made the use of covering unnecessary. Flavius Josephus's account of the famine conditions in Jerusalem includes a reference to the use of leather facing for shield construction:

"Necessity drove the victims to gnaw anything, and objects which even the filthiest of brute beasts would reject they condescended to collect and eat: thus in the end they abstained not from belts and shoes and stripped off and chewed the very leather of their bucklers" (*BJ* VI.196-197).

The second type of shield represented at Masada is difficult to characterize, as only a few fragments are preserved. The seven fragments from L92 attest to the existence of a shield board constructed from relatively thick wooden planks. Because none of the edges is preserved, it is impossible to determine the exact outlines of the shield. However, the similarity of the fragments from L92 to the oval plank shields from Dura-Europos (see below) suggests that they belonged to an oval shield with leather edging.<sup>177</sup> These fragments would therefore represent the earliest examples of this type, antedating the Dura shields by some eighteen hundred years.

### Decoration

Other than applied red paint on three specimens, no definite decoration can be observed on the shields from Masada. The leather facing of IN 2050-11/4 was painted crimson red, and faint remains of red paint are visible on the facings of two additional shields (IN 1039-139 and IN 1039-151). Other leather facings might have been painted as well, but if so, the color perished long ago. The only examples of painted shields in the Roman world are from Dura-Europos.<sup>178</sup> A single example of a painted

shield dating to the Hellenistic period was unearthed at Ai Khanoum in Afghanistan.<sup>179</sup>

Several consecutive stitching holes on a leather facing from L1276 (IN 1276-1785) mark the outlines of an *ansata* appliqué (no longer preserved), which, based on complete parallels from the West, would have indicated the unit designation.<sup>180</sup> An embossed strip on the face of a large shield fragment (IN 1039-139) could have been an ornament, though it seems more appropriate to interpret it as an imprint of a reinforcing bar.

### Edging Techniques

Most of the shields' perimeters are not preserved. The meager evidence that is available indicates that two different methods were used for the shields' edging. There are two distinct examples of leather binding along the shields' perimeter. In addition, copper alloy U-sectioned bindings are attested at Masada. Flat-headed, copper alloy nails fastened the binding to the shield board. The nails were inserted through holes pierced in the binding rather than through lobate expansions that extended from the binding, which was a more popular method in the Roman West.<sup>181</sup>

### Bosses and Gripping Devices

There is no record of bosses at Masada, nor did any evidence of gripping devices come down to us. A fragment of a reinforcement bar was unearthed (IN 1103-1751) and a narrow and elongated impression observed on the leather layer of a shield might provide further evidence (IN 1039-139; see below).

### Shield fragment IN 1039-139 (Pl. 12:1-2)

This fragment is preserved for a maximum length of 580 mm. and a maximum width of 330 mm. It consists of three thin layers of pressed wood or plant fibers (apparently date palm), with both sides covered with leather. One question concerns which of the leather facings was the front and which was the back. The answer appears to be indicated by a faintly impressed empty strip (20 mm. wide, preserved for a length of 480 mm.) that is discernible on

176 For a glued cover from Vindonissa, see *ibid.*, 74.

177 Brown 1939.

178 Cumont 1926, 262-263, Rostovtzeff *et al.* 1936, 327-337; Rostovtzeff, Brown, and Welles 1939, 326-369, 456-466.

179 Bernard 1973.

180 Driel-Murray and Gechter 1983, 35-36; Driel-Murray 1999, Fig. 3.

181 Bishop and Coulston 1993, 82. For similar binding see Groenman-van Waateringe 1967, 72, Fig. 18.

one of the leather facings. It could represent decoration, as in the case of the leather coverings of the shields from Vindonissa which are marked by faint impressions that originally bore applied decoration.<sup>182</sup> However, it seems to have had a more practical function than the decoration on the shields from the Roman West. At Vindonissa, a long impressed strip on one of the leather facings was identified as the imprint of the shield's reinforcing strip.<sup>183</sup> The length and straight, elongated shape of the element on the Masada shield compares well with the Swiss example, suggesting that this leather covering was the rear facing. A close examination of the other facing layer reveals the remains of red paint. This appears to accord with the reinforcing bar imprint mentioned above, which identifies the covering it appears on as the rear facing. In addition, the latter exhibits no traces of paint. Thus, the front facing was apparently painted red (similar to IN 2050-11/4), while the rear facing was not subjected to any additional treatment other than the attachment of the reinforcing strip.

It is impossible to determine the shape of the shield, due to the absence of preserved edges. Nevertheless, the construction method, which resembles that of IN 1276-1785, clearly suggests that this is a *scutum* fragment (see the discussion above). The alignment of the wooden or fiber layers appears to follow the standard arrangement. The medial layer of IN 1039-139 is laid at a 90° angle to the front and back layers, a common arrangement that provided the shield with better resistance to missiles.

Dimensions: 580×330 mm.; thickness of leather facings: 1 mm.; thickness of wooden layers: 0.5-1 mm.

**Shield fragments IN 1039-124 (?)** (not illustrated) Notes describing shield fragments from L1039 were made by Magness a number of years ago. Since then, the fragments have been lost or misplaced, and their exact context is unclear. Perhaps they come from basket 124, where the notes list shield fragments of plywood and leather.

There were three pieces of wood, one of which was just a plain irregular plank 160 mm. long×30 mm. wide×5 mm. thick (maximum dimensions). The other two pieces of wood were covered with

what appeared to be bitumen, to which pressed wood or fibers and leather still adhered. The maximum dimensions of these two pieces of wood were 190 mm.×70 mm.×1 mm., and 15 mm.×6.4 mm.×1 mm.

**Fragments of shield board IN 1039-61 (Pl. 13:1)** Aside from the fragments mentioned above (perhaps from basket 124), some fifteen shield fragments of plywood are reported from L1039. They were all registered under one number and, according to the basket list, were identified by the excavators as fragments of the room's ceiling. The locus card notes that the fragments were stratified directly under the uppermost collapse of the walls, at the top of the rich layer of dumped material that included scrolls, papyri, a hoard of 17 silver coins and numerous other objects, most notably organic finds.<sup>184</sup>

Although the fragments vary in the size, all were worked, as indicated by the small attachment holes for wooden pegs, by the tool marks visible on some, and by the beveled edges of three fragments. Because some of the fragments were mended together, it is reasonable to assume that they all belonged to one board. If this is indeed the case, we can get a good idea of the shield's appearance.

One fragment is of particular importance, as it has two layers laid at right angles to each other. The layers were strengthened by means of a unique constructional feature—fastening minute wooden pegs that were inserted through small holes. Such holes are visible on several more fragments of this group. This method recalls the use of small copper alloy nails for a similar purpose on shield fragment IN 2050-11/4 (see below).

None of the plywood strips is preserved to its complete length. Only one fragment appears to display its original breadth: 70 mm. A comparison with the Republican shield from Qasr el-Harit, Fayum (Egypt)<sup>185</sup> indicates that our fragment should be associated with the vertical strips.

Three pieces have bevelled edges, indicating that the shape of the shield was somewhat oval. There is no evidence for the existence of stitching holes or any other sort of binding along the edges. The thickness of the fragments varies from 1.5 mm.

182 Gansser-Burckhardt 1942, 76-89.

183 See *ibid.*, Abb. 56-57; Bishop and Coulston 1993, 82.

184 *Masada III*, 416-422, Plan 36.

185 Kimming 1940.



## THE MILITARY EQUIPMENT FROM MASADA

to 3 mm. The fragments belonging to the edges are 3 mm. thick.

To summarize, IN 1039-61 consists of fragments of an oval shield that was constructed from at least two layers of plywood strips. The strips were arranged at right angles to each other. We have no information regarding the facing of the plywood body or the manner in which the edges were bound, if at all.

IN 1039-61/1 (Pl. 21:3)

Dimensions: 59×79 mm.; thickness: 1.5-2 mm.

IN 1039-61/2 (Pl. 21:4)

Dimensions: 142×40 mm.; first plank: 142×30 mm.; thickness of first plank: 1.5 mm.; second plank: 40×28 mm.; thickness: 1-1.5 mm.

IN 1039-61/3 (Pl. 21:5)

Dimensions: 103×31 mm.; thickness: 1.5 mm.

IN 1039-61/4 (Pl. 21:1)

Dimensions: 172×101 mm.; first plank: 172×52 mm.; thickness 1.5 mm.; second plank: 101×40 mm.; thickness: 1.5 mm.

IN 1039-61/5 (Pl. 21:2)

Dimensions: 120×71 mm.; thickness: 3 mm.

IN 1039-61/6

Dimensions: 136×29 mm.; thickness: 15 mm.

IN 1039-61/7

Dimensions: 143×34 mm.; thickness: 2 mm.

IN 1039-61/8

Dimensions: 142×73 mm.; thickness: 2 mm.

IN 1039-61/9

Dimensions: 136×47 mm.; thickness: 2 mm.; diameter of attachment hole: 1 mm.

IN 1039-61/10 (edge)

Dimensions: 90×21 mm.; thickness: 2 mm.; diameter of attachment hole: 1 mm.

IN 1039-61/11 (edge)

Dimensions: 106×20 mm.; thickness: 3 mm.

IN 1039-61/12 (edge)

Dimensions: 109×22 mm.; thickness: 2.5 mm.

IN 1039-61/13

Dimensions: 120×54 mm.; thickness: 2 mm.

IN 1039-61/14

Dimensions: 93×33 mm.; thickness of first plank: 1.5-2 mm.; diameter of attachment hole: 1 mm.; second plank: 17×18 mm.; thickness of second plank: 1 mm.

IN 1039-61/15

Dimensions: 82×25 mm.; thickness: 1 mm.

**Fragment of bound shield board** IN 1039-151 (Pl. 13:2)

Described in the basket list as "wood nailed with bronze," this is a small, poorly preserved fragment of a shield board, the edge of which is bound by copper alloy U-binding. The body consisted of at least two plywood layers: the front layer is vertically aligned with the binding, and the rear layer is laid at a right angle to it. On the uppermost layer are remains of a thin leather facing. This parchment-like layer is dyed red. Other shield fragments from Masada with red paint adorning the front leather facing come from L2050-11/4 and L1039-139.

The fragment has three copper alloy nails, one of which is still fastened to the fragmentary binding. The tips of the nails' shanks are bent, indicating that the original thickness of the shield's body was 7 mm., and verified from a tiny preserved fragment.

Dimensions: 110×35 mm.; length of U-binding (damaged): 35 mm.; width of U-binding: 12 mm.; diameter of nail head: 6 mm.; thickness of shield board: 7 mm.

**Fragments of two shields from L92** (Pls. 14-15)

The second group of fragments comes from L92, the open square to the south of the Northern Palace. As noted above, a rich assemblage of finds was dumped there. A total of eight fragments represent the remains of two shields.

The largest fragment belongs to the first shield (Pl. 14:1-2). Its maximum dimensions are 290 mm.×215 mm. This fragment is made of three layers of pressed wood or fibers laid at right angles to each other. These layers are covered on both sides with leather facings that have no trace of decoration. A small section of the shield's edge that is 60 mm. long has survived, featuring a leather binding. The shield is edged by a bound hem: a leather strip, about 26 mm. wide, that was folded over and stitched to the perimeter of the shield. One line of stitching holes was pierced through the leather facings and three layers of pressed wood or fiber, corresponding with the holes in the binding strip. Four holes, 9 mm. apart, with the stitching threads still in place, are visible. The shield maker used two threads simultaneously for sewing the binding, executing a running stitch. This method was also employed on shield IN 1276-1785, which differs from the shield under discussion in using thin leather strips for the stitching (see below).

A pair of leather bands pierces the shield's wooden body, some 140 mm. from the above-mentioned edge. The exact nature of this feature is not clear. Due to the state of preservation it is impossible to determine whether the bands pierced the leather facing as well. If the answer is negative, the bands may have served as a means of stabilizing the wooden part of the shield, which was later concealed by the coverings. However, if the bands run through the exterior leather layers, creating two adjacent loops, they could have functioned as a sort of clasp. The latter might have held a carrying strap or gripping device. Two fragments of a corded strap were included in the same basket. If they are associated with the shield fragment, they could represent a corded gripping device, though this is highly speculative. Some chunks of what appears to be bitumen adhere to a small section of the exterior face of one of the leather layers. They do not appear to be part of the original structure of the shield.

The remains of the second shield from L92 consist of seven wooden plank fragments (Pl. 15:1-2). Tool marks are visible on some of the fragments. The thickness of the planks ranges between 5 and 6 mm. There is no evidence that this shield was constructed from more than one layer of wooden planks. The planks were presumably glued to each other. It is difficult to determine its outlines, as none of the fragments belongs to the shield's edge. Nevertheless, its structure is very similar to that of the celebrated oval wood plank shields from Dura-Europos, suggesting that the second shield from L92 had an oval shape. The question of facing is even more puzzling. Three of the fragments bear chunks of a bitumen-like substance. However, as in the case of the first shield from L92, this might have nothing to do with the original facing of the shield. This is because this material is not proven to be a constant coating layer. In addition, the other four fragments show no signs of such a treatment. It is therefore reasonable to assume that this material originated in a post-depositional process connected with the extensive dumping activity that took place in L92. Nevertheless, a small copper alloy nail that is attached to one of the fragments might hint at the existence of leather covering. This assumption is based on the small copper alloy nail on the fragment from L2050-11/4, which was used to secure the leather covering to the shield's body.

The measurements of the fragments are:

130×61 mm.; thickness: 5 mm.

150×71 mm.; thickness: 5 mm.

258×34 mm.; thickness: 6 mm.

249×28 mm.; thickness: 5 mm.

150×60 mm.; thickness: 5 mm.

145×34 mm.; thickness: 5 mm.

164×27 mm.; thickness: 5 mm.

#### **Shield fragment IN 1276-1785 (Pls. 16-18)**

The most distinctive shield remains were unearthed in L1276 ("the tannery"). Two large fragments of leather front facing and some nine smaller segments with remains of attached wood and vegetal fiber layers were found in this locus. The box that contained these fragments was labeled "leather shirt." In addition to the existence of another shield from Masada, the main interest lies in the fact that parts of the edges of both fragments have survived, allowing us to reconstruct or identify its shape. It is not certain whether both fragments belong to the same buckler, since mending the two together proved impossible. However, they were registered under the same basket number and have very similar characteristics.

The first large fragment, with maximum dimensions of 300×210 mm., was torn from the curved section of a shield. Its apex is very slightly curved—actually, almost straight—while the side appears to be straight. Judging from its outlines and dimensions, and based on comparisons with western examples, it is clear that this fragment represents the corner of a rectangular shield. This type is reported from Vindonissa (Switzerland), Doncaster (UK), and Roomburg (the Netherlands).<sup>186</sup> The fragment had leather binding that was ripped from the main body, as indicated by the remains of the stitching holes. In all likelihood, a bound hem edged the shield, as can be seen on the second fragment and on shield IN 1039-139. The shield's facing is covered with numerous straight scratches that might be the result of combat or simply usage. Two parallel impressions run horizontally across the width of the fragment, 200 and 240 mm. below its apex. Their nature is obscure, and we should not rule out the possibility of post-depositional processes as their cause. The back of the fragment exhibits the remains

<sup>186</sup> For Vindonissa, see Gansser-Burckhardt 1942, 74-81; for Doncaster, see Buckland 1978; for Roomburg, see Driel-Murray 1999.

## THE MILITARY EQUIPMENT FROM MASADA

of the plywood layer to which it was most probably glued. Between the leather facing and the plywood layer, scant remains of vegetal fiber layers are visible. The latter functioned as an attachment agent, like the textile layer identified on shield IN 2050-11/4. This layer is clearly recognizable on the second large fragment (see also below IN 1276-1802).

The second substantial fragment measures 460×390 mm. A fine example of leather binding (150 mm. long) is preserved. A leather thread was used for its stitching. A rare example of stitching holes arranged in a square is visible on the damaged edge of the facing, no doubt representing the remains of an *ansata* applique (ca. 75×28 mm.). Unfortunately, no sign of letters is discernable. Parallels from the West that retain *ansatae* suggest that our fragment constituted part of the upper left segment of the leather facing. The fragment's back exhibits remains of the wooden layers.

Several more fragments of the same board were recovered. Their measurements are:

- 240×120 mm.
- 160×70 mm.
- 78×97 mm.
- 120×130 mm.
- 61×66 mm.

### **Shield fragment** IN 2050-11/4-3 (Pls. 19-20)

This exquisitely preserved fragment (2050-11/4) comes from a cave in the south cliff of Masada.<sup>187</sup> Its facing consists of a very thin layer of animal skin. The skin was painted crimson red, like that of the leather scabbard discussed above (see above IN 1244-210). It was laid on top of a glue-soaked, khaki colored textile. The textile is glued to the wooden board of the shield, which is constructed of two layers of plywood. Each of the plywood layers is 2.5 mm. thick. The outer layer was laid at a 90° angle to the inner one; the latter is too small to determine its original orientation. The plywood layers were attached using glue and tiny copper alloy nails. One headless nail visible in the upper layer has a stem just long enough to pierce two plywood layers. The length of the stem suggests that there were only two wooden layers instead of the more common three. The method of construction used for this shield is remarkably close to that found in

Polybius's description of the *scutum*: "It is made of two planks glued together, the outer surface being then covered first with canvas and then with calfskin" (*The Histories* VI.23.3). An additional small leather fragment of the frontal facing (2050-11/3) is preserved. This very thin fragment was found detached from the main body and the paint is now lost.

The arrangement of the wooden layers strengthened the shield's durability against missiles. The textile layer provided additional reinforcement, although its primary task was to bind the facing skin and the plywood boards. In the Roman period the only apparent parallel to the painted leather facing outside Masada comes from the rich assemblage at Dura-Europos.

Dimensions (2050-11/4): 129×67 mm.; thickness: 5 mm.; upper plank: 55×64 mm.; thickness of upper plank: 2 mm.; lower plank: 94×16 mm. and 129×22 mm.; thickness of lower plank: 2-2.5 mm.

Dimensions (2050-11/3): 36×39 mm.; thickness: ca. 0.5 mm.

### **Shield binding** IN 1276-1802 (Pl. 22:1)

Two fragments of copper alloy U-binding are recorded from L1276. The large fragment consists of two plywood layers that are covered on both sides by layers of vegetable fibers (presumably date palm). The fibers were soaked in glue to facilitate the attachment of the leather facing to the wooden board. Due to the dimensions of the fragment and its state of preservation, it is impossible to determine whether leather facings covered the board. Two copper alloy nails attached the U-binding to the board. The shanks of the nails were bent over the rear face of the binding.

The small fragment is poorly preserved. Two wooden layers and fragmentary copper alloy U-binding with one copper alloy nail still in place can be discerned.

Dimensions of the large fragment: 67×20 mm.; length of binding (damaged): 67 mm.; width of binding 15 mm.; width of binding (unfolded): 29 mm.; diameter of heads of nails: 7-8 mm.; thickness of wooden layer: 2 mm.

Dimensions of the small fragment: 51×15 mm.; thickness fragment: 6 mm.; diameter of head of nail: 6 mm.

### **Shield binding** IN 1276-2268/1 (Pl. 22:2)

Additional copper alloy binding was unearthed in

<sup>187</sup> L2050—not included in *Masada* III.

L1276. Preserved for a length of 240 mm., the structure of this U-binding is flimsier than in the previous specimen. The edge of the bindings is slightly folded over. Eight attachment holes are spaced along the piece, one of which contains the flat headed copper alloy nail. The distance between the holes ranges between 27 mm. to 32 mm.

Dimensions: length (damaged): 240 mm.; width 20 mm.; width (unfolded): 40 mm.; diameter of head of nail: 5 mm.

**Shield reinforcement bar** IN 1103-1751 (Pl. 22:3) Iron bars were frequently used to reinforce the shield's board. The bars added strength to its structure and provided further durability against breakage. We point to the existence of two possible types of bars: the central and the circumferential bars, presumably in accordance with the shape of the shield. The initial type formed part of the gripping device, with its arms extending beyond the *umbo* providing added strength to the axis of the board. Arms that terminate in a bent T-like element are depicted on the rear face of a shield on Trajan's Column (scene LXXII),<sup>188</sup> Such objects were found in Newstead<sup>189</sup> and Vindonissa,<sup>190</sup> the impression of which is visible on a shield hide from Vindonissa.<sup>191</sup> It seems that such metal bars may have been attached not only to the front face of the shield but to its rear. At least part of the metal decorative elements of the front face (the Doncaster shield) so commonly depicted in the imperial propaganda monuments (e.g., the arch at Orange in France), may have had a strengthening function as well. If this notion is correct, the above noted impressed hide from Vindonissa should be identified as the face of the board rather than a shield's cover. The second type of bars, iron reinforcement bars with flat circular terminals are reported from Bonner Berg (Germany),<sup>192</sup> Rheingönheim (Germany),<sup>193</sup>

188 Cichorius 1896, Taf. LII, Cast 185. Such objects were found in Newstead (Curle 1911, 182, Pl. 34.2, 4, 5) and Vindonissa (Unz and Deschler-Erb 1997, 27, Nos. 559, 560, 562, 564, Taf. 25—with bibliography).

189 Curle 1911, 182, Pl. 34.2, 4, 5.

190 Unz and Deschler-Erb 1997, 27, Nos. 559, 560, 562, 564, Taf. 25—with bibliography.

191 Gansser-Burckhardt 1942, Abb. 56-57.

192 Driel-Murray and Gechter 1983, 59, Taf. 16:28).

193 Ulbert 1969, 52, Taf. 47, 1-4.

Hofheim (Germany),<sup>194</sup> Hod Hill (UK),<sup>195</sup> and Bar Hill.<sup>196</sup>

Dimensions: length: 486 mm+ (333+153 mm.); width: 16 mm. (terminal: 18 mm.); thickness: 2 mm.; diameter of pins heads: 12, 13, 12-15 mm.; weight: 103.27 gm.

## ARROWHEADS AND ARROW SHAFTS

Hundreds of arrowheads were found in the excavations at Masada (see Pls. 23-26).<sup>197</sup> With one exception, all are of iron and are of the same general type. The arrowheads are trilobate in section, have barbed wingtips, and have a tang that was inserted into a wooden foreshaft. Within this general type there is great variation in the size of the head, the relation of the length of the head to the maximum width of the head (at the tip of the barbs), the length and form of the barbs, and the length of the tang. The variations in proportions can be illustrated by the following arrowheads:<sup>198</sup>

Short, wide point:

IN 1-82 (1.7×1.3 cm.) (see Pl. 23:2)

IN 5-27 (2.4×1.4 cm.)

Medium long, medium wide point:

IN 126-237/3 (2.8×1.5 cm.)

Medium long, wide point:

IN 126-306 (3.0×1.3 cm.)

IN 234-1977/1 (3.2×1.5 cm.) (see Pl. 23:6)

Long, wide point:

IN 338-363 (4.5×2.0 cm.)

194 Ritterling 1913, 144, Taf. XVIII, 1-17.

195 Manning 1985, 147, T9-10.

196 Robertson, Scott and Keppie 1975, 100, Fig. 33, 19.

197 Because many of the arrowheads have disintegrated into small fragments, it is impossible to establish the original number represented. All of the iron fragments that could be identified as belonging to arrowheads are listed and described in the catalogue at the end of this chapter.

198 The distinctions between these arrowheads are subjective and are presented here solely for descriptive purposes. The measurements given are for the point alone, and do not include the tang. As in the case of the other objects, the locus number is provided first, followed by the registration number (for example, in the case of IN 1-82, 1 is the locus number and 82 is the registration number).

## THE MILITARY EQUIPMENT FROM MASADA

IN 401-1397/1 (4.0×1.8 cm.) (see Pl. 23:4)

Long, medium wide point:

IN 126-237/1 (3.5×1.4 cm.) (see Pl. 23:5)

IN 126-306 (4.4×1.8 cm.)

Long, narrow point:

IN 8-199/1 (3.1×1.1 cm.) (see Pl. 24:1)

IN 189-1480 (2.7×1.2 cm.)

Long, very narrow point:

IN 5-148 (2.9×1.0 cm.)

The variations in the relative proportions of the arrowheads do not appear to have chronological or typological significance. Instead, they should be attributed to the fact that the arrowheads were individually forged and not manufactured in moulds.<sup>199</sup> The diversity in the sizes and shapes of the iron arrowheads contrasts sharply with the uniformity of the bronze scales, which were pounded from cast sheet metal.<sup>200</sup>

Many of the arrowheads are badly corroded, and where the weight of the head is provided, the relative degree of corrosion is indicated.<sup>201</sup> Most of them presently weigh between 1.50–5.00 gm., though the heavier specimens can weigh over 7 gm. (see for example IN 441-1115 and 401-1397/1). The heaviest arrowhead in the group weighs just over 10 gm. (IN 338-363). The relative lightness of the arrowheads indicates that they were all probably shot from manually-powered bows instead of from catapults.<sup>202</sup> An analysis of one of the arrowheads from Masada has shown that it was not subjected to any special heat treatment, such as quenching or tempering, and is therefore fairly soft (4 on Moh's scale). In fact, although this arrowhead could have been effective against animals or humans protected by leather armor, it would have been incapable of penetrating scale or metal armor.<sup>203</sup> This is surprising in view of the fact that at least some of the soldiers at Masada (Romans and Jewish rebels) were protected by suits of metal armor.<sup>204</sup> Knox *et al.* suggested that the shape and use of the arrowheads may have compensated for their relative softness, though Coulston has

pointed out that the barbed, trilobate form is not necessarily the best type for armored targets.<sup>205</sup> Alternatively, the arrowheads may have been intended to inflict wounds on those soldiers not protected by scale or metal armor, while other types of weapons (such as catapult projectiles) could have penetrated metal armor. However, this is unlikely in view of the absence of objects from Masada which can be identified as catapult projectiles and in light of Coulston's statement that the Roman targets at Masada would have worn metal armor.<sup>206</sup> On the other hand, even a suit of metal armor leaves certain parts of the body exposed and vulnerable. The fact that the arrowhead from Masada was not specially heat treated accords with evidence from England that suggests that the technical level of smithing in the Roman period was low and that quench hardening was not widely practiced.<sup>207</sup> If the arrowhead was manufactured in the vicinity of Masada, considerations of water conservation may have dictated the decision to forego quenching (see the discussion of evidence for iron smithing at Masada below).

Barbed iron trilobate arrowheads with tangs are recorded from Roman sites (especially forts and military camps) throughout Europe.<sup>208</sup> Although this type of arrowhead first appeared prior to the Roman Imperial period, it was most common during the time of the Empire.<sup>209</sup> In Israel, a large number of iron arrowheads contemporary with those from Masada has been found at the site of Gamla (Gamala) in the Golan.<sup>210</sup> Other arrowheads of this type come from caves in the Judean Desert which were occupied at the time of the Bar Kokhba Revolt.<sup>211</sup> Sixty barbed iron trilobate arrowheads were found at Horvat 'Eqed, in contexts dating from the late Hellenistic period to the Bar Kokhba Revolt.<sup>212</sup>

205 Knox *et al.* 1983, 100; Coulston 1985, 268.

206 *Ibid.*

207 Lang 1988, 201.

208 Davies 1981 and Erdmann 1976 furnish lists of references to barbed iron trilobate arrowheads found at Roman sites in Europe. A discussion of this topic appears in Coulston 1985, 264–270; also cf. Bishop and Coulston 1993.

209 Erdmann 1976, 6, Davies 1981, 258, 265; Manning 1985, 177–178; Coulston 1985, 264.

210 Gutman 1981, 36–40.

211 Yadin 1963, 91; Aharoni 1961, 19–20; Avigad 1961, 10; Avigad 1962, 178.

212 Gichon and Vitale 1991.

199 Knox *et al.* 1983, 100.

200 Maddin *et al.* 1983, 109.

201 Many of the badly corroded arrowheads were not weighed.

202 Cf. Erdmann 1982, 6.

203 Knox *et al.* 1983, 99–100.

204 Coulston 1985, 268; and see the discussion of scale armor above.

Barbed iron trilobate arrowheads with tangs occur alongside socketed iron arrowheads at Dura-Europos in the third century C.E.<sup>213</sup>

The only arrowhead from Masada which differs in type from the rest is a bronze trilobate arrowhead with a socket, in an excellent state of preservation (IN 1169-1552; see Pl. 23:1). This type, which is sometimes called a “Scythian arrowhead,” is generally earlier in date than the barbed iron trilobate arrowheads with tangs.<sup>214</sup> Bronze trilobate arrowheads have been found in Israel at ‘Atlit and in the Citadel in Jerusalem in contexts dating to the Persian and Hellenistic periods.<sup>215</sup> Although this arrowhead should be ascribed on typological grounds to the Hasmonean or possibly Herodian phase of occupation at Masada, it apparently derives from a rebel context, indicating that it was used at the time of the revolt.<sup>216</sup> However, the arrowhead could have been manufactured at an earlier date. As mentioned above, Josephus (*BJ* VII.299) records that the Jewish rebels found a great store of arms that had been stockpiled by Herod when they took over the fortress (and see the conclusion below). This arrowhead may therefore have its origin in the Herodian period, or perhaps represents a relic from the Hasmonean phase of occupation.

The largest concentration of arrowheads comes from the Western Palace (L442, 456), where over two hundred were found. Both loci are rooms in the central wing of the Western Palace that were filled with a collapse of stones. Beneath the collapse were clear signs of a conflagration, and there was also evidence for rebel occupation. The arrowheads in L442 were found together with a large quantity of iron fragments and pieces of blue, orange and yellow slag in the center of a hearth about half a meter in diameter in the southwestern part of the room.<sup>217</sup> The arrowheads in L456, the southern half of which was paved with an elaborate mosaic floor, also lay in a hearth that was located in the northeastern half of

the locus, by Wall 458. A large quantity of charcoal and the remains of arrow shafts were found together with the arrowheads. The intensity of the heat from the hearths had whitened the areas surrounding them.<sup>218</sup> This evidence suggests that these rooms served during the time of the revolt as workshops (*fabricae*) for the forging of iron arrowheads.<sup>219</sup> Josephus (*BJ* VII.299) relates that in addition to a store of arms, Herod left a supply of iron, brass, and lead in his fortress on Masada. It is likely that the rebels used the raw materials they found to manufacture some of their own weapons.

Smithing furnaces occur in a variety of shapes and sizes and, unlike smelting furnaces, they do not have to be dug into the ground or covered.<sup>220</sup> The smith needs only a tuyère held down by a stone, a bellows, and a pile of charcoal. Once the pile of charcoal is ignited with air from the bellows, the piece of iron to be worked is placed in the charcoal near the tuyère. A temperature of up to 1,200 degrees Celsius can be reached in this type of forge.<sup>221</sup> Flat, simple hearths that could have been used for various purposes, such as crucible smelting and iron smithing, have been found at many Roman sites.<sup>222</sup> Bishop has noted that it is difficult to identify *fabricae* with certainty, as they are often located in buildings that had another primary function and because the evidence for industrial activity is seldom obvious.<sup>223</sup> One example of a site where industrial activity appears to be evident is Corbridge (UK), where arrowheads and other types of iron weapons and tools, and pieces of iron slag and scalings were

213 Hopkins 1932, 79; Brown 1936, 453–454.

214 Coulston 1985, 264; Erdmann 1976, 6; Davies 1981, 260; Gichon and Vitale 1991, 256.

215 Johns 1933, 55–56; Johns 1950, 130.

216 For L1162 cf. *Masada* III, 513–514, where, however, the context of this arrowhead is not described.

217 *Ibid.*, 285–286. According to the locus card, pieces of slag were sent for analysis, but all record of them has since been lost.

218 *Ibid.*, 249–250.

219 The suggestion that these loci served as workshops for the manufacture of iron arrowheads was first made by Amnon Ben-Tor, the area supervisor at the time of the excavation, who recorded this observation on the locus cards. However, Yadin interpreted the remains in these two rooms as piles of arrows that the Jewish rebels set on fire just before committing suicide (contrary to the statement in *Masada* III, 285, that, “It was the excavators’ impression that a blacksmith once worked here”). In preparing this material for publication, Magness independently reached Ben-Tor’s original conclusion; cf. Magness 1992. Nevertheless, the presence of arrow shafts with the arrowheads suggests that these objects were deliberately collected here.

220 Tylecote 1980, 193, 232.

221 *Ibid.*, 211.

222 *Ibid.*, 201; MacMullen 1960, 29, 39.

223 Bishop 1985, 5.

## THE MILITARY EQUIPMENT FROM MASADA

found alongside hearths and tempering tanks in a workshop complex.<sup>224</sup>

In light of the difficulty of identifying industrial workshops, the evidence for metalworking in L442 and L456 at Masada is compelling. It includes the hearths, charcoal, arrowheads and arrows, pieces of slag and scraps of iron. In addition, an iron tool with one flat face and one pointed end which may be a smith's hammer was found in L448, a room located between L442 and L456.<sup>225</sup> Bishop cites the presence of smiths' tools as a type of indirect evidence for the identification of a *fabrica*.<sup>226</sup> The choice of L456, with its mosaic floor as the site of a smithy operated by the rebels, at first appears to be puzzling, though the hearth was located on the side of the room not paved with mosaics. However, the selection of this room and L442 can be understood in light of their proximity to the small bathhouse in this part of the palace, whose pools could have been used for the quenching and tempering of the iron.<sup>227</sup> The arrowheads manufactured by the rebels are of the characteristic Roman barbed iron trilobate type. It is thus possible that the arrowhead analyzed by Knox *et al.* represents a rebel product.<sup>228</sup> However, that arrowhead more likely is a Roman product, as it comes from the lowest terrace of the Northern Palace (L9; see discussion below), not the Western Palace. The relative softness of the arrowhead may reflect the low technical level of Roman smithing. If some of their targets were not protected by metal armor, the Romans may have decided to forego the process of quenching the iron. Such a decision might also have been dictated by considerations of water conservation.

Another 80 arrowheads lay on the lowest terrace of the Northern Palace (L8, 9, 10), in the area around the cold water pool of the small bathhouse (see Pls. 24:1-4, 6; 25-26). They were found with a rich collection of objects from the time of the revolt in a

great dump or collapse of earth and stones. Most of the objects come from L8 (the *frigidarium*) and L9 (the *tepidarium*). The fact that the frequency of the finds in L8 decreased towards the bottom of the pool suggests that they were gradually washed in after the vaulted roof, which blocked the fall of masonry from the upper storey, collapsed.<sup>229</sup> In addition to the arrowheads, several arrow shafts and about 340 scales of armor were found in these three loci (see the discussion of scale armor above). The remains of three human skeletons were discovered beneath the debris close to the bottom of the cold water pool.<sup>230</sup>

A fragment of a barbed, trilobate, iron arrowhead with its tang embedded in a wooden shaft was found in L1273 (IN 1273-1730; see Pl. 24:5). This locus was a narrow strip outside the entrance to tower room L1264, along the casemate wall by the Western Palace.<sup>231</sup> The remaining part of the arrowhead consists of the lower part of one of the wings, and the tang. The shaft is 14.6 cm. long×0.9 cm. wide. The top of the shaft is flat and is cracked on one side where the arrowhead is still embedded. The cracked shaft may be the result of faulty manufacture or of use.<sup>232</sup> The bottom of the shaft is uneven, though on one side it is clearly shaved to taper for a distance of 0.5 cm. from the bottom of the shaft. A large piece of wood (1.8 cm. long×0.5 cm. deep) is missing from one side of the shaft. Impressions of binding are still visible wound around the top of the shaft. The strips of binding were about 0.1 cm. wide and were spaced about 0.2-0.3 cm. apart, to at least a distance of 2.5 cm. from the top of the shaft. Within this space, the binding was wrapped five times around the shaft. The tapered end of our shaft indicates that it is a wooden foreshaft similar to others from the time of the Bar Kokhba Revolt found in the caves of the Judean Desert. Coulston noted that the two-part construction of such arrow shafts, with a wooden head or foreshaft and a lower half of reed,

224 Coulston 1985, 265; MacMullen 1960, 28.

225 Cf. Manning 1985: 5-6; Kretzchmer 1983, 10-11; Neuburger 1919, 53. A sketch of the hammer appears on the locus card for L448, but the hammer itself could not be located. It is mentioned in *Masada* III, 255, as an "iron tool."

226 Bishop 1985, 7.

227 Cf. Coulston 1985, 265; Bishop 1985a, 4, 5; MacMullen 1960, 27, 28.

228 Knox *et al.* 1983, 98-100; cf. discussion above.

229 *Masada* III, 166-168.

230 For a reevaluation of the number and identity of these skeletons, cf. Zias 1998.

231 *Ibid.*, 450. Photographs of more two arrowheads from L9 (IN 260-1 and 260-2) still embedded in their original wooden shafts exist, but the objects are now missing. From the photographs it appears that the construction and binding of the missing shafts are the same as the one from L1273.

232 Cf. Gichon and Vitale 1991, 251.

is unusual.<sup>233</sup> Our shaft appears to represent the first published example of this type from a context dating to the time of the First Revolt.

## BOWS

Three pieces of worked bone belonging to bows were recovered at Masada (see Pl. 27). Two come from the cistern in L162 in Building 7 (see the scale armor from this locus above), and the third is from L233, an area next to Building 8 with clear signs of rebel occupation.<sup>234</sup> The three pieces, which are very slightly curved, are:

- 1) IN 162-146; a complete upper bone ear lath, 15 cm. long×1.5 cm. wide (at the top), tapering to 1.0 cm. wide at the bottom (see Pl. 27:1). It is 0.3 cm. thick at the top, and 0.2 cm. thick at the bottom. A 0.7 cm. deep “U-shaped” nock is cut into the back of the lath at a distance of 2.0 cm. from the slightly rounded upper end. The left side is smooth and convex, and the right side is flat and bears scoring and saw-marks. The lower tip displays a “laterally sawn section,” as described by Coulston.<sup>235</sup>
- 2) IN 162-146; a bone “middle” ear section, measuring 6.0 cm. long×1.1 cm. wide, and 0.4 cm. thick, broken at either end (see Pl. 27:3). It could have been paired with the first fragment, as its right side is smooth and convex, while the left is flat and scored.
- 3) IN 233-1857; an almost complete lower bone ear lath, 14.0 cm. long×1.6 cm. wide at the top, tapering to 1.2 cm. wide at the bottom, where it is broken off (see Pl. 27:2). A 0.7 cm. deep semi-circular nock is cut into the back side at a distance of 1.7 cm. from the rounded end of the lath. At its rounded end the lath is 0.1 cm. thick, and at the broken end it is 0.4 cm. thick. Light, diagonally-striated lines are visible on the convex left side, while the right side is flat and scored. Though it is technically possible that this lath belonged to the bottom part of the same bow

233 Cf. Coulston 1985, 267–268; Yadin 1963, 91; Avigad 1961, Pl. 18:C.

234 *Masada* III, 569–571.

235 Cf. Coulston 1985, 224.

as the other two pieces, its provenience makes this unlikely.

According to Coulston, Palestine was one of the most active areas in bow construction in the Roman East.<sup>236</sup> However, no laths from Palestine appear in his catalogue of Roman laths; the only Eastern examples come from Dura-Europos and Egypt.<sup>237</sup> The bone laths from Masada thus seem to represent the first published examples from Roman Palestine.

## SPEARS, LANCES AND JAVELINS

Three iron objects that can be identified as spear-heads, lanceheads, or javelinheads were found at Masada. Scholars define spears and lances as weapons for thrusting, as opposed to javelins, which were hurled.<sup>238</sup> According to traditional definitions, the Roman spear had a broad head and was called a *hasta*.<sup>239</sup> The *hasta* and the *spatha* (long sword) were generally the offensive weapons used by auxiliaries, while legionaries were equipped with *pila* and *gladii*.<sup>240</sup> Some scholars have called into question the traditional classification of Roman spears, including the use of the term “leaf-shaped” to describe the shape of the head. They have suggested using the ratio between the length of the spear blade and its broadest point to categorize spears, instead of the shape of the head.<sup>241</sup> They have also pointed out that it is impossible to equate ancient terms such as *hasta* and *lanceum* with these objects, or to determine which ones were hurled and which were

236 *Ibid.*, 258.

237 *Ibid.*, 224–234. Although Coulston notes that his catalogue of Roman laths is probably complete only for Britain, the inclusion of only two examples from the Roman East is striking.

238 Gonen 1975, 28; Collingwood and Richmond 1969, 305.

239 Gonen 1975, 35; Couissin 1926, 359–360; Collingwood and Richmond 1969, 305.

240 Parker 1971, 252; Collingwood and Richmond 1969, 305. Couissin 1926, 359, on the basis of representations on monuments, expressed the opinion that some legionaries carried *hastae*. For a discussion of the problem of identifying legionary-specific and auxiliary-specific military equipment, see Coulston 1988a.

241 Bishop and Coulston 1993, 69; but cf. Marchant 1990, 5.



thrusted. There is thus no scholarly consensus on the definition and classification of Roman spears.<sup>242</sup>

**Spearhead** IN 1138-1362/1 (Pl. 28:1)

One spearhead was found in L1138, together with a sword (IN 1138-1362/3) and a mortise chisel (IN 1138-1362/2). This casemate room on the eastern side of the mountain showed signs of rebel occupation (see the discussion of the sword above). The spearhead has a leaf-shaped blade with a raised medial rib, and a closed socket. The blade is low-shouldered, which means that its broadest point was closer to the socket than the tip.<sup>243</sup> Remains of the wooden shaft are visible inside the socket.

The spearhead from Masada shares certain features with a large group of spearheads from the Roman camp at Künzing (Germany).<sup>244</sup> However, none of the examples from Künzing displays the strong medial rib of the Masada spearhead. Our specimen also does not fall neatly within Scott's typology, where it is most closely paralleled by "Anomalous Forms" V134, V135 and V136.<sup>245</sup> It is larger than V134 and V135, and, unlike V136, it possesses a strong medial rib on both sides. Perhaps the closest parallel to the Masada spearhead is an iron spearhead from a turret on Hadrian's Wall in Britain, which is dated to the late first to second centuries C.E.<sup>246</sup> However, the Masada example is more triangular in form than the one from Hadrian's Wall, which has a long, leaf-shaped blade. The Masada spearhead also resembles two schematically drawn *hastae* from Mainz (Germany) and Nydam (Denmark) illustrated by Couissin.<sup>247</sup>

Dimensions: total length ca. 200 mm.; blade length 125 mm.; maximum width 30 mm.; weight 111.96 gm.

**Spearhead** IN 1041-1305 (Pl. 28:2)

Another spearhead comes from a rebel context in L1041, the first casemate room south of the synagogue.<sup>248</sup> It has a leaf-shaped blade with a raised rounded midrib, and the bottom widens towards a socket that is not preserved. In form and size this

fragmentary and very corroded piece is paralleled by the spearheads of Scott's Group I, of mid-first century C.E. date, but its midrib appears to be more prominent.<sup>249</sup> It is also comparable to a small spearhead from Hod Hill (UK).<sup>250</sup> It is not clear whether spearheads of this type were used for thrusting or for hurling.<sup>251</sup>

Dimensions: total length 90 mm. (of which 67 mm. is the point alone); maximum width 27 mm.; maximum thickness 10 mm.; weight 17.01 gm.

**Spearhead (?)** IN 1159-1520 (Pl. 29:1)

This iron object resembles a spearhead in form but is much smaller in size. It comes from L1159, a room in a dwelling constructed at the time of the revolt on the eastern side of the mountain.<sup>252</sup> The object has a flat, low-shouldered, leaf-shaped blade with a partially preserved closed socket. It is closely paralleled by the spearheads in Scott's Group II, of mid-first century C.E. date, by small spearheads of the first century C.E. from Hod Hill (UK), and by an arrowhead or spearhead from a third century C.E. grave in the Netherlands.<sup>253</sup> It is possible that this piece represents a spear-butt instead of a spearhead.

Dimensions: length 95 mm.; maximum width 20 mm.; weight 16.93 gr.

**Spear-butt** IN 1110-1505 (Pl. 29:2)

This iron ferrule exhibits an open socket with a square attachment hole. The circular socket tapers to a square-sectioned point. A similar object from Augusta Raurica (Switzerland) was published as a socketed *pilum* head.<sup>254</sup> It was found in a tower room in the eastern section of the casemate wall that was inhabited at the time of the revolt.<sup>255</sup> This room yielded also a buckle hinge plate (III.19/B.6).

Dimensions: length: 149 mm.; width of socket: 25 mm.; thickness of socket: 3–5 mm.; point: 10×10 mm.; hole: 7×7 mm.

249 Cf. Manning 1985, 162–165; Pls. 76–78.

250 Cf. Brailsford 1962, 6 no. B26; Pl. VI.

251 Manning 1985, 163; Bishop and Coulston 1993, 69.

252 *Masada* III, 525.

253 Scott's Group II, cf. Manning 1985, 165–166; Pls. 78–79; Hod Hill (UK), cf. Brailsford 1968, 115 no. A3c; Fig. 58; Scott 1980, Fig. 24:2.3–5; the Netherlands, cf. Willems 1989, 148; Fig. 5:2.

254 Deschler-Erb 1999, No. 51, Taf. 4.

255 *Masada* III, 552–553, Plan 56.

242 *Ibid.*

243 *Ibid.*

244 Cf. Hermann 1969, 133.

245 Cf. Manning 1985, 168; Pl. 81.

246 Cf. Allason-Jones 1988, Fig. 1:10a.

247 Cf. Couissin 1926, 361; Figs. 111–112.

248 *Masada* III, 413–416.

## RIDING EQUIPMENT

**Junction loop and ring junction** IN 1156-1230/2 (Pl. 30:1)

This is an intact junction loop that still retains its ring junction. This find is of particular interest since the two fittings are usually found separately.<sup>256</sup> The object is made of a copper alloy strap that has been folded over to create a loop that held the ring. The front part of the strap has a semi-hemispherical section decorated with three prominent horizontal ribs. A pin soldered to the back of the front part was originally riveted to the back plate through a leather strap. An identical junction loop was found at Risstissen (Germany) (Bishop's Type 4b), of which only the upper plate has survived.<sup>257</sup> The Risstissen example is slightly longer and wider, but is otherwise remarkably similar. Given the similarity in style and dimensions on one hand and the rarity of this sub-type on the other (these are the only examples known), it is possible that they come from the same workshop.

The object's place on the harness may be determined on the basis of the size of the ring. Rings with an external diameter of 30–50 mm. are believed to have served as harness junctions. Smaller rings were presumably junctions of bridles or reins.<sup>258</sup> Hence, the object under discussion seems to represent the latter. This unique object comes from tower room L1156, which is called the "Josephus room" because three impressions of that name in Latin were stamped on its south wall.<sup>259</sup>

Dimensions: weight: 9.09 gm.; thickness of ring: 2–4 mm.; inner diameter of ring: 20–21 mm.; external diameter of ring: 25–26 mm.; length of body (upper part): 31.75 mm.; width of body (upper part): 7 mm.; maximum thickness (upper part): 3.5 mm.; length of body (lower part): 33.5 mm.; width of body (lower part): 6 mm.; thickness of body (lower part): 1 mm.; length of pin: 6 mm.; thickness of pin: 2–3 mm.

**Junction phalera** IN 360-645 (Pl. 30:2)

This circular cast copper alloy disc with four

peripheral rings represents a junction *phalera*. The slightly convex *phalera* has a domed center. The circular boss and the *phalera*'s perimeter were emphasized by incised circles. The object comes from a two-room unit that was part of a complex added to the west of Building 9 during the time of the revolt or later. An additional harness fitting—a neatly decorated *phalera*—was found in an adjacent courtyard (IN 311-407/1).<sup>260</sup>

The external four-loop *phalera* belongs to Bishop's *phalerae* Functional Type 6a (this appears in Table 5 and Fig. 42 as Type 5a). This rare type is known as early as the Augustan period<sup>261</sup> and reappeared in the late first century to mid-second century C.E.<sup>262</sup> The late examples are notable for their large dimensions, more than double those of the Augustan examples. Using the criterion of size, the Masada piece belongs to the early group, although its domed center cast as one piece with the *phalera* is found on the later four-loop *phalerae*. However, the Newstead (UK) *phalera* has a domed stud that was riveted in its center. One of the equally spaced peripheral rings on the Masada piece was found detached from the main body. The same phenomenon was observed on the *phalera* from Newstead mentioned above. This kind of damage is typical of other harness looped articles (such as junction loops), mainly as a result of metal fatigue.<sup>263</sup>

Dimensions: weight: 12.08 gm.; height: 14 mm.; width: 58 mm.; maximum diameter of round body: 36.5 mm.; thickness of round body: 2 mm.; thickness of rings: 2–3 mm.; inner diameter of rings: 6.5–7 mm.; external diameter of rings: 11–12 mm.

**Harness decoration** IN 311-407/1 (not illustrated)

This is a richly decorated circular copper alloy *phalera*. Its front face has a flat, narrow border with a convex middle section surrounding a concave center. The reverse face has a flat border with a concave middle section surrounding a flat center. A hole was pierced through the center of the *phalera*. Each side of the reverse face has a soldered rivet, placed horizontally on the same axis as the central hole. A small hinge made of two parallel loops was soldered at the

256 Bishop 1988, 102–103.

257 Ulbert 1959, 72–73; Taf. 62:13.

258 Bishop 1988, 94.

259 *Masada* III, 527–529; on the stamp cf. Cotton and Geiger 1989, 211; Pl. 44:936.

260 *Masada* III, 229; Plan 15.

261 Oberaden (Germany), cf. Albrecht 1942, Taf. 47:5–6; Kempten (Germany), cf. Krämer 1957, Taf. B:23.

262 Newstead (UK), cf. Curle 1911, Pl. LXXIV:6.

263 Bishop 1988, 102.

bottom of the rear face. The *phalera* was fastened to a leather strap by a rivet through the hole in the disc's center. The two reverse rivets secured the attachment. The Masada piece is a variant of Bishop's two-loop *phalerae*.<sup>264</sup> The use of two rivets for attachment is attested on a *phalera* from Alesia (Musée Alesia 2627, France).<sup>265</sup> The front face of the Masada piece is richly decorated with inlaid niello designs. These consist of a group of three dots and a wavy line repeated alternately four times at regular intervals on the frontal convex part. Two more inlaid niello wavy designs decorate the central hole. These somewhat abstract elements, which symbolize viticulture, are common on harness fittings of the first century C.E.<sup>266</sup> The three dot motif represents a cluster of grapes, while the wavy line should be interpreted as a vine or tendril. Bacchic motifs are also attested on other harness fittings (see below, pendant IN 1138-1354/3). The Masada object comes from a courtyard and room built during the revolt and in the post-revolt period.<sup>267</sup> A few *militaria* were found in the adjacent rooms (see IN 360-645, 324-57/2, 310-250).

Dimensions: maximum diameter: 32 mm.; height: 4 mm.; diameter of hole: 2.75 mm.; thickness of hinges: 4 mm.; width of hinges 6.5 mm.; height of hinges: 7 mm.; diameter of hinge holes: 3 mm.; diameter of pins: 4-1.5 mm., 4.5-2 mm.; height of pins: 5.5 mm.

**Harness decoration** IN 1173-2199/1 (Pl. 30:3)

This richly decorated copper alloy *phalera* with traces of silver plating comes from a rebel unit annexed to tower room L1138 in the eastern casemate wall. Another harness fitting was found in the tower room (IN 1138-1354/3).<sup>268</sup> The perimeter of the *phalera*'s upper face is slightly raised, the middle part is convex, and the center is concave. The rear face is too corroded to determine its original form. The edges of the object have suffered damage, and three sections and part of the central hole are missing. Elaborate patterns are incised on the *phalera*'s frontal face. These consist of grapes, tendrils, and

vine leaves arranged on the convex perimeter, and six petals incised around the central hole. Numerous examples of motifs associated with viticulture are attested on harness fittings throughout the Roman world, including two from Masada (IN 1138-1354/3, 311-407/1). The upper part of the Masada piece was plated with a silver foil, most of which has disappeared. The incised details were presumably inlaid with niello that has not survived. Traces of the underlying solder are still visible, especially in the center. The use of silver instead of tin is generally associated with harness elements, whereas tin was favored for infantry equipment, especially belt mounts.<sup>269</sup> The object under discussion appears to strengthen this notion. However, the fact that one of the belt mounts from Masada (IN 1235-799/1) is silver-plated suggests that this rule may not always apply to equipment in the Roman East.

Dimensions: diameter: 46 mm.; height: 6 mm. (damaged); diameter of hole: 5 mm.; thickness of perimeter: 2 mm.

**Harness decoration** IN 324-57/2 (Pl. 30:4)

This circular disc, which is perforated in its concave center and has a convex perimeter comes from a rebel context in Building 9, which was a residential building during Herod's time.<sup>270</sup> As noted above, three military objects were excavated in the immediate vicinity (IN 360-645, 310-250 and 311-407/1). The frontal face of the *phalera* is decorated with two concentric circles. The strap was attached to the *phalera* by a rivet through the hole. This object appears to belong to Bishop's Functional Type 2h.<sup>271</sup> Such *phalerae* were probably intended for decorative rather than functional purposes. They presumably adorned the harness, as can be seen in Bishop's reconstruction of a Flavian parade harness.<sup>272</sup>

Dimensions: diameter: 44 mm.; height: 6 mm.; diameter of hole: 6 mm.; thickness: 1 mm.; diameter of large decoration circle: 28 mm.; diameter of small decoration circle: 26 mm.

**Harness decoration** IN 233-1911/6 (Pl. 30:5)

This circular *phalera* has a domed center with a flange and damaged perimeter. In this locus, which

<sup>264</sup> *Ibid.*, 95.

<sup>265</sup> Rabeisen 1990, 78; Fig. 4:4.

<sup>266</sup> Brouwer 1982, 149; Abb. 4; Bishop 1987, 118; Bishop 1988, 115.

<sup>267</sup> *Masada* III, 229, Plan 15.

<sup>268</sup> *Ibid.*, 537-539, Plan 53.

<sup>269</sup> Bishop 1987, 115.

<sup>270</sup> *Masada* III, 214; Plan 15.

<sup>271</sup> Bishop 1987, Fig. 41.

<sup>272</sup> *Ibid.*, Figs. 30-31.

was used as a dwelling by the rebels,<sup>273</sup> a helmet carrying handle (?) and a bow lath (IN 233-1857) were discovered.

Dimensions: diameter: 90 mm.; diameter of central hole: 1 mm..

**Harness decoration** IN 333-459/6 (Pl. 30:6)

This is a circular *phalera*, only half of which has survived. The upper face of the object is decorated by incised lines, seemingly representing petals. It was found in a small room of Unit II of Building 9.<sup>274</sup> The room was occupied during the revolt.

Dimensions: diameter: 33 mm.; diameter of central hole: 5 mm.

**Harness decoration** IN 1138-1354/3 (Pl. 30:7)

This is a copper alloy oak leaf-shaped pendant with acorn terminals. It comes from tower room L1138; a harness decoration was found in front of this room (IN 1173-2199/1).<sup>275</sup> Our piece represents a common type of harness pendant. Its main body is teardrop-shaped, with an acorn-tipped terminal and two more stylized acorn terminals attached to its sides. Two semi-hemispherical holes are cut obliquely into its center. Two eyes are fitted into the two side terminals. Traces of the pendant's suspending neck are visible on the mid-upper edge (Bishop's Type 1K). The frontal face of the pendant is densely filled with punched floral motifs. These include tendrils and grapevine or ivy leaf designs arranged symmetrically on the slightly convex body. The *punctum* technique used for these designs was popular during the pre-Flavian period, and was used on other types of harness fittings, including the "bird-headed" or "winged" pendants (Bishop's pendant Type 7). This technique was also used in the decoration of a belt buckle-pin from Masada (IN 1271-1252/1). The symbolism of the Masada pendant is expressed by its shape and decoration.<sup>276</sup> The same combination of oak leaf, acorn, and viticulture motifs is common in the West, notably at Xanten (Germany)<sup>277</sup> and Doorwerth (the Netherlands).<sup>278</sup> A fine example from the East was discovered at Nawa

(Syria).<sup>279</sup> The oak leaf, acorn, and vine motifs reflected Bacchus's association with horses (also see pendant IN 311-407/1 above).<sup>280</sup>

Dimensions: maximum length: 63.5 mm.; length of main body (excluding the broken loop): 62.5 mm.; maximum width: 50.5 mm.; maximum thickness: 3 mm.; weight: 30.45 gm.

**Harness decoration** IN 1052-1325 (Pl. 30:8)

This is a copper alloy teardrop-shaped pendant. The flat-faced pendant has a suspending neck, now partly missing, and a knobbed biconical terminal topped with a prominent horizontal rib. Such pendants were suspended from *phalerae*, while smaller examples functioned as an inter-pendant for the lunate pendant. Numerous examples have been published from the western Empire.<sup>281</sup> In the symbolic world of the Roman cavalryman, lunate pendants represented the moon and, together with the round *phalera*, symbolized the eternal couple—the moon and the sun, femininity and masculinity. This popular design was perhaps intended to protect the horse from evil forces.<sup>282</sup> The Masada object was found in a space to the east of and adjacent to the "Casemate of the Scrolls" (L1039; see above).<sup>283</sup>

Dimensions: total length: 44 mm.; length of broken neck: 6.5 mm.; maximum width: 24.5 mm.; width of neck: 4 mm.; thickness of terminal: 5 mm.; width of terminal: 4 mm.

**Harness decoration** IN 811-86/2 (Pl. 30:10)

This is a heart-shaped pendant with a domed head rivet in its upper center. Two small triangular coves are located in the middle of the object's sides. A close parallel to this shape is published from Vindonissa (Switzerland).<sup>284</sup> The tip of the pendant is now lost, as is the attachment loop. Rivets are sometimes found fastened to the frontal face of the pendant.<sup>285</sup> They may have served to secure the pendant to a leather backing. The Masada pendant

273 Masada III 570–571; Plan 2.

274 *Ibid.*, 206, Plan 15.

275 *Ibid.*, 536–537; Plan 53.

276 *Ibid.*, 118.

277 Jenkins 1985, Figs. 2, 3, 7, 10.

278 Brouwer 1982, Abb. 4.

279 Abdul-Hak 1954–55, 187–88, Pl. IX:1–2.

280 Bishop and Coulston 1985, 105.

281 Bishop's Type 8F; Strasburg (cf. Forrer 1927, Taf. LXXXVII:14).

282 Bishop 1988, 108.

283 Masada III, 423–424; Plan 36.

284 Unz and Deschler-Erb 1997, no. 1481.

285 For securing rivets on harness pendants cf. *ibid.*, nos. 1341, 1352, 1468, 1480.

## THE MILITARY EQUIPMENT FROM MASADA

comes from an annex to Building 13 that had clear evidence of rebel occupation.<sup>286</sup>

Dimensions: length (damaged): 27 mm.; maximum width: 29 mm.; thickness: 1 mm.; diameter of rivet's head: 7.5 mm.

### **Harness decoration** IN 145-1315/1 (Pl. 30:9)

The small lunate pendent has lost most of its loop and one terminal is now missing. A hole occupying the pendant's center was intended to hold a round inner pendant. A *gladius Hispaniensis* was also discovered in this locus (IN 145-1510).

Dimensions: length: 25 mm.; width: 21 mm.; thickness: 1.5 mm. (terminal: 3 mm.)

## CONCLUSION

With the possible exception of the socketed bronze arrowhead (IN 1169-1552), all of the military equipment found at Masada is Early Roman (second half of the first century B.C.E. and first century C.E.). Josephus relates that when the Jewish rebels took over Masada, they found a store of arms and raw materials that had been stockpiled by Herod. In fact, Josephus refers in these passages to two separate occasions on which the rebels made use of the equipment stockpiled by Herod. The first passage describes how Menahem, after having taken Masada, armed his men for a march on Jerusalem with the weapons he found in the fortress:

"Menahem... took his intimate friends off with him to Masada, where he broke into king Herod's armory and provided arms both for his fellow-townsmen and for other brigands..." (BJ II.433-434).

The second passage describes the large quantity of weapons and raw materials found by Eleazar and the *Sicarii* when they took over the fortress:

"All these Eleazar, when he with his *Sicarii* became through treachery master of the fortress, found in perfect condition... There was also found a mass of arms of every description, hoarded up by the king and sufficient for ten thousand men, besides unwrought iron, brass, and lead..." (BJ VII.295-299).

These two passages appear to be contradictory,

for Eleazar and his men should have found storehouses that had been emptied by Menahem instead of a large supply of arms. However, the first passage does not specifically state that Menahem took all of the weapons, and Eleazar may have found some left when he arrived at the fortress.<sup>287</sup> Alternatively, these passages might be a doublet referring to the same event from different points of view.<sup>288</sup> On the other hand, Foerster has noted that the provisions listed by Josephus in the second passage, including the arms and raw materials, seem to represent a condensed version of parts of a treatise by Philo of Byzantium.<sup>289</sup> Thus, this passage should not necessarily be understood literally, though it is likely that the contents of the storerooms at Masada corresponded largely with Josephus' description anyway.<sup>290</sup> Nonetheless, weapons dating to the days of Herod were indeed uncovered at the site: a *gladius Hispaniensis* and possibly two large groups of scales.

The formulaic nature of at least parts of Josephus's account is suggested by the apparent absence of iron projectile points (catapult bolts or darts) at Masada. According to BJ VII.309, the Romans fired missiles at the defenders from "numerous" artillery engines (catapults) placed in the tower at the top of the siege ramp.<sup>291</sup> However, we were unable to conclusively identify any iron object from Masada as a catapult bolt or projectile point fired by such a machine. This is in contrast to site of Gamla (Gamala) in the Golan, where numerous iron projectile points were recovered in contexts associated with the Roman siege of 67 C.E.<sup>292</sup> We believe that the apparent absence of such projectile points at Masada means that catapults were not employed in the siege. Perhaps the slope of the siege ramp and the steep angle of projection from it to the fortification wall above would have rendered catapult fire ineffective.

Whatever the interpretation of the above

287 Yadin 1966, 97.

288 For a discussion of these passages cf. Cotton and Geiger 1989, 5-6.

289 Foerster 1995, 215-216.

290 *Ibid.*

291 For a discussion of the artillery described by Josephus in connection with the siege at Masada cf. Holley 1994, 349-351.

292 Gutman 1981, 36-40.

286 Masada III, 351; Plan 24.

passages in Josephus's *Bellum Judaicum*, it is likely that the Jewish rebels used weapons of Herodian origin as well as arms that belonged to the Roman garrison that occupied the mountain after Herod's death. In addition, the rebels must have been armed when they took over the fortress, and may have received additional supplies from other parts of the country at least until the fall of Jerusalem in 70 C.E. There is also evidence that the rebels manufactured arrowheads and arrows at the site. Finally, some of the military equipment found at Masada must have belonged to the Roman soldiers involved in the siege, and to the garrison that later occupied the fortress.<sup>293</sup>

There is only one instance at Masada where a piece of military equipment can be said to be of Herodian or pre-Herodian origin on the basis of its stratigraphic context. In L1202, a tower in the southeastern casemate wall, a bronze scale is recorded on the locus card as having come from the fill of a Herodian floor. This scale must therefore be of Herodian (or possibly earlier) date. It is interesting that the scale is of the same type (long and narrow) as most of the other scales found at Masada. Either the other scales of this type are also of Herodian origin or there were no changes in the size and shape of scales through the end of the revolt. The fact that no scales were found attached together or attached to their original backing suggests that they might be Herodian in origin and were perhaps stored as raw material.

The majority of the military equipment was found in contexts dating to the last main phase of occupation of the site, that is, to the time of the revolt. Whatever its origin, this equipment appears to have been last used by the attackers and defenders of Masada. It derives from rebel occupation levels or from layers of destruction debris and collapse or from dumps that were deliberately collected after the time of the revolt. The sword from L145 is part of a rich group of objects that seem to have been stored in that area and were buried in the collapse of a great conflagration. L442 and L456 in the Western Palace, where there were hundreds of arrowheads and signs of metalworking activity, were also buried in the collapse of a conflagration. The largest

293 For a review of the Roman military presence on Masada cf. Cotton and Geiger 1989, 11–17.

concentrations of military equipment, however, come from dumps that appear to have been deliberately collected (and often burned) after the end of the revolt. Such dumps were found on the lowest terrace of the Northern Palace (L8, 9, 10), by the great wall in front of the Northern Palace (L92), in cistern or cave L162, and in casemate room L1039.<sup>294</sup>

Both legionary and auxiliary military equipment types are represented at Masada. To the first we assign the laminated armor fittings and the fragments of *scuti*. The rare group of handguards decorated by a v-shaped element probably belonged to auxiliary soldiers; the most likely candidates are the troops that manned the site prior to the outbreak of the revolt (“Garrison A”).

The overwhelming number of arrowheads in proportion to other kinds of weapons is probably due to the fact that bows and arrows constituted the majority of the weapons at the site, as they may have been considered most effective for the purposes of mural defense.<sup>295</sup> It is also possible that there were other weapons that were taken by the Roman troops.<sup>296</sup> As mentioned above, most of the military equipment was probably brought to the site either by Herod (and the Roman garrison that occupied the site after his death) or the Jewish rebels. Other equipment belonged to the Roman garrison that remained after the siege. It seems likely that the troops garrisoned by Herod and by his successors on Masada were equipped as auxiliaries,<sup>297</sup> while the rebels also armed themselves in the manner of auxiliaries or most easily obtained weapons of auxiliary type. The legionary types of military equipment were apparently brought to Masada only at the time of the Roman siege or later. We assume that the legionary equipment belonged to soldiers of the Tenth

294 Cf. the description of these loci in *Masada III*; in addition, for L1039 (the “Casemate of the Scrolls”), cf. Cotton and Geiger 1989, 18–20; for a different interpretation of the debris in L92, cf. Geva 1996.

295 Cf. Coulston 1985, 267, 284.

296 *Ibid.*

297 Cf. Cotton and Geiger 1989, 13. The evidence from Masada lends support to Shatzman's suggestion that Herod based his army on the Roman model (1991, 214; also cf. Keppie 1984, 141. For another view cf. Campbell [1986, 125], who stated that “legionaries are rarely attested in Judaea before AD 66”). Herod may also have supplied the Roman army with irregular *symmachiarii*, including horse and foot archers (Coulston 1985, 285).

## THE MILITARY EQUIPMENT FROM MASADA

Legion who participated in the siege, as well as to those who remained afterwards.<sup>298</sup> Bows and arrows probably represent the main type of weapon used by Herod, the Roman garrison, and the rebels at Masada, as archery was often used defensively during the Roman period in times of siege.<sup>299</sup> According to Coulston, archery played such an important role in mural defense that projecting stone towers were provided mainly for purposes of archery and not for the positioning of artillery machines. Archers were also employed in an offensive capacity to drive the defenders from the walls and to man the siege-towers while attempts were made to breach or scale the walls.<sup>300</sup> The Jews were as skilled in archery as the other peoples of the Roman East and Jewish cavalry archers served in Herod's army.<sup>301</sup>

The military equipment from Masada constitutes a significant addition to the corpus of arms and armor from the Roman world. The assemblage includes a wide variety of types dating from the first century B.C.E. through the first century C.E. The fact that most of the equipment was used at the time of the fall of the site provides an important fixed point for the dating of many of the types represented. This equipment sheds light on various aspects of the history of Masada and adds to our knowledge of the development of arms and warfare in the Roman world.

### ABBREVIATIONS

<i>AJA</i>	<i>American Journal of Archaeology</i>
<i>BAR</i>	<i>Biblical Archaeology Review</i>
<i>BJ</i>	Flavius Josephus, <i>Bellum Judaicum</i>
<i>BonJahr</i>	<i>Bonner Jahrbücher</i>
<i>EI</i>	<i>Eretz-Israel</i>
<i>IEJ</i>	<i>Israel Exploration Journal</i>
<i>JAS</i>	<i>Journal of Archaeological Science</i>
<i>JDAI</i>	<i>Jahrbuch des Deutschen Archäologisches Instituts</i>

298 Cf. Cotton and Geiger 1989, 15–16.

299 Cf. Coulston 1985, 294.

300 *Ibid.*

301 *Ibid.*, 295; Gichon and Vitale 1991, 252–253; Shatzman 1991, 215.

*Masada III* Netzer, E., *Masada III. The Yigael Yadin Excavations 1963–1965. Final Reports. The Buildings, Stratigraphy and Architecture*. Jerusalem: Israel Exploration Society, 1991.

*OM* *Oudheidkundige Mededelingen*

*JRMES* *Journal of Roman Military Equipment Studies*

*RLM* *Reinisches Landesmuseum*

*RLO* *Die Römische Limes in Österreich*

*SJ* *Saalburg Jahrbuch*

### BIBLIOGRAPHY

#### Abdul-Hak 1954–55:

Abdul-Hak, S., “Rapport préliminaire sur des objets provenant de la nécropole romaine située à proximité de Nawa (Hauran),” *Les Annales Archéologiques de Syrie* 4–5: 163–188.

#### Aharoni 1961:

Aharoni, Y., “The Expedition to the Judean Desert, 1960, Expedition B,” *Israel Exploration Journal* 11: 11–24.

#### Albrecht 1942:

Albrecht C., *Das Römerlager in Oberaden und das Uferkasell in Beckinghausen an der Lippe*, vol. 2. Dortmund.

#### Allason-Jones 1988:

Allason-Jones, L., “‘Small Finds’ from Turrets on Hadrian’s Wall,” pp. 197–233 in *Military Equipment and the Identity of Roman Soldiers*, ed. J.C. Coulston. Oxford (BAR International Series 394).

#### Allason-Jones and Bishop 1988:

Allason-Jones, L., and Bishop, M.C., *Excavations at Roman Corbridge: the Hoard*. London.

#### Allason-Jones and Miket 1984:

Allason-Jones, L., and Miket, R., *The Catalogue of Small Finds from South Shields Fort*. Newcastle upon Tyne.

#### Avigad 1961:

Avigad, N., “The Expedition to the Judean Desert, 1960, Expedition A,” *IEJ* 11: 6–10.

**Avigad 1962:**

Avigad, N., "The Expedition to the Judean Desert, 1961, Expedition A—Nahal David," *IEJ* 12: 169–185.

**Bennett 1985:**

Bennett P., "A Chased Cheek-piece from Stanwix," pp. 109–116 in Bishop 1985b.

**Berciu 1982:**

Berciu, D., "Un glaive romain (*gladius*) découvert dans la Buridava dace (Ocnita, dép. de Vilcea)," *Thraco-Dacica* 3: 147–152.

**Bernard 1973:**

Bernard, P., *Fouilles d’Ai Khanoum 1: 1965–8, rapport préliminaire* (Mémoires de la délégation archéologique française en Afghanistan, Tome 21). Paris.

**Bishop 1985a:**

Bishop, M.C., "The Military Fabrica and the Production of Arms in the Early Principate," pp. 1–42 in Bishop 1985b.

**Bishop 1985b:**

Bishop, M.C. (ed.), *The Production and Distribution of Roman Military Equipment, Proceeding of Roman Military Equipment Research Seminar*: Oxford (BAR International Series 275).

**Bishop 1987:**

Bishop, M.C., "The Evolution of Certain Features," pp. 109–139 in Dawson 1987.

**Bishop 1988:**

Bishop, M.C., "Cavalry Equipment of the Roman Army in the First Century A.D.," pp. 67–195 in Coulston 1988b.

**Bishop 1992:**

Bishop, M.C., "The Early Imperial 'Apron'," *JRMES* 3 1992: 81–104.

**Bishop and Coulston 1993:**

Bishop, M.C., and Coulston, J.C.N., *Roman Military Equipment, from the Punic Wars to the Fall of Rome*. London.

**Boube-Piccot 1994:**

Boube-Piccot, C., *Les bronzes antiques du Maroc*. IV. *L'équipement militaire et l'armement*. Paris.

**Brailsford 1962:**

Brailsford, J.W., *Antiquities from Hod Hill in the Durden Collection*. London.

**Brailsford 1968:**

Brailsford, J.W., "Bronze Objects from the Roman Fort and Iron Objects from the Roman Fort," pp. 113–116 in *Hod Hill*, ed. I.A. Richmond. London.

**Brouwer 1982:**

Brouwer M., "Römische Phalerae und anderer Lederbeschlag aus dem Rhein," *OM* 63: 145–199.

**Brown 1936:**

Brown, F.E., "Arms and Armour," pp. 439–466 in *The Excavations at Dura-Europos, Preliminary Report of the Sixth Season of Work, October 1932–March 1933*, ed. M.I. Rostovtzeff, A.R. Bellinger, C. Hopkins and C.B. Welles. New Haven.

**Brown 1939:**

Brown, F.E., "The Painted Shields, Technical Description," pp. 327–331 in *The Excavations at Dura-Europos, Preliminary Report of the Seventh and Eighth Seasons of Work, 1933–1934 and 1934–1935*, ed. M.I. Rostovtzeff, F.E. Brown and C.B. Welles. New Haven.

**Buchholz 1976:**

Buchholz, H.-G., "Pfeilspitzen, weitere Beobachtungen," *JDAI* 91: 1–13.

**Buckland 1978:**

Buckland P., "A First-Century Shield from Doncaster, Yorkshire," *Britannia* 9: 247–269.

**Campbell 1986:**

Campbell, D.B., "Auxiliary Artillery Revisited," *BonJahr* 186: 117–132.

**Cheesman 1914:**

Cheesman, G.L., *The Auxilia of the Roman Imperial Army*. Oxford.

**Collingwood and Richmond 1969:**

Collingwood, R.G., and Richmond, I., *The Archaeology of Roman Britain*. London.

**Connolly 1988:**

Connolly, P., *Tiberius Claudius Maximus, the Legionary*. Oxford.



## THE MILITARY EQUIPMENT FROM MASADA

### **Connolly 2000:**

Connolly, P., "Pilum, Gladius and Pugio in the Late Republic," *JRMES* 8: 41–57.

### **Cotton and Geiger 1989:**

Cotton, H.M., and Geiger, J., *Masada II. The Yigael Yadin Excavations 1963–1965. Final Reports. The Latin and Greek Documents*. Jerusalem.

### **Couissin 1926:**

Couissin, P., *Les armes romaines*. Paris.

### **Coulston 1985:**

Coulston, J.C.N., "Roman Archery Equipment," pp. 220–366 in Bishop 1985b.

### **Coulston 1988a:**

Coulston, J.C.N. (ed.), *Military Equipment and the Identity of Roman Soldiers. Proceedings of the Fourth Roman Military Equipment Conference*. Oxford (BAR International Series 394).

### **Coulston 1988b:**

Coulston J.C.N., pp. 1–29, "Three Legionaries at Croy Hill (Strathclyde)," in Coulston 1988a.

### **Cumont 1926:**

Cumont, F., *Fouilles de Doura-Europos (1922–1923)*. Paris.

### **Curle 1911:**

Curle, J., *A Roman Frontier Post and its People. The Fort of Newstead in the Parish of Melrose*. Glasgow.

### **Davies 1981:**

Davies, J.L., "Roman Arrowheads from Dinorben and the Sagittarii of the Roman Army," *Britannia* 12: 257–270.

### **Dawson 1987:**

Dawson, M. (ed.), *Roman Military Equipment: The Accoutrements of War. Proceedings of the Third Roman Military Equipment Research Seminar*. Oxford (BAR International Series 336).

### **Down 1978:**

Down, A., *Chichester Excavations III*. Chichester.

### **Driel-Murray 1988:**

van Driel-Murray, C., "A Fragmentary Shield Cover from Caerleon," pp. 51–66 in Coulston 1988a.

### **Driel-Murray 1989:**

van Driel-Murray, C. (ed.), *Roman Military Equipment: the Sources of Evidence, Proceedings of the Fifth Roman Military Equipment Conference*. Oxford (BAR International Series 476).

### **Driel-Murray 1999:**

van Driel-Murray C., "A Rectangular Shield Cover of the COH. XV Voluntariorum C.R.," *JRMES* 10: 45–54.

### **van Driel-Murray and Gechter 1983:**

van Driel-Murray C. and Gechter M., "Funde aus der Fabrika der Legio I Minervia aus Bonner Berg," *Rheinische Ausgrabungen* 23: 1–83.

### **Erdmann 1976:**

Erdmann, E., "Dreiflügelige Pfeilspitzen aus Eisen von der Saalburg," *SJ* 32: 5–10.

### **Erdmann 1982:**

Erdmann, E., "Vierkantige Pfeilspitzen aus Eisen von der Saalburg," *SJ* 38: 5–11.

### **Fellmann 1966:**

Fellmann, R., "Hölzerne Schwertgriffe aus dem Schutthügel von Vindonissa," pp. 215–222 in *Helvetica Antiqua, Festschrift Emil Vogt*. Zürich.

### **Feugère 1993:**

Feugère, M., *Les armes des Romains, de la République à l'Antiquité tardive*. Paris.

### **Feugère 1994:**

Feugère, M., *Les casques antiques, visages de la guerre de Mycènes à l'antiquité tardive*. Paris.

### **Foerster 1995:**

Foerster, G., *Masada V. The Yigael Yadin Excavations 1963–1965. Final Reports. Art and Architecture*. Jerusalem.

### **Franzius 1995:**

Franzius, G., "Die römischen Funde aus Kalkriese 1987–95 und ihre Bedeutung für die Interpretation und Datierung militärischer Fundplätze der augusteischen Zeit im nordwesteuropäischen Raum," *JRMES* 6: 69–88.

### **Frere 1984:**

Frere, S., *Verulamium III*. Oxford.

### **Gansser-Burckhardt 1942:**

Gansser-Burckhardt, A., *Das Leder und seine*

- Verarbeitung im römische Legionslager Vindonissa. Verossentlichungen der Gessellschaft pro Vindonissa*, Band I. Basel.
- Garbsch 1978:**  
Garbsch, J., *Römische Paraderüstungen*. Munich.
- Gerhart-Witteveen and Hubrecht 1990:**  
Gerhart-Witteveen, A.M., and Hubrecht, A.V.M., "Survey of Swords and Daggers in the Provincial Museum G.M. Kam, Nijmegen," *JRMES* 1: 99–107.
- Geva 1996:**  
Geva, H., "The Siege Ramp Laid by the Romans to Conquer the Northern Palace at Masada," *EI* 25: 297–306 (Hebrew with English summary on p. 100\*).
- Gichon and Vitale 1991:**  
Gichon, M., and Vitale, M., "Arrow-Heads from Horvat 'Eqed," *IEJ* 41: 242–257.
- Gonen 1975:**  
Gonen, R., *Weapons of the Ancient World*. Jerusalem.
- von Groller 1901:**  
von Groller, M., "Das Lager von Carnuntum. Römische Waffen," *RLO* 2: 17ff.
- Greep 1984:**  
Greep, S., "Ribbed Gladius Handles of the First Century A.D.," *Exercitus*: 122–124.
- Greep 1989:**  
Greep, S., "Approaches to the Study of Bone, Antler and Ivory Military Equipment," pp. 16–21 in *Roman Military Equipment, Proceedings of a Seminar Held in the Department of Ancient History and Classical Archaeology at the University of Sheffield, 21st March 1983*, ed. M.C. Bishop. Sheffield.
- Grew and Griffiths 1991:**  
Grew, F., and Griffiths, N., "The Pre-Flavian Military Belt: the Evidence from Britain," *Archeologia* 109: 47–84.
- Groenman-van Waateringe 1967:**  
Groenman-van Waateringe W., *Romeins lederwerk uit Valkenburg Z.H.* Groningen.
- Gutman 1981:**  
Gutman, S., *Gamla, The First Eight Seasons of Excavations*. Israel (in Hebrew).
- Gutman 1994:**  
Gutman, S., *Gamla—A City in Rebellion*. Tel Aviv.
- Hayes 1984:**  
Hayes, J.W., *Greek, Roman and Related Metalware in the Royal Ontario Museum, A Catalogue*. Toronto.
- Herrmann 1969:**  
Herrmann, F.-R., "Der Eisenhortfund aus dem Kastell Künzing," *SJ* 26: 129–141.
- Holbrook and Bidwell 1991:**  
Holbrook, N., and Bidwell, P.T., *Roman Finds from Exeter*. Exeter (Exeter Archaeological Reports 4).
- Holley 1994:**  
Holley, A.E., "The *Ballista* balls from Masada," pp. 347–365 in *Masada IV. The Yigael Yadin Excavations 1963–1965. Final Reports*. Jerusalem.
- Hopkins 1931:**  
Hopkins, C., "Armor," pp. 72–75 in *The Excavations at Dura-Europos, Preliminary Report of Second Season of Work, October 1928–April 1929*, ed. P.C.V. Baur and M.I. Rostovtzeff. New Haven.
- Hopkins 1932:**  
Hopkins, C., "Report on finds, armor and tools," pp. 78–82 in *The Excavations at Dura-Europos, Preliminary Report of Third Season of Work, November 1929–March 1930*, ed. P.V.C. Baur, M.I. Rostovtzeff and A.R. Bellinger. New Haven.
- Hyland 1993:**  
Hyland, A., *Training the Roman Cavalry from Arrian's Ars Tactica*. Gloucestershire.
- Jackson 1990:**  
Jackson, R., *Camerton, The Late Iron Age and Early Roman Metalwork*. London.
- Jenkins 1985:**  
Jenkins, I., "A Group of Silvered-Bronze Horse-Trapings from Xanten (Castrum Vetus)," *Britannia* 16: 141–161.
- Johns 1933:**  
Johns, C.N., "Excavations at 'Atlit (1930–1): The South-Eastern Cemetery," *Quarterly of the Department of Antiquities in Palestine* 2: 41–104.
- Johns 1950:**  
Johns, C.N., "The Citadel, Jerusalem. A Summary of

## THE MILITARY EQUIPMENT FROM MASADA

Work Since 1934,” *Quarterly of the Department of Antiquities in Palestine* 14: 121–190.

### **Keppie 1984:**

Keppie, L., *The Making of the Roman Army, From Republic to Empire*. London.

### **Kimming 1940:**

Kimming, W., “Ein Keltenschild aus Ägypten,” *Germania* 24: 106–111.

### **Knox et al. 1983:**

Knox, R., Maddin, R., Muhly J.D. and Stech, T., “Iron Artifacts from Masada: Metallurgical Studies,” *IEJ* 33: 97–107.

### **Krämer 1957:**

Krämer, W., *Cambodunumforschungen 1953–I*. Kallmünz.

### **Krekovič 1994:**

Krekovič, C., “Military Equipment on the Territory of Slovakia,” *JRMES* 5: 211–225.

### **Kretzchmer 1983:**

Kretzchmer, I.F., *Bilddokumente römischer Technik*. Dusseldorf.

### **Künzel 1994:**

Künzel, E., “Dekorierte Gladii und Cingula: eine ikonographische Statistik,” *JRMES* 5: 33–58.

### **Lang 1988:**

Lang, J. “Study of the Metallography of Some Roman Swords,” *Britannia* 19: 199–216.

### **McLeod 1988:**

McLeod, W., “The Bow at Night: An Inappropriate Weapon?” *Phoenix* 42: 121–125.

### **MacMullen 1960:**

MacMullen, R., “Inscriptions on Armor and the Supply of Arms in the Roman Empire,” *AJA* 64: 23–40.

### **Maddin et al. 1983:**

Maddin, R., Muhly, J.D. and Stech, T., “Armor Scales from Masada: A Metallurgical Study,” *IEJ* 33: 108–109.

### **Magness 1992:**

Magness J., “Arms and the Man,” *BAR* 18: 58–67.

### **Manning 1985:**

Manning, W.H., *Catalogue of the Romano-British Iron*

*Tools, Fittings and Weapons in the British Museum*. Dorset.

### **Marchant 1990:**

Marchant, D., “Roman Weapons in Great Britain, a Case Study: Spearheads, Problems in Dating and Typology,” *JRMES* 1: 1–6.

### **Marsden 1969:**

Marsden, E.W., *Greek and Roman Artillery: Historical Development*. Oxford.

### **Marsden 1971:**

Marsden, E.W., *Greek and Roman Artillery: Technical Treatises*. Oxford.

### **Meshorer 1989:**

Meshorer, Y., “The Coins of Masada,” pp. 71–132 in *Masada I. The Yigael Yadin Excavations 1963–1965*. Jerusalem.

### **Morel and Bosman 1989:**

Morel, J.-M.A.W., and Bosman, A.V.A.J., “An Early Roman Burial in Velsen I,” pp. 167–191 in Driell-Murray 1989.

### **Netzer 1991:**

Netzer, E., “The Last Days and Hours at Masada,” *BAR* 17: 20–32.

### **Neuburger 1919:**

Neuburger, A., *Die Technik des Altertums*. Leipzig.

### **Parker 1971:**

Parker, H.M.D., *The Roman Legions*. Cambridge (UK).

### **Peterson 1992:**

Peterson, D., *The Roman Legions Recreated in Colour Photographs*. London.

### **Petrikovits 1951:**

Petrikovits, V., “Eine Pilumspitze von der Grotenburg bei Detmold,” *Germania* 29: 198–210.

### **Rabeisen 1990:**

Rabeisen, E., “La production d’équipement de cavalerie au 1er s. après J.-C. à Alesia (Alise-Sainte-Reine, Côte-d’Or, France),” *JRMES* 1: 73–98.

### **Richmond 1962:**

Richmond, I.A., *Trajan’s Army on Trajan’s Column*. London.

**Robinson 1975:**

Robinson, H.R., *The Armour of Imperial Rome*. London.

**Rostovtzeff, Brown, and Welles 1939:**

Rostovtzeff M.I., Brown F.E. and Welles C.B., *The Excavations at Dura-Europos, Preliminary Report of the Seventh and Eighth Seasons of Work, 1933–1934 and 1934–1935*. New Haven.

**Rostovtzeff et al. 1936:**

Rostovtzeff M., Bellinger A., Hopkins C. and Welles C.B. (eds.), *The Excavations at Dura-Europos, Preliminary Report on the Sixth Season, October 1932–March 1933*. New Haven.

**Schönberger 1978:**

Schönberger, H., *Kastell Oberstimm, Die Grabungen von 1968 bis 1971*. Berlin.

**Scott 1980:**

Scott, I.R., “Spearheads of the British Limes,” pp. 333–343 in *Roman Frontier Studies 1979*, ed. W.S. Hanson and L.J.F. Keppie. Oxford (BAR International Series 71 [i]).

**Shatzman 1991:**

Shatzman, I., *The Armies of the Hasmonaeans and Herod, From Hellenistic to Roman Frameworks*. Tübingen.

**Syon 1992:**

Syon, D., “Gamla—Portrait of a Rebellion,” *BAR* 18: 20–37.

**Tylecote 1980:**

Tylecote, R.F., “Furnaces, Crucibles, and Slags,” pp. 183–228 in *The Coming of the Age of Iron*, ed. T.A. Wertime and J.D. Muhly. New Haven.

**Ulbert 1959:**

Ulbert, G., *Die römischen Donaukastelle Aislingen und Burghöfe*. Berlin.

**Ulbert 1969a:**

Ulbert, G., *Das frühromische Kastell Rheingönheim*. Berlin.

**Ulbert 1969b:**

Ulbert, G., “Gladii aus Pompeji,” *Germania* 47: 97–128.

**Ulbert 1985:**

Ulbert, G., *Cáceres el Viejo, Ein spätrepublikanisches Legioslager in Spanisch-Extremadura*. Mainz.

**Unz and Deschler-Erb 1997:**

Unz, C., and Deschler-Erb, E., *Katalog der Militaria aus Vindonissa*. Brugg.

**Vanden Berghe 1996:**

Vanden Berghe, L., “Some Roman Military Equipment of the First Three Centuries AD in Belgian Museums,” *JRMES* 7: 59–95.

**Webster 1969:**

Webster, G., *The Roman Imperial Army of the First and Second Centuries A.D.* London.

**Wild 1977:**

Wild, J.P., “A Find of Roman Scale Armour from Carpow,” *Britannia* 8: 305–306.

**Willems 1989:**

Willems, W.J.H., “An Officer or a Gentleman? A Late-Roman Weapon-Grave from a Villa at Voerendaal (NL),” pp. 143–156 in Driel-Murray 1989.

**Williams 1977:**

Williams, A.R., “Roman Arms and Armour: a Technical Note,” *JAS* 4: 77–87.

**Yadin 1963:**

Yadin, Y., *The Finds from the Bar Kokhba Period in the Cave of Letters*. Jerusalem.

**Yadin 1965:**

Yadin, Y., “The Excavation of Masada—1963/64, Preliminary Report,” *IEJ* 15: 1–120.

**Yadin 1966:**

Yadin, Y., *Masada*. London.

**Zias 1998:**

Zias, J. “Whose Bones?” *BAR* 24: 40–45, 64–66.

## CATALOGUE OF ARROWHEADS

The following information is provided for each arrowhead: a description of the proportions of the point is given (for example, "short, wide head"); then the length and maximum width of the point is stated in centimeters; followed by the relative length of the tang and the total preserved length in centimeters of the arrowhead including the tang; then there is a description of the form of the point and of the barb tips (for example, "3 wings" = trilobate point, and "pointed" means that the barb tips are pointed). The weight is provided if the arrowhead has been weighed, and the relative degree of corrosion is indicated. Finally, the existence of a drawing and/or photograph for the arrowhead is mentioned. In the case of both the arrowheads and the scales, "missing" indicates that records exist but the object itself could not be located.

Only those arrowheads that were assigned individual numbers prior to the writing of this report appear here with individual numbers (for example, 8-187/1; 8 is the locus number, and 187/1 is the registration number). Some groups of arrowheads were not individually numbered within the registration number designation; these appear here without individual numbers (for example, the group of seven arrowheads from L174-1439).

### **1-82**

Short, wide head (tip broken?); 1.7×1.3; medium tang (3.2); 3 wings (1 broken), pointed; 1.90 g; drawn; photo.

### **5-17**

Head broken (top broken); wide; 1.9×1.5; tang broken (3.0); 3 wings, pointed; 2.99 g (corroded).  
Tang; 2.8 cm long; 1.08 g (corroded); drawn.

### **5-27**

- 2 Short, wide head; 2.4×1.4; tang broken; 3 wings (1 broken), pointed; 2.26 g (corroded), drawn.
- 3 Short, wide head (tip broken); 2.1×1.4; tang broken (3.0); 3 wings, rounded; 2.85 g (corroded); drawn.
- 4 Short, wide head (top broken); 1.6×1.2; tang broken (2.2); 3 wings, very worn, rounded? 1.93 g (corroded); drawn.

### **5-39**

Fragment of an arrowhead, shapeless, 2.0×0.8 + 15 other iron fragments of various shapes and sizes; not all are pieces of arrowheads, except for 1 clear fragment of 2 wings.

### **5-120**

Long, medium-wide head (tip broken); 2.4×1.4; long tang (4.3); 3 wings, rounded; 3.56 g (corroded), drawn.

### **5-148**

Long, very narrow head; 2.9×1.0; medium tang (tip broken) (3.8); 3 wings, straight; drawn.

### **8-187**

- 1 Long, medium-wide head; 3.7×1.4; long tang (5.6); 3 wings, rounded; 4.7 g (perfect condition); drawn; photo. (Pl. 26:4)
- 2 Short, wide head; 3.0×1.4; very long tang (6.0); 3 wings, straight; 2.6 g; drawn; photo. (Pl. 25:1)
- 3 Medium-long, wide head; 3.0×1.5; medium tang (4.2); 3 wings, straight; 3.5 g; drawn; photo. (Pl. 25:2)
- 4 Long, medium-wide head; 3.9×1.4; short tang (5.0); 3 wings, straight; 5.1 g (perfect condition); drawn; photo. (Pl. 26:3)

### **8-199**

- 1 Long, narrow head; 3.1×1.1; medium tang (broken?) (4.2); 3 wings, rounded; 3.04 g (perfect condition); drawn; photo. (Pl. 24:3)

- 2 Short, wide head; 2.4×1.3; long tang (4.4); 3 wings, straight; 2.3 g (perfect condition); drawn; photo. (Pl. 24:2)
- 3 Missing; drawn; photo. (Pl. 24:6)
- 4 Long, narrow head; 3.0×1.0; long tang (4.9); 3 wings, straight; 2.8 g; drawn; photo. (Pl. 25:5)
- 5 Long, medium-wide head; 2.5×1.4; very long tang (5.3); 3 wings, straight; 2.68 g (a little corroded); drawn; photo.
- 6 Medium-long, medium-wide head; 2.8×1.3; long tang (4.5); 3 wings, straight; 2.8 g (perfect condition); drawn; photo.
- 7 Long, medium head; 3.2×1.2; medium tang (4.4); 3 wings, rounded; 2.96 g (a little corroded); drawn; photo.
- 8 Long, medium head; 2.9×1.1; long tang (4.7); 3 wings, rounded; 3.05 g (perfect condition); drawn; photo. (Pl. 24:3)
- 9 Missing; drawn; photo. (Pl. 24:4)
- 10 Long, medium-wide head; 3.2×1.2; long tang (5.5); 3 wings, straight; 2.8 g (perfect condition); drawn; photo. (Pl. 26:1)
- 11 Medium-short, medium-wide head; 2.7×1.0; medium tang (3.6); 3 wings, rounded; 2.4 g; drawn; photo. (Pl. 26:6)
- 12 Long, wide head; 3.2×1.7; long tang (5.6); 3 wings (tip of one is broken), pointed; 3.3 g; drawn; photo. (Pl. 26:5)
- 13 Medium-long, medium-wide head; 2.7×1.0; medium tang (4.3); 3 wings, rounded; 2.2 g; drawn; photo.
- 14 Long, medium-wide head; 2.9×1.1; long tang (4.9); 3 wings, pointed; 3.3 g (a little corroded); drawn; photo. (Pl. 25:3)
- 15 Long, narrow head; 2.5×1.0; medium tang (3.7); 3 wings, rounded; 1.86 g (corroded); drawn; photo.
- 16 Short, wide head; 2.5×1.2; short tang (broken?) (3.6); 3 wings, rounded; 1.99 g (a little corroded); drawn; photo.
- 17 Short, medium-wide head; 2.5×1.0; medium tang (3.6); 3 wings, straight; 2.5 g (perfect condition); drawn; photo. (Pl. 25:4)
- 18 Long, wide head (tip broken); 2.6×1.2; long tang (4.2); 3 wings, rounded; 3.81 g (a little corroded); drawn; photo.
- 19 Long, narrow head; 3.0×1.2; long tang (4.6); 3 wings; straight; 1.77 g (perfect condition); drawn; photo.  
Fragment of a tang (3.2); 0.81 g.

**8-200**

Arrow shaft.

**8-230**

- 1 Long, medium-narrow head; 3.0×1.1; long tang (4.8); 3 wings, straight; 2.6 g (perfect condition); drawn; photo. (Pl. 26:2)
- 2 Medium-long, medium-wide head; 3.0×1.3; medium tang (tip broken) (4.0); 3 wings (tip of one is broken), straight; 2.6 g; drawn; photo.
- 3 Long, medium-wide head; 3.2×1.3; medium tang (4.6); 3 wings (1 broken), straight; 3.0 g (a little corroded); drawn; photo.
- 4 Medium-long, medium-wide head; 2.7×1.2; long tang (broken?) (4.0); 3 wings; straight; 2.50 g (a little corroded); photo.
- 5 Long, narrow head; 4.0×1.1; medium tang (5.6); 3 wings, rounded; 4.0 g (a little corroded); drawn; photo.

**9-260**

- 1 Short, medium-wide head; 2.9×1.2; 3 wings, straight; drawn; photo. The arrowhead is set into a wooden shaft that is preserved for a length of 11.0 cm, with a maximum diameter of 0.6 cm. Remains of fiber are

## THE MILITARY EQUIPMENT FROM MASADA

visible wound around the upper 2.0 cm of the shaft; the lower third of the shaft is burnt. The weight of the arrowhead with the shaft is 6.0 g.

2 Medium-long, medium-wide head; 2.8×1.3; medium tang (4.5); 3 wings, straight: 2.7 g (perfect condition); drawn; photo. The arrowhead is preserved together with the shaft (although the two have become separated). The wooden shaft is preserved for a length of 13.5 cm, with a maximum diameter of 0.7 cm. Impressions left by the fiber wound around the upper 2.1 cm of the shaft are visible; the lower third of the shaft is burnt. The shaft weighs 4.6 g.

### 9-261

(2 shafts) Missing.

### 9-264

1 Long, medium-wide head; 3.5×1.3; medium tang (5.2); 3 wings, rounded; 4.5 g (perfect condition); drawn; photo.

2 Medium-long, medium-wide head; 2.1×1.1; medium tang (4.0); 3 wings, straight; 3.0 g (perfect condition); drawn; photo.

3 Bottom half only; seems to be long and narrow; preserved length and width 2.2×1.2; very long tang; 3 wings, pointed; drawn; photo.

4 Long, narrow head; 3.3×1.1; tang broken (3.9); 3 wings (1 broken), straight; 1.79 g (corroded); drawn; photo.

5 Long, very narrow head; 2.7×0.7; short tang (broken?) (3.3); 3 very shallow and very rounded wings; 1.9 g (corroded); drawn; photo.

6 Missing; drawn; photo.

7 Short, medium-wide head; 2.2×0.7; tang broken (3.2); 3 wings (2 broken), rounded (7); 1.6 g (corroded); drawn; photo.

### 9-283

1 Medium-long, medium-wide head; 2.6×1.3; medium tang (4.0); 3 wings, straight; 2.6 g (perfect condition); drawn; photo.

2 Short, wide head; 2.0×0.9; tang broken (3.0); 3 wings (very worn); 1.02 g (very corroded); drawn; photo.

### 16-112

Short, wide head (tip broken?); 2.3×1.4; tang broken (2.8); 3 wings, pointed; 2.68 g (corroded); drawn.

### 16-164

1 Very long and narrow; 3.0×1.0; very long tang (5.0); 3 wings (2 broken), rounded; 2.54 g (corroded); drawn; photo.

2 Missing; drawn; photo.

### 16-295

1 Medium-long, medium-wide head; 2.8×1.1; long tang (4.6); 3 wings, straight; 2.43 g (perfect condition); drawn; photo.

2 Medium-long, narrow head; 3.3×1.0; medium tang (4.9); 3 wings, rounded; 2.7 g (corroded); drawn; photo.

### W42-44

Short, wide head; 2.0×1.2; tang broken (2.7); 3 wings, pointed; 2.90g (corroded); drawn.

### W44-41

1 Short, wide head; 2.1×1.2; tang broken (2.6); 3 wings, pointed; very corroded; drawn.

2 Short, wide head; 2.2×1.1 (wing tips broken) (3.3); 3 wings, pointed; 2.98 g (corroded); drawn.

3 4 fragments, formless.

**52-10**

- 1 Medium-long, medium-wide head (tip broken); 2.5×1.4; broken (2.8); 3 wings, seem to be pointed; 3.58 g (corroded); drawn.
- 2 Medium-long, medium-wide head (tip broken); 2.5×1.4; tang broken (4.0); 3 wings; 2.94 g (very corroded); drawn.
- 3 Very corroded fragment; 3 wings.
- 4 Short, wide head; 2.0×1.2; tang broken (2.5); 3 wings; 2.25 g (very corroded); drawn.
- 5 Short, wide head (tip broken?); 2.0×1.4; tang broken (2.2); 3 wings, pointed; 1.87 g (very corroded); drawn.
- 6 Large, wide head; (top broken); 2.0×1.7; tang broken; 3 wings, pointed; 3.13 g (very corroded); drawn.

**92-139**

- 1 Short, wide head; 2.3×1.1; medium tang (4.0); 3 wings, straight; 1.59 g (perfect condition); drawn.

**92-492**

Long, medium-wide head; 2.7×1.1; medium tang (4.0); 3 wings, straight; 2.12 g (perfect condition); drawn; photo.

**108-594**

- 1 Missing; drawn.

**126-113**

- 1 Missing; drawn.
- 2 Missing; drawn.

**126-180**

- 2 Long, wide head (tip broken); 2.6×1.5; tang broken (3.4); 3 wings, pointed; 3.99 g (very corroded); drawn.

**126-237**

- 1 Long, medium-wide head; 3.5×1.4; medium tang (5.3); 3 wings, straight; 6.25 g (very corroded); drawn.
- 2 Long, medium-wide head (top broken); 2.0×1.4; medium tang (3.7); 3 wings, rounded; 4.21 g (very corroded); drawn.
- 3 Medium-long, medium-wide head; 2.8×1.5; tang broken (3.2); 3 wings; pointed; 3.40 g (very corroded).
- 4 Medium-long, medium-wide head; 2.8×1.4; tang broken (3.1); 3 wings, pointed; 3.30 g (very corroded).

**126-306 (3 arrowheads)**

Long, medium-wide head; 4.4×1.8; tang broken; 3 wings; rounded.  
Medium-long, wide head; 3.0×1.3; tang broken (3.5); 3 wings, straight.  
Too fragmentary to measure.

**159-197**

- 1 Missing.

**173-1427**

- 2 Medium-long, wide head (top broken); 1.8×1.6; medium tang (broken?) (3.6); 3 wings, pointed; 4.15 g (very corroded); drawn.
- 3 Medium-long, wide head (top broken); 2.2×1.6; tang broken (2.6); 3 wings, seem to be pointed; 2.57 g (very corroded); drawn.

**174-1439 (7 very corroded arrowheads)**

Medium-long, medium-wide head; 2.7×1.6; tang broken (3.4); 3 wings, pointed.  
Medium-long, medium-wide head; 2.5×1.6; medium tang (3.7); 3 wings; straight or pointed.  
Long, narrow head (tip broken); 2.8×1.4; tang broken (3.2); 3 wings, rounded.



## THE MILITARY EQUIPMENT FROM MASADA

Short, wide head; 2.4×1.6; tang broken; 3 wings, straight or pointed.  
Short, wide head; 2.4×1.6; tang broken; 3 wings, straight or pointed.  
Short, wide head; 2.2×1.3; tang broken (2.5); 3 wings; rounded or straight.  
Short, wide head; 2.5×1.3 (side broken); tang broken; 3 wings (tips broken).

### 176-218

1 Long, narrow head; 3.1×1.3; tang broken (4.7); 3 wings, rounded; 4.76 g (corroded), drawn.

### 189-1480 (9 very corroded arrowheads)

Very long and narrow head; 4.3×1.7; medium tang (broken?); 3 wings, rounded.  
Long, wide head; 3.1×2.0; tang broken; 3 wings, straight (?).  
Long, wide head (tip broken); 3.2×2.1; tang broken (4.3); 3 wings, seem to be rounded.  
Long, medium-wide head; 3.7×1.8; tang broken; 3 wings (tips broken).  
Long, narrow head; 3.3×1.5; tang broken (4.0); 3 wings, rounded.  
Medium-long, wide head (bottom broken); 2.9×1.6; tang broken; 3 wings.  
Small, long, narrow head; 2.7×1.2; tang broken (3.2); 3 wings, rounded.  
Top broken; seems to be medium-long, medium-wide head; 1.6×1.6; tang broken (2.5); 3 wings, seem to be straight.  
Long, narrow head (tip broken); 3.0×1.2 (sides broken); tang broken (4.0); 3 wings, rounded.

### 234-1977

1 Medium-long, wide head; 3.2×1.5; medium tang (broken?) (4.7); 3 wings (1 broken), straight but rounded at tips; 4.22 g (very corroded).

### 323-145

Long, narrow head; 3.4×1.3; tang broken (4.8); 3 wings, rounded; 5.43 g (very corroded).

### 338-363

Long, wide head; 4.5×2.0; tang broken (5.4); 3 wings, straight; 0.18 g (very corroded); drawn.

### 361-488 (3 very corroded arrowheads)

Short and wide; 2.0×1.6; medium tang (3.4); 3 wings, pointed.  
Short, wide head; 2.0×1.6; tang broken (2.6); 3 wings pointed.  
Very corroded; seems to be medium-long, wide head; 3.0×2.0; tang broken; 3 wings (tips broken).

### 368-481 (15 very corroded arrowheads)

Short, wide head; 2.4×1.5; medium tang (4.1); 3 wings, pointed.  
Short, wide head; 2.3×1.5; medium tang (3.6); 3 wings, pointed.  
Short, wide head (tip broken); 2.3×1.8; tang broken (3.5); 3 wings, pointed.  
Short, wide head (tip broken); 2.1×1.5; medium tang (broken?) (3.9); 3 wings, pointed.  
Short, wide head; 2.5×1.9; short tang (3.7); 3 wings, straight.  
Short, wide head; 2.5×1.7; tang broken (2.7); 3 wings, pointed.  
Medium-long, wide head; 2.8×1.6; tang broken (3.0); 3 wings, pointed.  
Small, short, wide head; 2.1×1.2; long tang (tip broken) (4.0); 3 wings, pointed.  
Small, short, wide head; 2.1×1.3; medium tang (3.7); 3 wings, straight(?).  
Small, short, wide head; 1.7×1.2; long tang (3.5); 3 wings, pointed.  
Short, wide head; 2.2×1.1; medium tang (3.5); 3 wings, pointed.  
Short, wide head; 2.0×1.5; medium tang (3.5); 3 wings, pointed.  
Short, wide head; 2.4×1.4; tang broken (3.0); 3 wings, pointed.  
Large head, too corroded to measure.  
Short, wide head; 2.2×1.3; tang broken; 3 wings, pointed.

**401-1289/1** (3 very corroded arrowheads)

Long, narrow head; 3.2×1.2; tang broken (4.3); 3 wings, rounded.

Small, long, narrow head; 2.7×1.2; medium tang (broken?) (3.8); 3 wings, rounded.

Long, narrow head; 2.9×1.3; tang broken (3.6); 3 wings, rounded.

**401-1397**

1 Long, wide head; 4.0×1.8; tang broken (5.1); 3 wings, pointed; 8.53 g (very corroded); drawn.

2 Short, medium-wide head; 2.7×1.3; tang broken (3.4); 3 wings, worn; 3.31 g (very corroded); drawn.

**401-426**

Short, wide head; 2.3×1.5; tang broken (3.6); 3 wings, pointed; 3.49 g (corroded); drawn.

**441-1115** (5 fragmentary and corroded arrowheads)

Long, wide head (tip broken); 3.5×1.8; tang broken (4.7); 3 wings, straight; 7.26 g (very corroded).

Long, narrow head; 2.5×1.1; tang broken (3.3); 3 wings, pointed; 1.85 g (very corroded).

Medium-long, medium-wide head; 2.1×1.1; very long tang (4.6); 3 wings, pointed; 2.35 g (very corroded).

Short, wide head (tip broken); 2.0×1.5; tang broken (2.8); 3 wings, pointed.

Short, wide head (tip broken); 1.8×1.5; tang broken (2.5); 3 wings, pointed.

**442-511**

1 Short, wide head; 1.7×1.3; long tang (3.8); 3 wings, pointed; 2.37 g (corroded); drawn; photo.

2 Short, wide head; 2.2×1.5; tang broken (3.2); 3 wings, pointed; 3.14 g (corroded); drawn; photo.

3 Short, wide head; 2.0×1.3; tang broken (2.9); 3 wings (1 broken), pointed; 1.28 g (very corroded); drawn; photo.

4 Short, wide head; 1.6×1.2; long tang (broken?) (3.5); 3 wings, pointed; 2.57 g (corroded); drawn; photo.

5 Short, medium-wide head, 2.1×1.3; tang broken (3.6); 3 wings, pointed; 3.70 g (very corroded); drawn; photo.

6 Short, wide head; 2.0×1.4; long tang (broken?) (4.0); 3 wings, pointed; 3.23 g (very corroded); drawn; photo.

**442-511/7** (105 fragmentary arrowheads; 4 photographed)

Medium-long, wide head; 2.5×1.5; tang broken (3.9); 3 wings, pointed.

Short, wide head; 2.5×1.4; medium tang (broken?) (3.8); 3 wings, pointed.

Short, wide head; 2.3×1.6; medium tang (broken?) (4.0); 3 wings, pointed.

Short, wide head; 2.3×1.3; long tang (broken?) (4.3); 3 wings, pointed.

Short, wide head; 2.0×1.5; tang broken (3.5); 3 wings, pointed.

Short, wide head; 2.4×1.4; long tang (broken?) (4.1); 3 wings, pointed.

Short, wide head; 2.1×1.4; tang broken (3.8); 3 wings, pointed.

Short, wide head (tip broken); 1.9×1.5; long tang (broken?) (3.5); 3 wings, pointed.

Short, wide head; 1.9×1.4; tang broken (2.4); 3 wings, pointed.

Short, wide head; 2.5×1.4; tang broken (4.0); 3 wings, pointed.

Short, wide head; 2.2×1.3; long tang (broken?) (3.8); 3 wings, pointed.

Short, wide head; 2.1×1.6; tang broken (2.7); 3 wings, pointed.

Short, wide head; 2.3×1.4; tang broken (2.4); 3 wings, pointed.

Short, wide head; 1.9×1.4; tang broken (3.1); 3 wings, pointed.

Short, wide head; 2.3×1.4; long tang (broken?) (3.9); 3 wings, pointed.

Short, wide head (tip broken); 1.9×1.3; long tang (3.7); 3 wings, pointed.

Short, wide head; 2.2×1.3; tang broken (4.0); 3 wings, pointed.

Short, wide head (tip broken), 1.7×1.6; tang broken (3.0); 3 wings, pointed.

Short, wide head; 2.3×1.4; tang broken (3.7); 3 wings, pointed.

Short, wide head (top broken); 1.8×1.7; long tang (broken?) (3.6); 3 wings, pointed.

## THE MILITARY EQUIPMENT FROM MASADA

Short, wide head; 2.0×1.3; tang broken (2.8); 3 wings, pointed.  
Short, wide head (top broken); 1.8×1.5; tang broken (3.0); 3 wings, pointed.  
Short, wide head; 1.8×1.6; tang broken (2.7); 3 wings, pointed.  
Short, wide head (top broken); 1.4×1.6; tang broken (2.8); 3 wings, pointed.  
Short, wide head; 1.6×1.3; long tang (broken?) (3.5); 3 wings, pointed.  
Short, wide head (top broken); 1.4×1.3; tang broken (2.9); 3 wings, pointed.  
Short, wide head (top + 2 wings broken); 1.9×1.3; tang broken (2.8); 3 wings, pointed.  
Short, wide head (tip broken); 1.5×1.5; tang broken (2.3); 3 wings, pointed.  
Short, wide head (top broken); 1.9×1.4; tang broken (3.1); 3 wings, pointed.  
Short, wide head; 2.3×1.4; tang broken (3.0); 3 wings, pointed.  
Short, wide head (2 wings broken); 2.2×1.3; tang broken; 3 wings, pointed.  
Short, wide head (2 wings broken); 2.1×1.3; long tang (4.0); 3 wings, pointed.  
Short, wide head; 1.5×1.4; tang broken (2.3); 3 wings, pointed.  
Short, wide head; 1.9×1.3; tang broken (2.0); 3 wings, pointed.  
Short, wide head; 1.9×1.4; tang broken (3.1); 3 wings, pointed.  
Short, wide head; 2.0×1.2; long tang (broken?) (3.5), 3 wings, pointed.  
Short, wide head; 2.0×1.3; tang broken (2.7); 3 wings, pointed.  
Short, wide head (very corroded); 1.7×1.1; tang broken (2.8); 3 wings, pointed.  
Short, wide head; 2.0×1.2; tang broken (3.0); 3 wings, pointed.  
Short, wide head (very corroded); 1.6×1.1; long tang (3.3); 3 wings, pointed.  
Short, wide head; 1.9×1.2; tang broken (2.6); 3 wings, pointed.  
Short, wide head (top broken); 1.6×1.3; tang broken (2.8); 3 wings, pointed.  
Short, wide head (top broken); 1.7×1.6; tang broken (2.8); 3 wings, pointed.  
Short, wide head (top broken); 1.6×1.2; tang broken (2.7); 3 wings, pointed.  
Short, wide head (top broken); 1.9×1.5; tang broken (2.7); 3 wings, pointed.  
Short, wide head (top broken); 1.9×1.2; tang broken (3.5); 3 wings, pointed.  
Short, wide head; 2.5×1.5; tang broken (3.1); 3 wings (1 broken), pointed.  
Short, wide head (top broken); 1.0×1.3; tang broken (2.3); 3 wings, pointed.  
Short, wide head (very corroded); 1.4×1.3; tang broken (3.1); 3 wings, pointed.  
Long, narrow head; 2.3×1.1; medium tang (broken?) (3.5); 3 wings (tips broken).  
Short, wide head (very corroded); 1.7×1.1; long tang (broken?) (3.0); 3 wings (tips broken).  
Short, wide head (top broken); 1.4×1.3; tang broken (2.4); 3 wings (tips broken).  
Short, wide head; 1.9×1.3; tang broken (3.4); 3 wings, pointed.  
Short, wide head; 1.7×1.4; tang broken (3.2); 3 wings, pointed.  
Short, wide head; 2.1×1.3; long tang (broken?) (4.0); 3 wings, pointed.  
Short, wide head; 2.0×1.4; long tang (4.0); 3 wings, pointed.  
Short, wide head; 1.8×1.6; tang broken (2.1); 3 wings, pointed.  
Short, wide head (tip broken); 2.1×1.5; tang broken? (4.0); 3 wings, pointed.  
Short, wide head (tip broken); 1.7×1.3; tang broken (3.0); 3 wings, pointed.  
Short, wide head (top broken); 1.6×1.5; tang broken (3.1); 3 wings, pointed.  
Short, wide head; 1.7×1.3; long tang (broken) (3.5); 3 wings, pointed.  
Short, wide head; 2.0×1.4; tang broken (3.0); 3 wings, pointed.  
Short, wide head; 2.0×1.6; tang broken (2.9); 3 wings, pointed.  
Short, wide head; 2.0×1.4; tang broken (2.9); 3 wings, pointed.  
Short, wide head; 2.3×1.7; tang broken (2.9); 3 wings, pointed.  
Short, wide head; 1.5×1.3; long tang (3.2); 3 wings, pointed.  
Short, wide head; 1.8×1.2; tang broken (3.2); 3 wings, pointed.  
Short, wide head; 2.0×1.6; tang broken (2.7); 3 wings, pointed.  
Short, wide head (2 wings broken); 1.8×1.5; medium tang (broken?) (3.7); 3 wings, pointed.

Short, wide head; 2.0×1.5; tang broken (2.8); 3 wings, pointed.  
 Short, wide head; 2.1×1.2; medium tang (broken?) (3.6); 3 wings, pointed.  
 Short, wide head; 2.1×1.3; tang broken (2.6); 3 wings, pointed.  
 Short, wide head (tip + 2 wings broken); 1.6×1.5; medium tang (broken?) (3.3); 3 wings (tips broken).  
 Short, wide head (very corroded); 1.8×1.4; tang broken (3.1); 3 wings, pointed.  
 Short, wide head (very corroded); 2.0×1.5; tang broken; 3 wings (tips broken).  
 The other 30 pieces are too fragmentary to measure.

**442-511/7** (105 very corroded fragments of arrowheads; 4 photographed)

**448-940**

Short, wide head; 1.8×1.2; medium tang (broken?) (3.3); 3 wings, pointed, 2.95 g (very corroded); drawn.

**456-337**

- 1 Long and narrow; 4.0×1.5 medium tang (6.0); 3 wings, rounded; 6.89 g (very corroded); drawn; photo.
- 2 Medium-long, medium-wide head; 2.8×1.7; tang broken (4.0); 3 wings, pointed; 3.79 g (very corroded); drawn; photo.
- 3 Medium-long, medium-wide head; 2.0×1.2; tang broken (3.6); 3 wings, pointed; 1.50 g (corroded); drawn; photo.
- 4 Medium-long, medium-wide head; 3.0×1.5; tang broken (4.0); 3 wings, pointed; 3.81 g (corroded); drawn; photo.
- 5 Short, wide head; 1.7×1.5; medium tang (broken?) (3.5); 3 wings, pointed; 2.31 g (very corroded); drawn; photo.

**456-337/6** (110 very corroded arrowheads)

Long, medium-wide head; 4.0×1.6; tang broken (5.2); 3 wings, straight.  
 Long, medium-wide head; 3.3×1.6; tang broken (4.1); 3 wings, rounded.  
 Short, wide head; 3.0×1.7; tang broken (4.1); 3 wings, pointed.  
 Short, wide head; 2.2×1.2; medium tang (3.7); 3 wings, pointed.  
 Long, narrow head; 3.0×1.5; tang broken (3.5); 3 wings, pointed.  
 Short, wide head; 1.9×1.4; medium tang (3.6); 3 wings, pointed. (Pl. 23:8)  
 Long, narrow head; 2.7×1.2; tang broken (3.6); 3 wings, pointed.  
 Long, narrow head; 2.6×1.2; tang broken (2.9); 3 wings, pointed.  
 Long, medium-wide head (tip broken); 2.0×1.4; tang broken (3.2); 3 wings, pointed.  
 Short, wide head; 2.3×1.6; tang broken (2.7); 3 wings, pointed.  
 Long, medium-wide head; 2.4×1.2; tang broken (3.0); 3 wings, pointed.  
 Short, wide head; 2.1×1.3; tang broken (2.5); 3 wings, pointed.  
 Short, wide head; 2.4×1.6; tang broken (3.5); 3 wings, pointed.  
 Short, wide head; 2.5×1.3; tang broken (3.0); 3 wings, pointed.  
 Short, wide head; 2.5×1.6; tang broken (3.1); 3 wings, pointed.  
 Short, medium-wide head; 2.3×1.3; tang broken (3.2); 3 wings, pointed.  
 Short, wide head; 1.7×1.2; long tang (3.2); 3 wings, pointed.  
 Short, medium-wide head; 2.2×1.5; tang broken (2.9); 3 wings, pointed.  
 Long, wide head; 2.7×1.6; tang broken (3.2); 3 wings, pointed.  
 Long, narrow head (tip broken); 2.5×1.4; tang broken (3.6); 3 wings, pointed.  
 Long, medium-wide head (top broken); 1.9×1.4; tang broken (2.9); 3 wings, pointed.  
 Long, narrow head; 2.6×1.3; tang broken (3.5); 3 wings, pointed.  
 Long, narrow head; 2.6×1.3; tang broken (3.0); 3 wings, pointed.  
 Long, narrow head (tip broken); 2.2×1.2; long tang (4.0); 3 wings, pointed.  
 Short, wide head; 2.1×1.4; tang broken (2.3); 3 wings, pointed.  
 Short, medium-wide head (top broken); 1.9×1.4; tang broken (3.6); 3 wings, pointed.

## THE MILITARY EQUIPMENT FROM MASADA

Short, wide head; 2.0×1.2; tang broken (2.6); 3 wings, pointed.  
Short, wide head; 2.2×1.4; tang broken (3.3); 3 wings, pointed.  
Long, narrow head; 2.5×1.2; medium tang (broken?) (4.1); 3 wings, rounded.  
Long, wide head; 2.2×1.6; tang broken (3.4); 3 wings, pointed.  
Long, narrow head; 2.4×1.2; tang broken (2.7); 3 wings, pointed.  
Long, narrow head; 2.4×1.1; long tang (broken?) (4.4); 3 wings, pointed.  
Long, narrow head; 2.2×1.3; tang broken (3.2); 3 wings, pointed.  
Short, wide head (top broken); 1.8×1.4; tang broken (3.4); 3 wings, pointed.  
Long, medium-wide head; 3.6×1.5; tang broken (4.3); 3 wings, rounded.  
Long, medium-wide head (top broken); 2.3×1.3; tang broken (3.3); 3 wings, pointed.  
Long, medium-wide head; 2.5×1.3; tang broken (2.9); 3 wings (tips broken).  
Long, narrow head (tip broken); 2.1×1.1; tang broken (3.2); 3 wings, pointed.  
Short, wide head; 2.2×1.3; tang broken (3.7); 3 wings, seem to be pointed.  
Long, medium-wide head; 4.0×1.4; tang broken; 3 wings, rounded.  
Short, wide head (tip broken); 1.9×1.4; tang broken (2.8); 3 wings, pointed.  
Long, narrow head (tip broken); 2.3×1.3; tang broken (2.5); 3 wings, pointed.  
Short, wide head (tip broken); 1.9×1.4; tang broken (2.7); 3 wings, pointed.  
Long, narrow head; 2.4×1.1; tang broken (2.9); 3 wings, pointed.  
Short, wide head; 2.2×1.2; long tang (4.1); 3 wings, pointed.  
Short, wide head (top broken); 1.8×1.8; tang broken (2.4); 3 wings, pointed.  
Long, narrow head; 2.5×1.3; tang broken (2.7); 3 wings, pointed.  
Long, medium-wide head; 3.0×1.4; tang broken (3.6); 3 wings, rounded.  
Long, narrow head; 2.7×1.2; tang broken (3.0); 3 wings, pointed.  
Short, wide head (top broken); 1.5×1.7; medium tang (broken?) (3.1); 3 wings, pointed.  
Long, medium-wide head (tip broken); 2.9×1.4; tang broken; 3 wings, rounded.  
Short, wide head; 2.4×1.7; tang broken (3.2); 3 wings, pointed.  
Short, wide head; 2.2×1.6; tang broken (3.2); 3 wings, pointed.  
Short, wide head (top broken); 1.7×1.3; tang broken (2.8); 3 wings, pointed.  
Short, medium-wide head; 2.0×1.1; tang broken (2.8); 3 wings, pointed.  
Long, medium-wide head; 2.1×1.3; tang broken (2.9); 3 wings, pointed.  
Long, medium-wide head; 2.5×1.2; tang broken (3.0); 3 wings, pointed.  
Short, wide head; 2.1×1.3; tang broken (2.7); 3 wings (tips broken).  
Long, medium-wide head (top broken); 1.7×1.3; long tang (5.0); 3 wings (tips broken).  
Long, narrow head; 2.9×1.2; tang broken (3.9); 3 wings, pointed.  
Long, medium-wide head; 4.1×1.8; tang broken; 3 wings, rounded or straight.  
Long, medium-wide head; 3.1×1.6; tang broken; 3 wings, rounded.  
Short, wide head; 2.2×1.4; tang broken (2.7); 3 wings, pointed.  
Short, wide head; 2.2×1.4; tang broken (2.4); 3 wings, pointed.  
Short, wide head (top worn away?); 1.6×1.6; medium tang (broken?) (3.0); 3 wings, pointed.  
Short, wide head; 2.0×1.2; tang broken (2.5); 3 wings, pointed.  
Short, wide head; 2.0×1.3; tang broken (2.3); 3 wings, pointed.  
Long, narrow head (tip broken); 1.9×1.1; tang broken (2.2); 3 wings, pointed.  
Short, medium-wide head; 2.2×1.3; tang broken (3.1); 3 wings, pointed.  
Medium-long, wide head; 2.6×1.4; tang broken (3.2); 3 wings, pointed or straight.  
Long, narrow head; 2.5×1.1; tang broken (2.8); 3 wings, straight.  
Short, wide head; 1.8×1.4; medium tang (broken?) (3.4); 3 wings (tips broken).  
Short, wide head; 2.6×1.4; tang broken; 3 wings, pointed(?).  
Short, wide head; 2.1×1.4; tang broken (2.5); 3 wings, pointed.  
Short, wide head (top broken); 1.9×1.5; tang broken (2.7); 3 wings, pointed.

Short, wide head; 2.1×1.3; tang broken (2.5); pointed.

Long, medium-wide head; 3.0×1.2; tang broken; 3 wings, rounded.

Short, wide head; 1.9×1.3; medium tang (broken?) (3.3); 3 wings, pointed.

Short, wide head; 2.1×1.3; tang broken (2.4); 3 wings straight or pointed.

Short, wide head (top broken); 1.9×1.6; tang broken (2.9); 3 wings, pointed.

Short, wide head; 1.9×1.4; tang broken; 3 wings, pointed.

Long, narrow head; 2.6×1.3; tang broken (3.0); 3 wings, pointed.

Short, wide head (2 wings + tip broken); 1.8×1.1; tang broken (2.7); 3 wings, pointed or straight.

Long, narrow head; 3.0×1.2; tang broken; 3 wings, rounded.

Short, wide head (top broken); 1.8×1.3; tang broken (3.0); 3 wings, pointed.

Short, wide head (very corroded); 1.7×1.2; medium tang (broken?) (2.8); 3 wings, pointed.

Short, wide head (top broken); 1.3×1.4; tang broken (2.0); 3 wings, straight or pointed.

The remaining 21 arrowheads are too corroded to measure.

**457-583**

Long, narrow head; 2.1×1.2; tang broken (3.8); 3 wings, pointed; 2.50 g (corroded); drawn.

**458-54**

Long, medium-wide head; 2.2×1.4; tang broken (3.6); 3 wings (1 wing broken), pointed; 2.12 g (very corroded); drawn.

**458-82**

1 Short, wide head (tip broken); 2.0×1.5; tang broken (3.4); 3 wings, pointed; 2.99 g (very corroded); drawn.

2 Short, wide head; 2.3×1.6; tang broken(?) (4.3); 3 wings, pointed; 4.06 g (very corroded); drawn.

3 Short, wide head; 2.2×1.4; tang broken (2.4); 3 wings, pointed; 2.61 g (very corroded); drawn.

**458-83**

3 Missing.

**489-330**

Long, medium-wide head; 2.7×1.5; tang broken (4.2); 3 wings, pointed; 3.51 g (corroded); drawn; photo.

**501-1587**

Long, medium-wide head; 2.9×1.2; tang broken (4.0); 3 wings, pointed; 3.85 g (very corroded); drawn.

**502-3041** (2 arrowheads)

Long, medium-wide head; 3.3×1.6; tang broken(?) (4.8); 3 wings, rounded; 7.01 g.

Long, medium-wide head (top broken); 3.0×1.7; tang broken (4.0); 3 wings, rounded; 7.44 g (very corroded).

**521-96**

1 Short, wide head; 1.7×1.2; medium tang (broken?) (3.4); 3 wings, pointed; 3.00 g.

2 Short, medium-wide head; 2.0×1.4; tang broken (3.0); 3 wings, pointed; 2.66 g (very corroded).

**523-342**

1 Short, wide head; 1.9×1.3; medium tang (broken?) (3.4); 3 wings, pointed; 2.44 g (very corroded); drawn.

2 Short, wide head; 2.2×1.6; long tang (broken) (4.5); 3 wings, pointed; 3.33 g (very corroded); drawn.

**534-743** (2 very corroded arrowheads)

Short, wide head; 2.3×1.7 (2 wings broken); tang broken (4.3); 3 wings, pointed; 4.75 g (very corroded).

Too corroded to measure.

**547-1162**

Long, medium-wide head (tip broken); 3.6×1.7; tang broken (4.3); 3 wings, rounded; 8.58 g (very corroded).



Short, wide head; 2.0×1.2; tang broken (2.7); 3 wings, pointed.  
The other 2 arrowheads are too corroded to measure.

**1058-1384**

Medium-long, medium-wide head; 2.3×1.4; tang broken (4.1); 3 wings, pointed; 3.62 g (very corroded); drawn.

**1059-2201**

Short, wide head; 1.9×1.5; tang broken (3.1); 3 wings, pointed; 3.38 g (very corroded).

**1110-1481**

2 Short, medium-wide head (tip broken); 2.2×1.2; tang broken (3.6); 3 wings, rounded; 2.57 g (corroded); drawn; photo.

**1113-1826**

Short, wide head; 2.0×1.5; long tang (broken?) (4.0); 3 wings, pointed, 2.76 g (very corroded); drawn.

**1128-1964**

Very long and narrow head; 4.2×1.5; tang broken (5.5); 3 wings, straight; 5.64 g (very corroded); drawn.

**1141-1327**

3 (With restored shaft); short, wide head; 2.2×1.5; 3 wings, pointed; drawn; photo.

**1163-1329**

2 Short, wide head (tip broken); 1.8×1.1; medium tang (broken?) (3.3); 3 wings, rounded(?); 2.38 g (very corroded); drawn.

**1169-1552** (bronze arrowhead with socket)

1 Long, narrow head (tip broken); 2.5×1.0; socket (3.7); 3 wings, rounded; 4.22 g (perfect condition); drawn; photo.

**1238-163**

1 Long, wide head; 3.2×1.6; tang broken (3.8); 3 wings, pointed; 5.86 g (very corroded).

**1264-1958**

1 Short, medium-wide head; 2.5×1.1; medium tang (4.0); 3 wings, pointed; 2.6 g; drawn; photo.  
2 Missing.

**1264-2062** (2 fragmentary arrowheads)

Too fragmentary to measure.

**1269-1811**

Medium-long, wide head; 2.5×1.5; tang broken (3.6); 3 wings, pointed; 3.50 g (very corroded); drawn.

**1271-1257**

2 Long, narrow head; 3.3×1.3; tang broken (4.2); 3 wings, rounded; 4.09 g (very corroded); drawn.

**1271-1637**

1 Long, medium-wide head; 4.5×1.3; tang broken (6.0), 3 wings, rounded; 8.03 g (very corroded); drawn.  
2 Short, wide head; 2.0×1.5; tang broken (3.5); 3 wings, pointed; 4.13 g (very corroded); drawn.

**1273-1730**

Fragment of an arrowhead with original wooden shaft; drawn.

**1273-1732** (3 very corroded arrowheads)

Too fragmentary to measure.



## THE MILITARY EQUIPMENT FROM MASADA

### **1273-1784** (10 very corroded arrowheads)

Short, wide head; 2.2×1.5; long tang (4.3); 3 wings, pointed.

Short, wide head; 2.3×1.3; tang broken (3.1); 3 wings, pointed.

Short, wide head; 2.2×1.5; tang broken (3.5); 3 wings, pointed.

Short, wide head (2 wings broken); 2.1×1.4; tang broken (3.6); 3 wings, pointed.

Medium-long, wide head; 2.9×1.4; tang broken (3.1); 3 wings, pointed.

Short, wide head; 1.9×1.3; medium tang (broken?) (3,3); 3 wings, pointed.

Medium-long, wide head; 2.8×1.5; tang broken (3.2); 3 wings, pointed.

Short, wide head (tip broken); 2.0×1.3; tang broken (2.2); 3 wings, pointed.

2 pieces too fragmentary to measure.

### **1276-1758**

(With restored shaft); short, wide head; 2.9×1.4; 3 wings, straight; drawn; photo.

### **1276-1880**

Short, wide head; 1.9×1.0; very long tang (3.8); 3 wings, pointed; 1.20 g (perfect condition); drawn; photo.

## CATALOGUE OF SCALE ARMOR

The following information is provided for each scale: the relative proportions and shape of the scale (for example, “long and narrow”); the color as it presently appears (for example, “red;” in cases where the scale is now green due to corrosion, the color is not indicated); then the length and width of the scale in centimeters is stated; the existence of a raised medial rib and border is indicated; the number of holes punched in the scale is given (“4 holes” means that there are four holes arranged in a square at the top of the scale); and finally, the existence of a drawing and/or photograph for the scale is mentioned. The system of numbering in regard to loci and registration numbers is the same as for the arrowheads.

### 8-188

- 1 Missing; drawn.
- 2 Long and narrow; silvered; 3.2×1.3; central rib (3/4) + border, 4 holes; drawn.
- 3 Long and narrow; gold; 3.2×1.3; central rib + border; 4 holes; drawn.
- 4 Long and narrow; silvered; 3.0×1.4; central rib + border; 4 holes; drawn.
- 5 Long and narrow; gold; 2.9 (broken)×1.4; central rib + border, 4 holes; drawn.
- 6 Long and narrow; gold; 3.2×1.3; central rib + border; 4 holes; drawn.
- 7 Long and narrow; red; 3.2×1.4; central rib + border; 4 holes; drawn.
- 8 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes + 2 large holes in center; drawn.
- 9 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 10 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 11 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes + 2 holes in center; drawn.
- 12 Long and narrow; gold; 3.2×1.3; central rib + border; 4 holes; drawn.
- 13 Long and narrow; silvered; 3.0 (broken)×1.2 (broken); central rib + border, 4 holes; drawn.
- 14 Long and narrow; red; 3.2×1.4; central rib + border; 4 holes; drawn.
- 15 Long and narrow; gold; 3.0×1.3; central rib (3/4) + border; 4 holes; drawn.
- 16 Long and narrow; silvered; 3.3×1.5; central rib + border; 4 holes; drawn.
- 17 Long and narrow; red; 3.2×1.4; central rib + border; 4 holes; drawn.
- 18 Long and narrow; gold; 3.0×1.2; central rib + border; 4 holes; drawn.
- 19 Long and narrow; gold; 2.9 (bottom broken)×1.4; central rib (3/4) + border, 4 holes; drawn.
- 20 Long and narrow; gold; 3.0×1.4; central rib (3/4) + border; 4 holes; drawn.
- 21 Long and narrow; gold; 2.9×1.3; central rib (3/4) + border; 4 holes; drawn.
- 22 Long and narrow; silvered; 3.3×1.4; central rib + border, 4 holes; drawn.
- 23 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 24 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 25 Missing; drawn.
- 26 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.
- 27 Short and wide; silvered; 2.7×1.6; central rib + border; 4 holes; drawn.
- 28 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 29 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 30 Short and wide; gold; 2.6×1.6; central rib (1/2) + border; 4 holes; drawn.
- 31 Long and narrow; gold; 2.9 (tip broken)×1.3; central rib (3/4) + border; 4 holes; drawn.
- 32 Long and narrow; gold; 3.2×1.3; central rib (3/4) + border; 4 holes; drawn.
- 33 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.
- 34 Long and narrow; gold; 3.2×1.3; central rib + border; 4 holes; drawn.
- 35 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 36 Long and narrow; red; 3.1×1.3; central rib + border; 4 holes; drawn.
- 37 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.

## THE MILITARY EQUIPMENT FROM MASADA

- 38 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 39 Long and narrow; silvered; 1.7 (broken)×1.4; central rib + border, 4 holes; drawn.
- 40 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes + 1 hole on upper left + 1 hole in center bottom; drawn.
- 41 Missing; drawn.
- 42 Long and narrow; gold; 3.0×1.3; central rib (3/4) + border; 4 holes; drawn.
- 43 Long and narrow; red; 3.2×1.4; central rib + border; 4 holes; drawn.
- 44 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 45 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 46 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 47 Long and narrow; silvered; 3.1×1.3; central rib (3/4) + border, 4 holes; drawn.
- 48 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.
- 49 Long and narrow; red; 3.3×1.3; central rib + border; 4 holes; drawn.
- 50 Long and narrow; gold; 3.1×1.3; central rib (3/4) + border; 4 holes; drawn.
- 51 Long and narrow; silvered; 3.1×1.3; central r (3/4) + border; 4 holes; drawn.
- 52 Missing; drawn.

### 8-196

- 1 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes + 2 holes in center; drawn.
- 2 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.
- 3 Long and narrow; gold; 3.2×1.6; central rib (3/4) + border; 4 holes + 1 hole on lower right; drawn.
- 4 Missing; drawn.
- 5 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes; drawn. 6 Missing; drawn.
- 7 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 8 Long and narrow; gold; 3.2×1.3; central rib + border; 4 holes; drawn.
- 9 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 10 Long and narrow; silvered; 3.0×1.2; central rib (3/4) + border, 4 holes; drawn.
- 11 Long and narrow; gold; 3.2×1.3; central rib (3/4) + border; 4 holes; drawn.
- 12 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.
- 13 Missing; drawn.
- 14 Missing; drawn.
- 15 Short and wide; silvered; 2.7×1.6; central rib (1/2) + border, 4 holes; drawn.
- 16 Long and narrow; gold; 2.8 (bottom broken)×1.4; central rib + border, 4 holes; drawn.
- 17 Short and wide; gold; 2.7×1.6; central rib (1/2) + border; 4 holes; drawn.
- 18 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.
- 19 Long and narrow; red; 3.2×1.4; central rib + border; 4 holes; drawn.
- 20 Long and wide; silvered; 3.6×2.1; central rib (3/4); 4 holes; drawn.
- 21 Long and narrow; silvered; 3.1×1.3; central rib-I-border; 4 holes; drawn.
- 22 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 23 Long and narrow; gold; 3.2×1.4; central rib + border; 4 holes; drawn.
- 24 Long and narrow; gold; 3.1×1.4; central rib (3/4) + border; 4 holes; drawn.
- 25 Long and narrow; gold; 3.2 (tip broken)×1.4; central rib + border, 4 holes; drawn.
- 26 Long and narrow; gold; 3.1×1.2; central rib (3/4) + border; 4 holes; drawn.
- 27 Long and narrow; gold; 3.2×1.4; central rib + border; 4 holes; drawn.
- 28 Long and narrow; gold; 3.2×1.5; central rib (3/4) + border; 4 holes; drawn.
- 29 Long and narrow; red; 3.2×1.3; central rib + border, 4 holes; drawn.
- 30 Long and narrow; dark gold; 3.2×1.3; central rib + border; 4 holes; drawn.
- 31 Long and narrow; gold; 2.8 (bottom broken)×1.3; central rib (3/4) + border, 4 holes; drawn.
- 32 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes + 2 holes in center; drawn.

- 33 Long and narrow; gold; 3.0 (broken at top)×1.3; central rib + border; 4 holes; drawn.
- 34 Long and narrow; gold; 3.0 (broken at top)×1.4; central rib + border; 4 holes; drawn.
- 35 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 36 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 37 Missing; drawn.
- 38 Short and wide; ride; 2.7×1.6; central rib (1/2) + border; 4 holes; drawn.
- 39 Long and narrow; red; 3.2×1.4; central rib + border; 4 holes; drawn.
- 40 Long and narrow; gold; 3.0 (bottom broken)×1.4; central rib (3/4) + border, 4 holes; drawn.

**8-197**

- 1 Long and narrow; silvered; 3.1×1.4; central rib (3/4) + border, 4 holes; drawn.
- 2 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 3 Long and narrow; gold; 3.0×1.3; central double rib (3/4) + border; 4 holes; drawn.
- 4 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.
- 5 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 6 Long and narrow; gold; 3.2×1.3; central rib (3/4) + border; 4 holes; drawn.
- 7 Short and wide; gold/red; 2.6×1.8; central rib (1/2); 4 holes + 2 holes below; drawn.
- 8 Short and wide; 2.7×1.6; central rib (1/2) + border, 4 holes; drawn.
- 9 Long and narrow; gold; 3.0 (broken at top)×1.3; central rib + border, 4 holes; drawn.
- 10 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 11 Long and narrow; gold; 3.2×1.3; central rib + border; 4 holes; drawn.
- 12 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 13 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 14 Long and narrow; silvered; 3.0 (broken at top)×1.4; central rib (3/4) + border, 4 holes; drawn.
- 15 Long and narrow; gold; 3.2×1.3; central rib (3/4) + border; 4 holes; drawn.
- 16 Long and narrow; gold; 2.2 (broken)×1.4; central rib (3/4) + border, 4 holes; drawn.
- 17 Short and wide; 2.7×1.6; central rib (1/2) + border; 4 holes; drawn.
- 18 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.
- 19 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.
- 20 Long and narrow; gold; 3.0 (broken at top)×1.4; central rib (3/4) + border, 4 holes; drawn.
- 21 Long and narrow; silvered; 3.1×1.4; central rib (3/4) + border, 4 holes; drawn.
- 22 Long and narrow; red; 3.1 (broken at top)×1.4; central rib + border, 4 holes; drawn.
- 23 Long and narrow; gold; 3.0 (broken at top)×1.4; central rib (3/4) + border, 4 holes; drawn.
- 24 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes; drawn.
- 25 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.
- 26 Long and narrow; gold; 2.7×1.4; central rib (3/4) + border; 4 holes; drawn.
- 27 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 28 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.
- 29 Long and narrow; gold; 3.2 (top broken)×1.3; central rib (3/4) + border; 4 holes; drawn.
- 30 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 31 Long and narrow; red; 3.3×1.4; central rib + border; 4 holes; drawn.
- 32 Long and narrow; gold; 2.9 (top broken)×1.4; central rib (3/4) + border; 4 holes; drawn.
- 33 Long and narrow; gold; 3.3×1.5; central rib + border; 4 holes; drawn.
- 34 Short and wide; silvered; 2.7×1.7; central rib (1/2) + border, 4 holes; drawn.
- 35 Long and narrow; red; 3.3×1.4; central rib + border; 4 holes; drawn.
- 36 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.
- 37 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.
- 38 Long and narrow; gold; 3.2×1.3; central rib (3/4) + border; 4 holes; drawn.
- 39 Long and narrow; gold; 3.2×1.3; central rib + border; 4 holes; drawn.

## THE MILITARY EQUIPMENT FROM MASADA

- 40 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.  
41 Short and wide; red; 2.7×1.7; central rib (1/2) + border; 4 holes; drawn.  
42 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.  
43 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.  
44 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.  
45 Missing; drawn.  
46 Long and narrow; silvered; 3.2 (top broken)×1.6; central rib (3/4) + border; 4 holes + 1 hole in lower center; drawn.  
47 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.  
48 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.  
49 Long and narrow; gold; 3.3×1.4; central rib (3/4) + border; 4 holes; drawn.  
50 Long and narrow; gold; 3.1×1.4; central rib (3/4) + border; 4 holes; drawn.  
52 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.  
53 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.  
54 Long and narrow; silvered; 3.2 (top broken)×1.7; central rib (3/4) + border, 4 holes; drawn.  
55 Long and narrow; silvered; 2.8×1.4; central rib (3/4) + border, 4 holes; drawn.  
56 Long and narrow; gold; 3.3 (tip broken)×1.3; central rib + border, 4 holes; drawn.  
57 Long and narrow; silvered; 3.3×1.5; central rib + border; 4 holes; drawn.  
58 Long and narrow; silvered; 3.3×1.4; central rib (3/4) + border, 4 holes; drawn.  
59 Long and narrow; gold; 3.2 (tip broken)×1.4; central rib + border, 4 holes; drawn.  
60 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes; drawn.  
61 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.  
62 Long and narrow; silvered; 3.2×1.5; central rib (3/4) + border, 4 holes; drawn.  
63 Long and narrow; red; 3.3×1.4; central rib + border; 4 holes; drawn.  
64 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.  
65 Short and wide; red; 2.7×1.7; central rib (1/2) + border; 4 holes; drawn.  
66 Long and narrow; gold; 3.2 (tip broken)×1.4; central rib (3/4) + border; 4 holes; drawn.  
67 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.  
68 Long and narrow; 3.2×1.3; central rib + border, 4 holes; drawn.  
69 Long and narrow; red; 3.3×1.4; central rib + border; 4 holes; drawn.  
70 Long and narrow; gold; 3.2 (top broken)×1.4; central rib + border, 4 holes; drawn.  
71 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.  
72 Short and wide; 2.7×1.7; central rib (1/2) + border, 4 holes; drawn.  
73 Short and wide; red; 2.7×1.6; central rib (1/2) + border; 4 holes; drawn.  
74 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.  
75 Long and narrow; silvered; 2.8 (tip broken)×1.4; central rib + border, 4 holes; drawn.  
76 Missing.  
77 Short and wide; 2.6×1.6; central rib (1/2) + border, 4 holes; drawn.  
78 Missing; drawn.  
79 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.  
80 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes; drawn.  
81 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 8-227**  
1 Long and narrow; dark gold; 3.2×1.3; central rib + border; 4 holes; drawn.  
2 Missing; drawn.  
3 Long and narrow; gold; 3.1×1.3; central rib (3/4) + border; 4 holes; drawn.  
4 Long and narrow; gold; 3.2×1.4; central rib (3/4) + border; 4 holes; drawn.  
5 Long and narrow; silvered; 3.0×1.4; central rib + border; 4 holes; drawn.

- 6 Long and narrow; gold; 3.0×1.4; central rib (3/4) + border; 4 holes; drawn.
- 7 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 8 Long and wide; silvered; 3.6×1.8; central rib + border; 4 holes; drawn.
- 9 Long and narrow; gold; 3.2×1.3; central rib + border; 4 holes; drawn.
- 10 Short and wide; silvered; 2.7×1.5; central rib + border; 4 holes; drawn.
- 11 Long and narrow; gold; 3.1×1.3; central rib (3/4) + border; 4 holes; drawn.
- 12 Long and narrow; red; 3.1 (tip broken)×1.3; central rib + border, 4 holes; drawn.
- 13 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.
- 14 Missing; drawn.
- 15 Missing; drawn.
- 16 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.
- 17 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.
- 18 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.
- 19 Long and narrow; red; 3.3×1.4; central rib + border; 4 holes; drawn.
- 20 Long and narrow; gold; 3.2×1.3; central rib + border; 4 holes; drawn.
- 21 Missing; drawn.
- 22 Long and narrow; gold; 2.6 (broken)×1.3; central rib + border, 4 holes; drawn.
- 23 Missing; drawn.
- 24 Long and narrow; gold; 3.1×1.3; central rib (3/4) + border; 4 holes; drawn.
- 25 Short and wide; gold; 2.7×1.6; central rib + border; 4 holes; drawn.
- 26 Short and wide; silvered; 2.7×1.6; central rib + border; 4 holes; drawn.
- 27 Short and wide; red; 2.7×1.5; central rib + border, 4 holes + 2 holes on right side; drawn.
- 28 Long and narrow; gold; 3.1×1.3; central rib (3/4) + border; 4 holes; drawn.
- 29 Long and narrow; gold; 3.2×1.3; central rib + border; 4 holes; drawn.
- 30 Missing; drawn.
- 31 Long and narrow; red; 3.2×1.4; central rib + border; 4 holes; drawn.
- 32 Long and narrow; gold; 3.2×1.4; central rib + border; 4 holes; drawn.
- 33 Long and narrow; gold; 2.9 (bottom broken)×1.3; central rib (3/4) + border, 4 holes; drawn.
- 34 Long and narrow; gold; 2.8×1.3; central rib (3/4) + border; 4 holes; drawn.
- 35 Missing; drawn.
- 36 Missing; drawn.
- 37 Long and narrow; gold; 2.8 (bottom broken)×1.3; central rib (3/4) + border, 4 holes; drawn.
- 38 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes; drawn.
- 39 Missing; drawn.
- 40 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.

**8-257**

- 1 Short and wide; gold; 2.7×1.7; central rib (1/2) + border; 4 holes; drawn.

**9-262**

Long and narrow; gold; 3.1×1.4; central rib (3/4) + border; 4 holes; drawn.

**9-263**

- 1 Long and narrow; red; 3.2×1.4; central rib + border; 4 holes; drawn.
- 2 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes + 1 hole on lower right side; drawn.
- 3 Very long and narrow; silvered; 3.8×1.3; central rib (3/4); 2 holes, one above the other, drawn.
- 4 Short and wide; silvered; 2.7×1.6; central rib (1/2) + border; 4 holes; drawn.
- 5 Long and narrow; gold; 3.0×1.3; central rib (3/4) + border; 4 holes; drawn.
- 6 Long and narrow; gold; 3.2×1.3; central rib + border; 4 holes; drawn.
- 7 Missing; drawn.

## THE MILITARY EQUIPMENT FROM MASADA

- 8 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 9 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 10 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.
- 11 Short and wide; silvered; 2.7×1.6; central rib (1/2) + border, 4 holes; drawn.
- 12 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 13 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.
- 14 Long and wide; silvered; 3.6×2.0; central rib (3/4) + border, 4 holes; drawn.
- 15 Long and narrow; silvered; 3.1 (tip broken)×1.3; central rib + border, 4 holes; drawn.
- 16 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 17 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes; drawn.
- 18 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.
- 19 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 20 Missing; drawn.
- 21 Long and narrow; gold; 3.0×1.3; central rib (3/4) + border; 4 holes; drawn.
- 22 Long and wide; silvered; 3.6×1.8; central rib (3/4); 4 holes; drawn.
- 23 Long and narrow; red; 3.2×1.4; central rib + border; 4 holes; drawn.
- 24 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 25 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.
- 26 Long and narrow; gold; 3.3×1.4; central rib (3/4) + border; 4 holes; drawn.
- 27 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.
- 28 Long and narrow; gold; 3.1×1.4; central rib (3/4) + border; 4 holes; drawn.
- 29 Short and wide; red; 2.7×1.7; central rib (1/2); 4 holes; drawn.
- 30 Short and wide; gold; 2.7×1.5; central rib (1/2) + border; 4 holes; drawn.
- 31 Long and narrow; gold; 3.2×1.6; central rib + border; 4 holes; drawn.
- 32 Short and wide; gold; 2.7×1.6; central rib (1/2) + border; 4 holes; drawn.
- 33 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.
- 34 Short and wide; gold; 2.8×1.7; central rib (1/2) + border; 4 holes; drawn.
- 35 Very long and wide; silvered; 3.8×1.8; central rib (3/4); 4 holes; drawn.
- 36 Long and narrow; gold; 2.6 (top broken)×1.3; central rib (3/4) + border; 4 holes; drawn.
- 37 Long and narrow; gold; 3.1×1.3; central rib (3/4) + border; 4 holes; drawn.
- 38 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 39 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.
- 40 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.
- 41 Short and wide; gold; 2.6×1.6; central rib (1/2) + border; 4 holes; drawn.
- 42 Short and wide; gold; 2.7×1.6; central rib (1/2) + border; 4 holes; drawn.
- 43 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 44 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.
- 45 Short and wide; silvered; 2.7×1.7; central rib (1/2) + border, 4 holes; drawn.
- 46 Long and narrow; gold; 3.2×1.4; central rib (3/4) + border; 4 holes; drawn.
- 47 Missing; drawn.
- 48 Long and wide; silvered; 3.7×2.1; central rib (3/4); 4 holes; drawn.
- 49 Long and narrow; silvered; 3.2×1.4; central rib border; 4 holes; drawn.
- 50 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.
- 51 Missing; drawn.
- 52 Short and wide; silvered; 2.7×1.7; central rib (1/2); 4 holes; drawn.
- 53 Long and narrow; silvered; 2.9×1.3; central rib (3/4) + border; 4 holes; drawn.
- 54 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 55 Long and narrow; gold; 3.2×1.4; central rib (3/4) + border; 4 holes; drawn.
- 56 Missing; drawn.

- 57 Long and narrow; gold; 3.1×1.3; central rib (3/4) + border; 4 holes; drawn.  
 58 In Israel Museum; drawn.  
 59 Long and narrow; red; 3.2×1.3; central rib + border; 4 holes; drawn.  
 60 Long and narrow; silvered; 3.1×1.3; central rib (3/4) + border, 4 holes; drawn.  
 61 Long and narrow; silvered; 3.2×1.3; central rib (3/4) + border, 4 holes; drawn.  
 62 Short and wide; silvered; 2.7×1.6; central rib (1/2) + border, 4 holes; drawn.  
 63 Long and narrow; gold; 3.0×1.4; central rib (3/4) + border, 4 holes; drawn.  
 64 Long and narrow; gold; 3.2×1.4; central rib (3/4) + border; 4 holes; drawn.  
 65 Long and narrow; gold; 3.2×1.3; central rib + border; 4 holes; drawn.  
 66 Long and narrow; gold; 2.8×1.3; central rib + border; 4 holes; drawn.  
 67 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes; drawn.  
 68 In Israel Museum; drawn.  
 69 Short and wide; 2.1×1.8; central rib (1/2); 4 holes; drawn.  
 70 Long and narrow; gold; 3.1×1.4; central rib (3/4) + border; 4 holes; drawn.  
 71 Long and narrow; silvered; 2.8 (bottom broken)×1.4; central rib (3/4) + border, 4 holes; drawn.  
 72 Missing; drawn.  
 73 Long and narrow; gold; 1.5 (bottom broken)×1.4; central rib (3/4) + border, 4 holes; drawn.  
 74 Missing; drawn.  
 75 Missing; drawn.

**9-264**

- 2 Missing.  
 6 Missing.  
 7 Missing.

**9-282**

- 1 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.  
 2 Long and narrow; gold; 3.1×1.4; central rib (3/4) + border; 4 holes; drawn.  
 3 Long and narrow; silvered; 3.3×1.5; central rib + border; 4 holes; drawn.  
 4 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.  
 5 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.  
 6 Long and narrow; red; 3.3×1.4; central rib + border, 4 holes; drawn.  
 7 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes; drawn.  
 8 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.  
 9 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes + 1 hole on bottom right side; drawn.  
 10 Short and wide; silvered; 2.7×1.6; central rib (1/2) + border, 4 holes; drawn.  
 11 Short and wide; silvered; 2.8×1.3; central rib (1/2) + border, 4 holes; drawn.  
 12 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.  
 13 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.  
 14 Long and narrow; red; 3.3×1.4; central rib + border; 4 holes; drawn.  
 15 Long and narrow; red; 3.3×1.4; central rib + border; 4 holes; drawn.  
 16 Long and narrow; gold; 3.2×1.3; central rib (3/4) + border; 4 holes; drawn.  
 17 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes; drawn.  
 18 Long and narrow; silvered (?); 3.2×1.4; central rib + border; 4 holes; drawn.

**10-304**

- 1 Missing; drawn.  
 2 Long and wide; silvered; 3.7×2.3; central rib (3/4); 4 holes; drawn.  
 3 Missing; drawn.  
 4 Long and narrow; red; too fragmentary to measure; central rib + border; 5 holes (?); drawn.



## THE MILITARY EQUIPMENT FROM MASADA

- 5 Long and narrow; gold; 1.8×1.1 (side and bottom broken); central rib + border, 4 holes; drawn.
- 6 Long and narrow; silvered; 1.9 (bottom broken)×1.4; central rib + border, 4 holes; drawn.
- 7 Long and narrow; gold; 3.1×1.4; central rib (3/4) + border; 4 holes; drawn.
- 8 Long and narrow; gold; 3.2×1.4; central rib + border; 4 holes; drawn.
- 9 Long and narrow; gold; 3.1 (bottom broken)×1.4; central rib (3/4) + border, 4 holes; drawn.
- 10 Missing; drawn.
- 11 Long and narrow; gold; 2.9 (bottom broken)×1.3; central rib (3/4) + border, 4 holes; drawn.
- 12 Long and narrow; silvered; 1.6 (bottom broken)×1.4; central rib + border; 4 holes; drawn.
- 13 Long and narrow; gold; 2.9×1.4; central rib (3/4) + border; 4 holes; drawn.
- 14 Long and narrow; silvered; too fragmentary to measure; 4 holes; drawn.
- 15 Long and narrow; gold; 1.6×1.3 (ends + sides broken); central rib + border; 4 holes; drawn.
- 16 Long and narrow; silvered; 3.1 (bottom broken)×1.4; central rib + border, 4 holes; drawn.
- 17 Long and narrow; gold; 2.9 (bottom broken)×1.3; central rib (3/4) + border, 4 holes; drawn.
- 18 Long and narrow; gold; 2.0 (top broken)×1.4; central rib + border, drawn.
- 19 Long and narrow; silvered; 2.5 (bottom broken)×1.4; central rib + border, 4 holes; drawn.
- 20 Long and narrow; gold; 3.0×1.3; central rib (3/4) + border; 4 holes; drawn.
- 21 Long and narrow; silvered; 2.9 (bottom broken)×1.4; central rib + border, 4 holes; drawn.
- 22 Long and wide; red; 3.7×1.9; central rib (3/4); 4 holes; drawn.
- 23 Long and narrow; dark gold; 3.3×1.4; central rib + border; 4 holes; drawn.
- 24 Long and narrow; red; 3.2×1.4; central rib + border; 4 holes; drawn.
- 25 Long and narrow; red; 3.3×1.4; central rib + border; 4 holes; drawn.
- 26 Long and narrow; gold; 3.2 (top broken)×1.4; central rib + border, 4 holes; drawn.
- 27 Long and narrow; gold; 3.0×1.2; central rib (3/4) + border; 4 holes; drawn.
- 28 Long and narrow; gold; 2.6 (bottom broken)×1.4; central rib + border, 4 holes; drawn.
- 29 Long and narrow; gold; 3.1×1.3; central rib (3/4) + border; 4 holes; drawn.
- 30 Long and narrow; gold; 3.2×1.4; central rib + border; 4 holes; drawn.
- 31 Long and narrow; gold; 2.9 (bottom broken)×1.3; central rib (3/4) + border, 4 holes; drawn.
- 32 Long and narrow; gold; 3.0×1.2; central rib (3/4) + border; 4 holes; drawn.
- 33 Missing; drawn.
- 34 Long and narrow; gold; 2.6 (bottom broken)×1.2; central rib (3/4) + border, 4 holes; drawn.
- 35 Long and narrow; silvered; 3.1×1.4; central rib + border; 4 holes.
- 36 Long and narrow; gold; 3.1×1.3; central rib + border; 4 holes; drawn.
- 37 Long and narrow; gold; 2.8 (bottom broken)×1.4; central rib (3/4) + border, 4 holes; drawn.
- 38 Long and narrow; gold; 3.1 (bottom broken)×1.4; central rib (3/4) + border, 4 holes; drawn.
- 39 Missing.

### 16-152

- 1 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes.
- 2 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes.
- 3 Long and narrow; silvered; central rib + border, 4 holes.
- 4 Long and narrow; gold; 2.7 (bottom broken)×1.3; central rib (3/4) + border; 4 holes.

### 16-161

- 1 Long and narrow; silvered; 3.3×1.4; central rib + border, 4 holes; drawn.
- 2 Short and wide; black; 2.7×1.6; central rib (1/2) + border; 4 holes; drawn.
- 3 Missing; drawn.
- 4 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 5 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 6 Long and narrow; red; 3.2×1.4; central rib (3/4) + border; 4 holes; drawn.
- 7 Short and wide; black; 2.7×1.6; central rib (1/2) + border; 4 holes; drawn.

- 8 Long and narrow; black; 3.2×1.4; central rib (3/4) + border; 4 holes; drawn.
- 9 Long and narrow; dark gold; 3.1×1.4; central rib (3/4) + border, 4 holes; drawn.
- 10 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 11 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 12 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 13 Short and wide; silvered; 2.7×1.6; central rib (1/2) + border, 4 holes; drawn.
- 14 Long and narrow; silvered (?); 3.2×1.4; central rib + border; 4 holes; drawn.
- 15 Long and narrow; silvered; 3.1×1.6; central rib (3/4) + border, 4 holes; drawn.
- 16 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 17 Long and wide; silvered; 4.0×1.9; central rib (3/4); 4 holes; drawn.
- 18 Long and narrow; silvered; 3.3×1.6; central rib (3/4) + border, 4 holes; drawn.
- 19 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 20 Long and narrow; 3.3×1.4; central rib + border, 4 holes; drawn.
- 21 Long and narrow; red; 3.3×1.4; central rib + border; 4 holes; drawn.
- 22 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 23 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 24 Long and wide; red; 3.8×1.7; central rib (3/4) + border; 4 holes; drawn.
- 25 Long and narrow; red; 3.2×1.4; central rib (3/4) + border; 4 holes; drawn.
- 26 Long and wide; 3.8×2.2; central rib (3/4); 4 holes; drawn.
- 27 Short and wide; silvered; 2.7×1.6; central rib (1/2) + border, 5 holes; drawn.
- 28 Long and narrow; silvered; 3.4×1.5; central rib (3/4) + border, 4 holes + 1 hole on bottom right side; drawn.
- 29 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 30 Long and narrow; silvered; 3.3×1.5; central rib (3/4) + border, 4 holes + 1 hole on bottom right side; drawn.
- 31 Long and narrow; silvered; 2.7 (top broken)×1.6; central rib (3/4) + border, 4 holes + 1 hole in bottom center; drawn.
- 32 Long and wide; silvered; 3.8×2.0; central rib (3/4) + border, 4 holes; drawn.
- 33 Long and narrow; silvered; 2.9 (bottom broken)×1.4; central rib + border, 4 or 5 holes; drawn.
- 34 Long and narrow; 2.3 (bottom)×1.4; central rib (3/4) + border, 4 holes; drawn.
- 35 Long and narrow; silvered; 2.1 (bottom broken)×1.4; central rib + border, 4 holes; drawn.
- 36 Missing.

**16-184**

- 1 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 2 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 3 Long and narrow; silvered; 3.2×1.4; central rib + border; 4 holes; drawn.
- 4 Long and narrow; gold; 3.0×1.4; central rib (3/4) + border; 4 holes; drawn.
- 5 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 6 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 7 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 8 Long and narrow; silvered; 3.2×1.3; central rib + border; 4 holes; drawn.
- 9 Long and narrow; gold; 3.1×1.2; central rib (3/4) + border; 4 holes; drawn.
- 10 Long and narrow; gold; 3.2×1.4; central rib (3/4) + border; 4 holes; drawn.
- 11 Missing; drawn.
- 12 Long and narrow; silvered; 3.3×1.3; central rib + border; 4 holes; drawn.
- 13 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes; drawn.

**16-296**

- 1 Long and wide; silvered; 3.6×1.9; central rib (3/4); 4 holes.

## THE MILITARY EQUIPMENT FROM MASADA

- 2 Missing; drawn.
- 3 Missing; drawn.
- 4 Long and wide; silvered; 3.8×1.8; central rib (3/4); 4 holes; drawn.
- 5 Short and wide; silvered; 2.7×1.7; central rib (1/2); 4 holes; drawn.
- 6 Long and wide; silvered; 3.6×1.9; central rib (3/4); 4 holes; drawn.
- 7 Short and wide; silvered; 2.7×1.6; central rib (3/4) + border; 4 holes; drawn.
- 8 Long and narrow; silvered; 3.3×1.4; central rib + border, 4 holes; drawn.
- 9 Long and narrow; silvered; 3.4×1.5; central rib + border, 4 holes; drawn.
- 10 Long and narrow; gold; 3.1×1.4; central rib (3/4) + border, 4 holes; drawn.
- 11 Missing; drawn.
- 12 Long and narrow; gold; 3.2×1.3; central rib (3/4) + border; 4 holes; drawn.
- 13 Long and narrow; red; 3.0×1.3; central rib (3/4) + border; 4 holes; drawn.
- 14 Long and narrow; gold; 3.1×1.3; central rib (3/4) + border; 4 holes; drawn.
- 15 Long and narrow; dark gold; 3.2×1.4; central rib (3/4) + border; 4 holes; drawn.
- 16 Missing; drawn.
- 17 Long and narrow; silvered; 3.3×1.5; central rib + border; 4 holes; drawn.
- 18 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes; drawn.
- 19 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.
- 20 Long and narrow; gold; 3.0×1.3; central rib (1/2) + border; 2 holes; drawn.
- 21 Long and narrow; gold; 3.1×1.3; central rib (3/4) + border; 4 holes; drawn.
- 22 Long and wide; red; 3.6×1.8; central rib (3/4) + border; 4 holes; drawn.
- 23 Long and narrow; gold; 2.7 (bottom broken)×1.3; central rib (3/4) + border; 4 holes; drawn.
- 24 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes; drawn.
- 25 Long and narrow; gold; 3.0×1.3; central rib (3/4) + border; 4 holes; drawn.
- 26 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes; drawn.

### **162-142**

This is a group of 69 complete or almost complete scales and about 585 fragments. All of these scales, with one exception, are of a uniform size and fabric. All measure 2.5×1.3 (are short and narrow), have a central rib + border and have 4 holes. The one exception (not included in the above count) is a long and narrow scale, of a different fabric, measuring 3.2×1.3, with a central rib (3/4) + border and 4 holes.

## MISCELLANEOUS SCALES

### **10-304**

39 Missing.

### **92-305**

- 1 Long and narrow; red; 3.3×1.4; central rib + border; 4 holes.

### **100-560**

- 1 Long and wide; 3.3 (bottom broken)×2.0; central rib (3/4); 4 holes + 1 hole in middle of each side.
- 2 Long and wide; 2.0 (bottom broken)×1.9; central rib (3/4); 4 holes.

### **100-665**

Too fragmentary to measure; red; seems to be long and narrow; central rib + border; 4 holes.

### **101-690**

Short and narrow; red; 2.5×1.4; central rib (3/4) + border; 4 holes.

### **121-517**

Missing.

**126-235**

1 Short and narrow;  $2.5 \times 1.3$ ; central rib + border, 4 holes.

6 Too fragmentary to measure; seems to be long and narrow; central rib + border; 4 holes.

**142-635**

1 Missing.

2 Missing.

**151-536** (3 scales)

Long and narrow;  $3.2 \times 1.4$ ; central rib (3/4) + border; 4 holes.

Long and narrow;  $2.5$  (bottom broken)  $\times 1.4$ ; central rib + border; 4 holes.

Long and narrow;  $1.8$  (top broken)  $\times 1.4$ ; central rib + border.

**155-475**

Missing.

**158-248**

2 Long and narrow; gold;  $3.1 \times 1.4$ ; central rib + border; 4 holes.

**162-183**

Too fragmentary to measure; remains of at least 2 scales; seem to be long and narrow.

**188-81** (4 scales)

Short and narrow;  $2.1$  (broken at top)  $\times 1.3$ ; central rib (3/4) + border; 4 holes.

Long/Short and narrow;  $2.1$  (bottom broken)  $\times 1.3$ ; central rib + border, 4 holes.

Long/Short and narrow;  $1.6$  (top broken)  $\times 1.2$  (side broken); central rib + border.

Long/Short and narrow;  $1.3$  (top broken)  $\times 1.3$ ; central rib + border.

**189-1482** (3-4 scales)

Long and wide;  $3.7 \times 2.1$ ; central rib (3/4); 4 holes + 1 hole on side (other side broken).

Other pieces too fragmentary to measure, but seem to be same general size and type.

**201-122**

Too fragmentary to measure.

**220-143**

A fragment—perhaps not a scale.

**222-237** (1 complete scale + 2 fragments)

Long and wide;  $3.9 \times 2.0$ ; central rib (3/4); 2 holes.

Long and wide;  $2.2$  (broken at top)  $\times 2.0$ ; central rib.

Long and narrow;  $2.4$  (top broken)  $\times 1.5$ ; central rib + border.

**238-297**

Too fragmentary to measure; seems to be long and narrow; central rib + border; 4 holes.

**239-286**

Long and wide;  $3.0$  (bottom broken)  $\times 2.1$ ; central rib (3/4); 4 holes.

**242-394** (2 scales)

Long and wide; red;  $3.7 \times 1.9$ ; central rib (3/4); 4 holes.

Long and wide; red;  $3.6 \times 1.9$ ; central rib (3/4); 4 holes.

**293-994**

Long and narrow;  $3.4 \times 1.5$ ; central rib + border; 4 holes.

## THE MILITARY EQUIPMENT FROM MASADA

### 334-183

Too fragmentary to measure; seems to be long and narrow; central rib + border; 4 holes.

### 338-362

Long and wide; 2.9 (bottom broken)×1.7; central rib (3/4); 4 holes.

### 410-1502 (2 scales)

Long and narrow; gold; 3.3×1.4; central rib + border, 4 holes.

Long and narrow; gold; 3.0×1.4; central rib (3/4) + border; 4 holes.

### 441-1117 (1 complete scale + 1 fragment)

Short and narrow; 2.5×1.3; central rib + border, 4 holes.

Long/Short and narrow; 1.4 (top broken)×1.4; central rib + border.

### 456-398

Long and narrow; 3.3×1.4; central rib + border; 4 holes; drawn.

### 521-93/3 (2 fragments)

Long and narrow; dark gold; 2.3 (top broken)×1.2 (side broken); central rib + border; remains of 2 holes.

Long and narrow; dark gold; 1.9 (both ends broken)×1.2 (side broken); central rib (3/4) + border, 4 holes.

### 609-27

Long and narrow; 2.9 (top broken)×1.4; central rib (3/4) + border, 4 holes.

### 625-342 (1 complete scale + fragments of 3 or more scales)

Short and narrow; 2.5×1.3; central rib + border, 4 holes.

Long/Short and narrow; 1.8 (top broken)×1.4; central rib + border.

Long/Short and narrow; 1.4 (top broken)×1.4; fragmentary.

Long/Short and narrow; too fragmentary to measure; central rib + border.

4 more very small fragments.

### 791-1046/2 (fragments of 3 or more scales)

Too fragmentary to measure. All seem to be long and narrow; black; central rib + border.

### 1039-190

6 Missing; drawn; photo.

7 Missing; drawn; photo.

8 Missing; drawn; photo.

9 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes; drawn.

10 Long and narrow; silvered; 3.3×1.4; central rib + border; 4 holes; drawn.

11 Missing; drawn; photo.

12 Long and wide; silvered; 3.5×2.0; central rib (3/4); 4 holes; drawn.

13 Missing; drawn; photo.

### 1039-316

5 Missing.

### 1045-425

4 Too fragmentary to measure; seems to be long and narrow.

### 1047-618

3 Short and wide; red; 3.0×1.8; central rib (3/4); 4 holes + 2 holes vertically on each side.

### 1054-836

5 Missing.

**1056-801** (a scale?)

Short and wide; iron; 3.0×2.0; no rib; no border; no sign of holes; drawn.

**1065-1453**

2 Long and narrow; black; 3.2×1.4; central rib + border; 4 holes.

**1076-2115**

Long and narrow; 2.1 (bottom broken)×1.4; central rib + border; 4 holes.

**1091-426**

3 Long and narrow; 2.0 (bottom broken)×1.2; central rib + border, 4 holes.

**1113-1668**

2 Long and wide; 1.7 (bottom broken)×2.0; 4 holes.

**1188-791** (1 complete scale + 1 fragment)

Short and narrow; 2.6×1.4; central rib + border, 4 holes.

Too fragmentary to measure.

**1194-311**

6 Long and narrow; 3.0 (bottom + top broken)×1.4; central rib + border, 4 holes.

**1201-23/8** (8 scales)

Missing.

**1201-129**

Missing.

**1202-760**

Long and narrow; 1.7 (top broken)×1.4; central rib + border.

**1209-671**

Long and narrow; gold; 3.2 (tip broken)×1.4; central rib + border; 4 holes; drawn.

**1209-685**

Long and narrow; 2.2 (top broken)×1.5; central rib + border; 1 hole preserved; drawn.

**1273-1733**

1 Long and narrow; gold; 3.3×1.4; central rib (3/4) + border; 4 holes.

2 Long and narrow; gold; 3.0×1.3; central rib (3/4) + border; 4 holes.

3 Long and narrow; gold; 3.3×1.4; central rib + border; 4 holes.

4 Long and narrow; gold; 2.6 (bottom broken)×1.3; central rib + border, 4 holes.

**1276-1803/1** (5 complete scales + 2 fragments)

Long and narrow; red; 3.3×1.4; central rib (3/4) + border, 4 holes.

Short and narrow; dark brown; 2.5×1.3; central rib (3/4) + border, 4 holes.

Short and narrow; red; 2.5×1.3; central rib + border, 4 holes.

Short and narrow; red; 2.5×1.4; central rib + border, 4 holes.

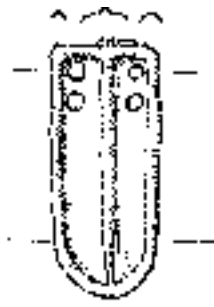
Short and narrow; bent in half; 4 holes. Two pieces too fragmentary to measure.

**1279-319**

Too fragmentary to measure.



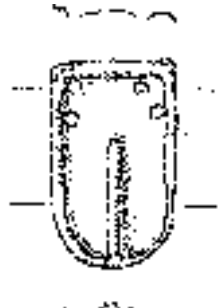
1 - Scale  
(9-263/18)



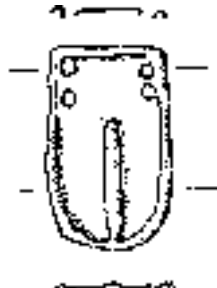
2 - Scale  
(9-263/12)



5 - Two scales  
(8-196/36) (8-197/60)



3 - Scale  
(9-263/62)



4 - Scale  
(9-263/11)



(8-196/33)



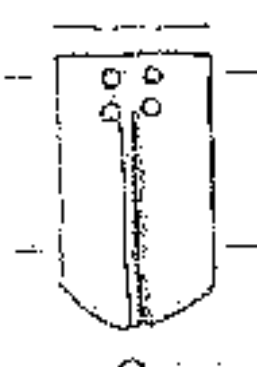
6 - Three scales  
(162-142)



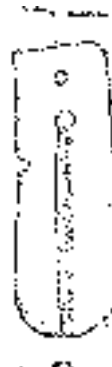
(8-196/15)



7 - Scale  
(9-263/35)



8 - Scale  
(9-263/14)



9 - Scale  
(9-263/3)



(8-196/20)



10 - Two scales  
(16-896/22)

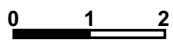
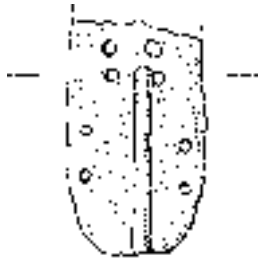
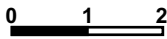


PLATE 2



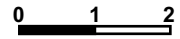
1 - Scale  
(1047-618/3)



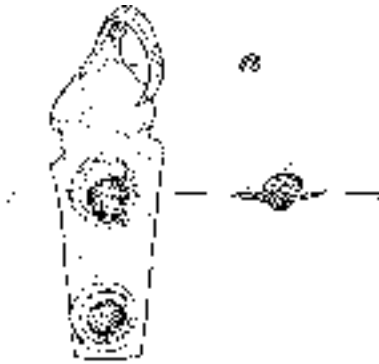
2 - Group of scales  
(Locus 162)



3 - Iron scale  
(1056-801)



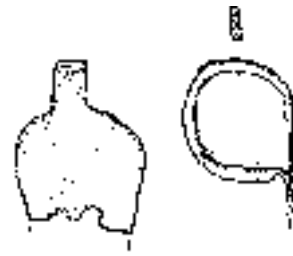




1 - Tie-hoop of segmental armor  
(1169-1552/1)



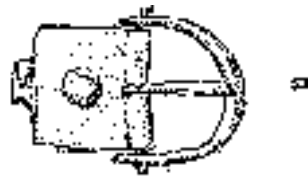
2 - Tie-hoop of segmental armor  
(1169-1552/2)



3 - Tie-hoop of segmental armor  
(126-235/2)



4 - Lobate hinge of segmental armor  
(1052-475/2)



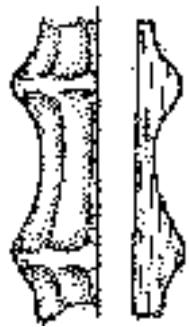
5 - D-buckle of segmental armor  
(1276-1915/4)



6 - D-buckle of segmental armor  
(1110-1535/3)



7 - Ribbed bone handle  
(458-69/2)



8 - Ribbed bone handle  
(458-69/3)



9 - Ribbed bone handle  
(458-85)



10 - Ribbed wooden handle  
(1276)



11 - Bone handle  
(336-87)

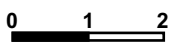
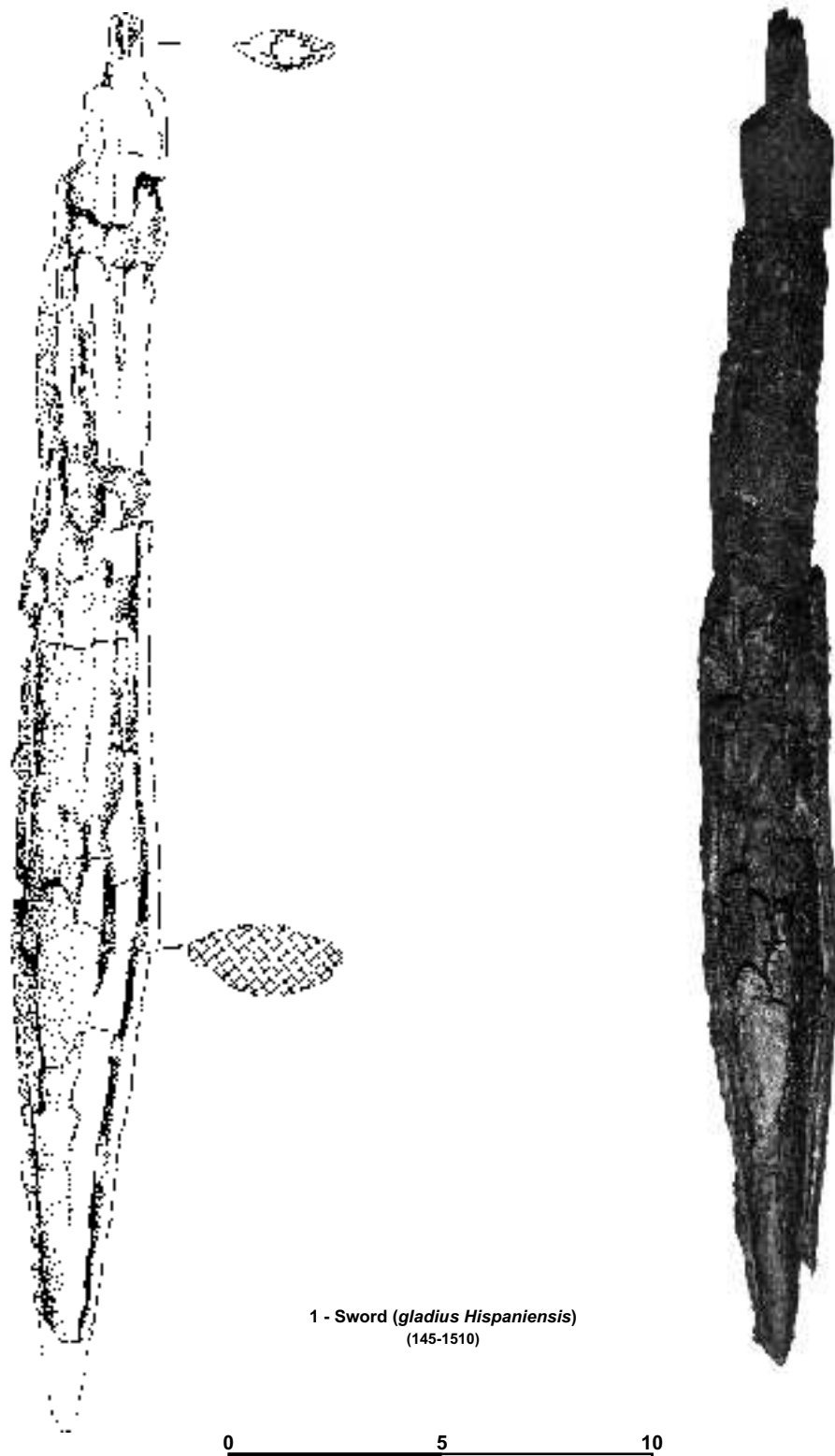


PLATE 4



1 - Sword (*gladius Hispaniensis*)  
(145-1510)



1 - Fragmentary blade of sword  
(1138-1362/2)



2 - Dagger  
(1204-748)

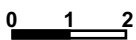
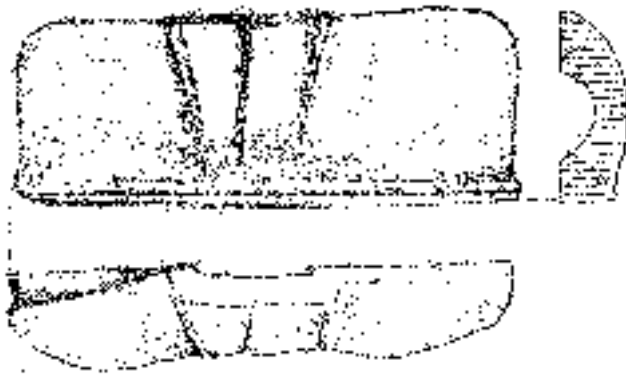
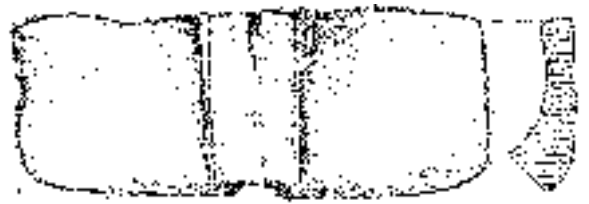


PLATE 6



1 - Decorated bone handguard  
(1273-1787/1)



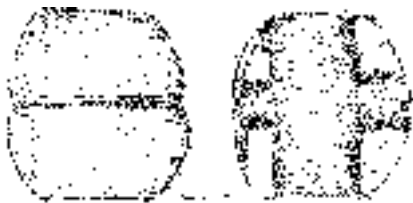
2 - Decorated bone handguard  
(1054-837/1)



3 - Decorated bone handguard  
(176-75/1)



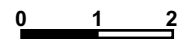
4 - Decorated ivory handguard  
(126-277)



5 - Bone pommel  
(456-396)



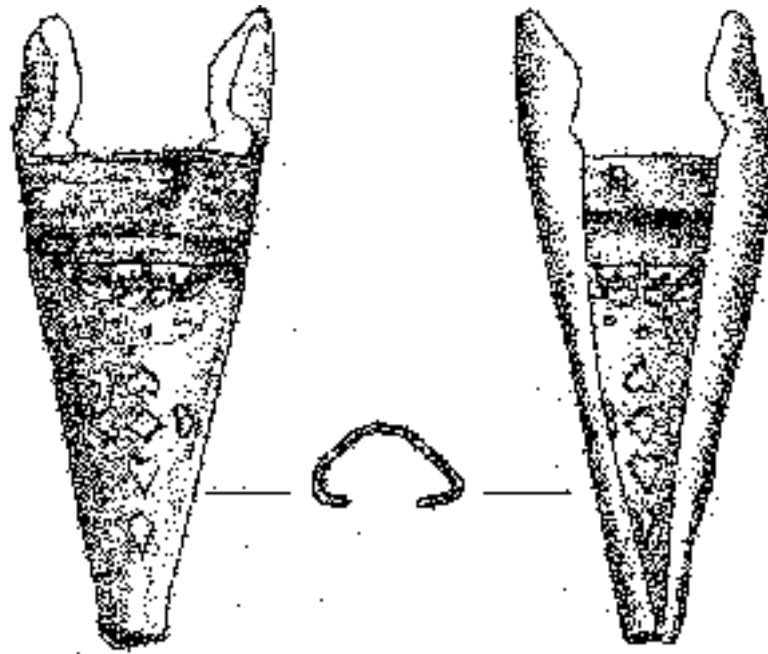
6 - Bone pommel  
(1039-305/3)



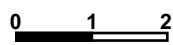


1 - Painted leather scabbard (*vagina*)  
(1244-210)

PLATE 8

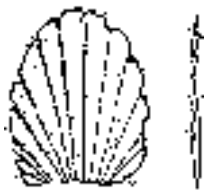


1 - Scabbard chape  
(1196-296)

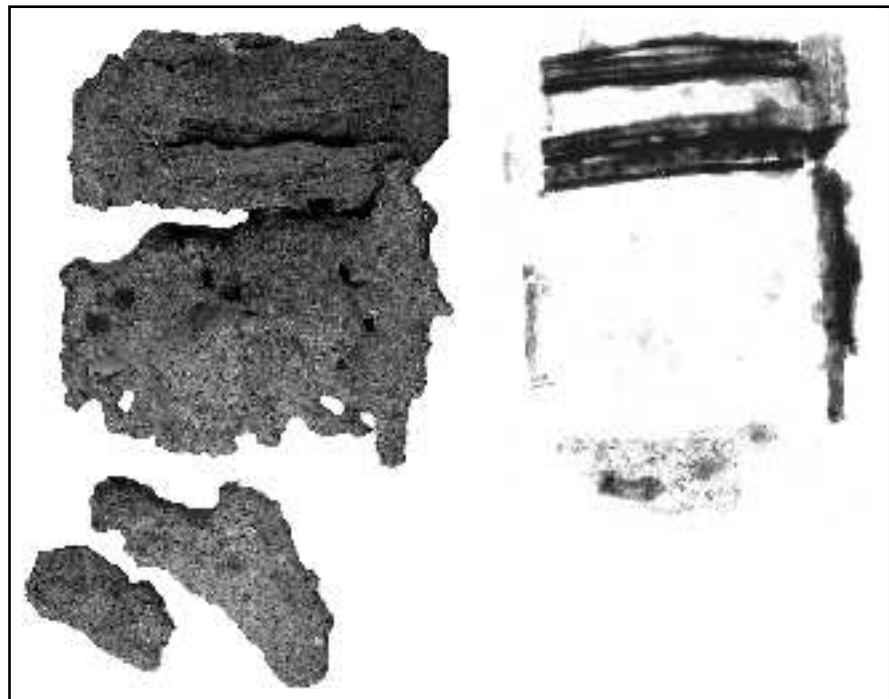




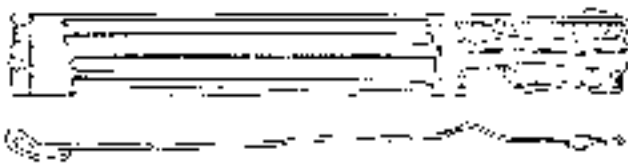
1 - Tip of scabbard chape  
(1186-2385/2)



2 - Scabbard's plamette ornament  
(491-2082/2)



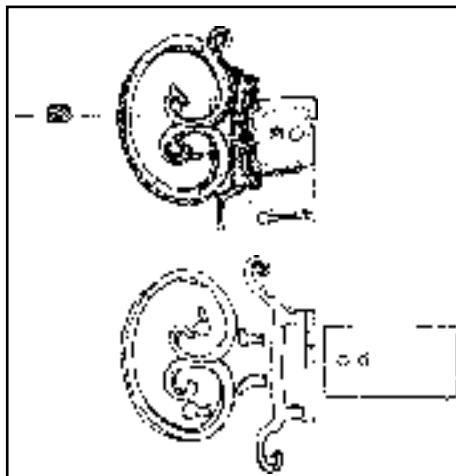
3 - Scabbard mount and its x-ray image  
(334-183/1)



4 - Scabbard mount  
(245-522/1)



6 - Scabbard mount  
(692-114/2-4+5)



7 - Suspension loop of dagger sheath  
(523-344)



8 - Suspension loop of dagger sheath  
(1039-316/9)

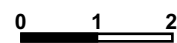
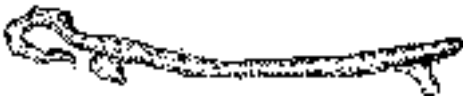
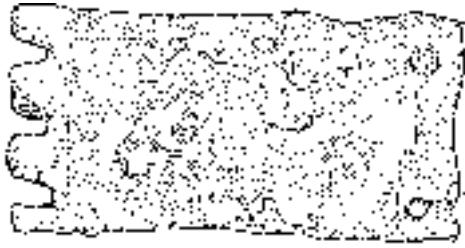
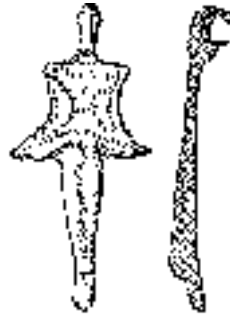


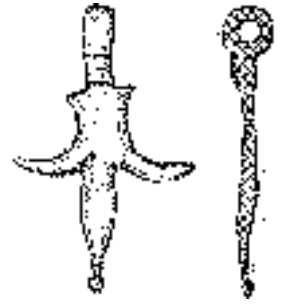
PLATE 10



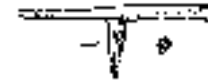
1 - Silver-plated hinged belt mount  
(1235-499/1)



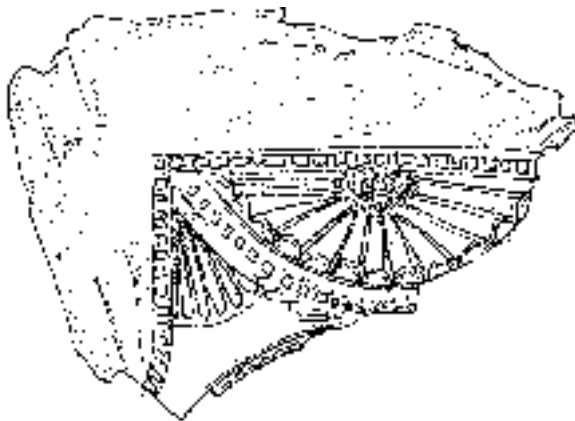
2 - Belt buckle-tongue  
(1271-1252/1)



3 - Belt buckle-tongue  
(1039-1631)



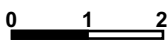
4 - Silver-plated stud (apron?)  
(1039-316/11)



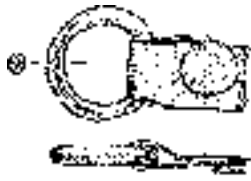
5 - Fragmentary cheekpiece  
(1118-1912/2)



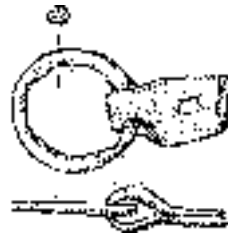
6 - Crest holder  
(310-250)







1 - Helmet fastening loop?  
(1273-1748/3)



2 - Helmet fastening loop?  
(531-247)



3 - Helmet handle?  
(1264-2061/1)



5 - Helmet handle?  
(1248-170/2)



4 - Helmet handle?  
(233-1920/1)



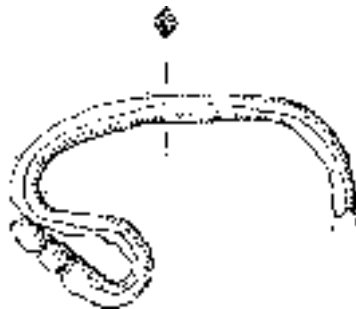
6 - Helmet handle?  
(1035-30/3)



7 - Helmet handle?  
(542-836/1)



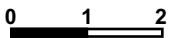
8 - Helmet handle?  
(1201-1527/2)



9 - Helmet handle?  
(232-2120/2)

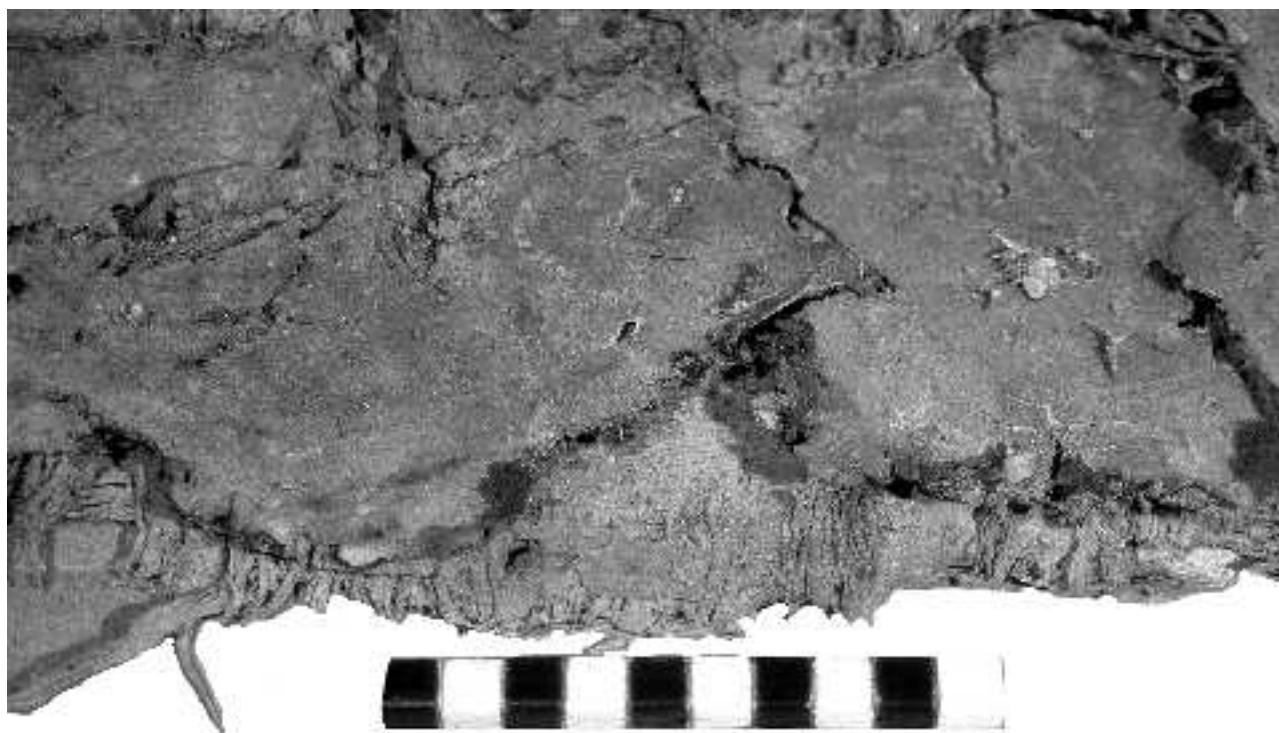


10 - Helmet handle?  
(1045-1612)





1 - *Scutum* board (Shield No. 1)  
(1039-139)



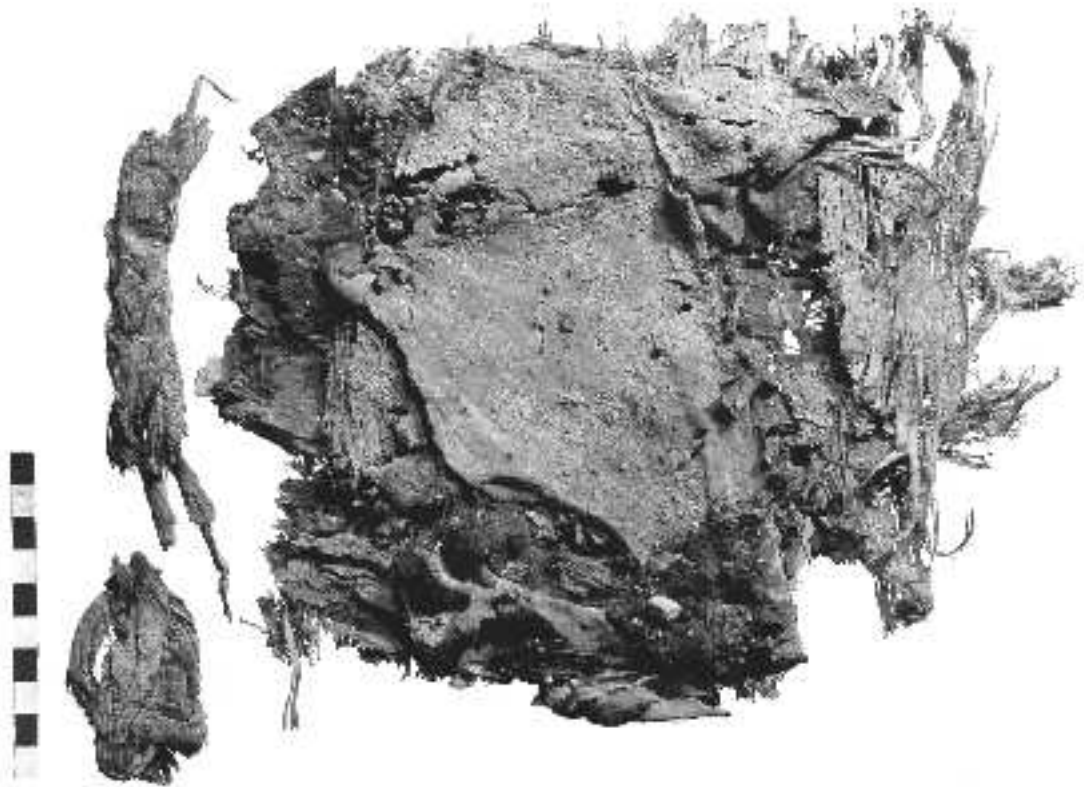
2 - *Scutum* board (detail) (Shield No. 1)  
(1039-139)



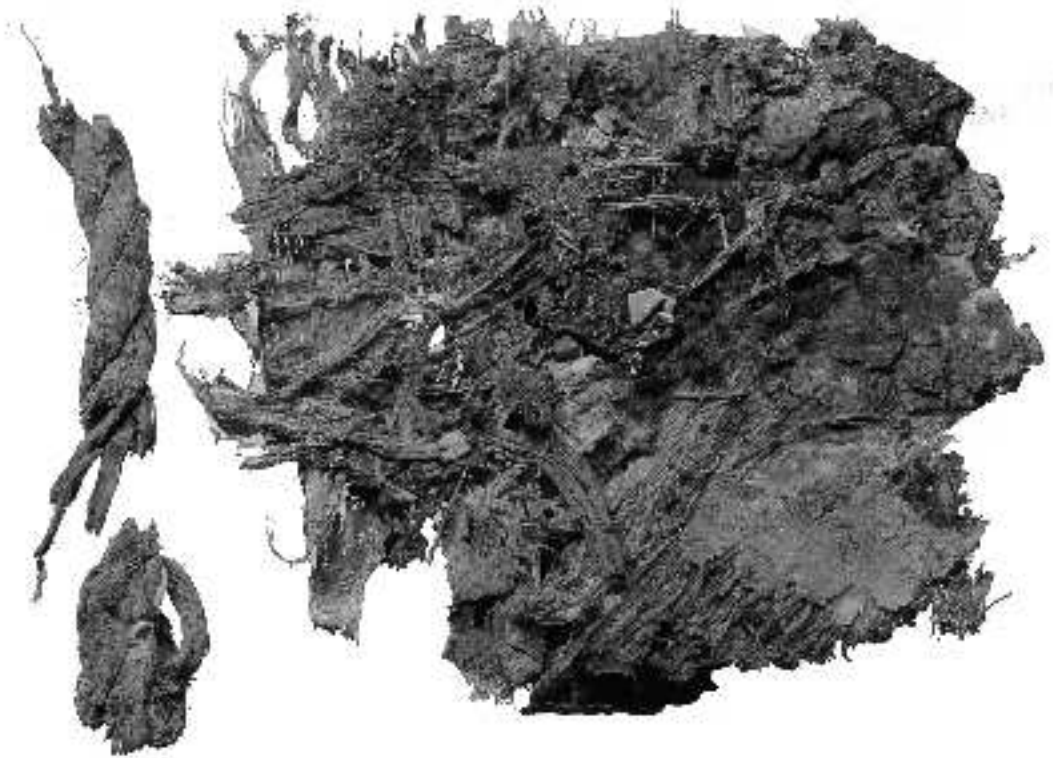
1 - Plywood shield-board fragment  
(1039-61)



2 - Shield fragment and detail  
(1039-151)

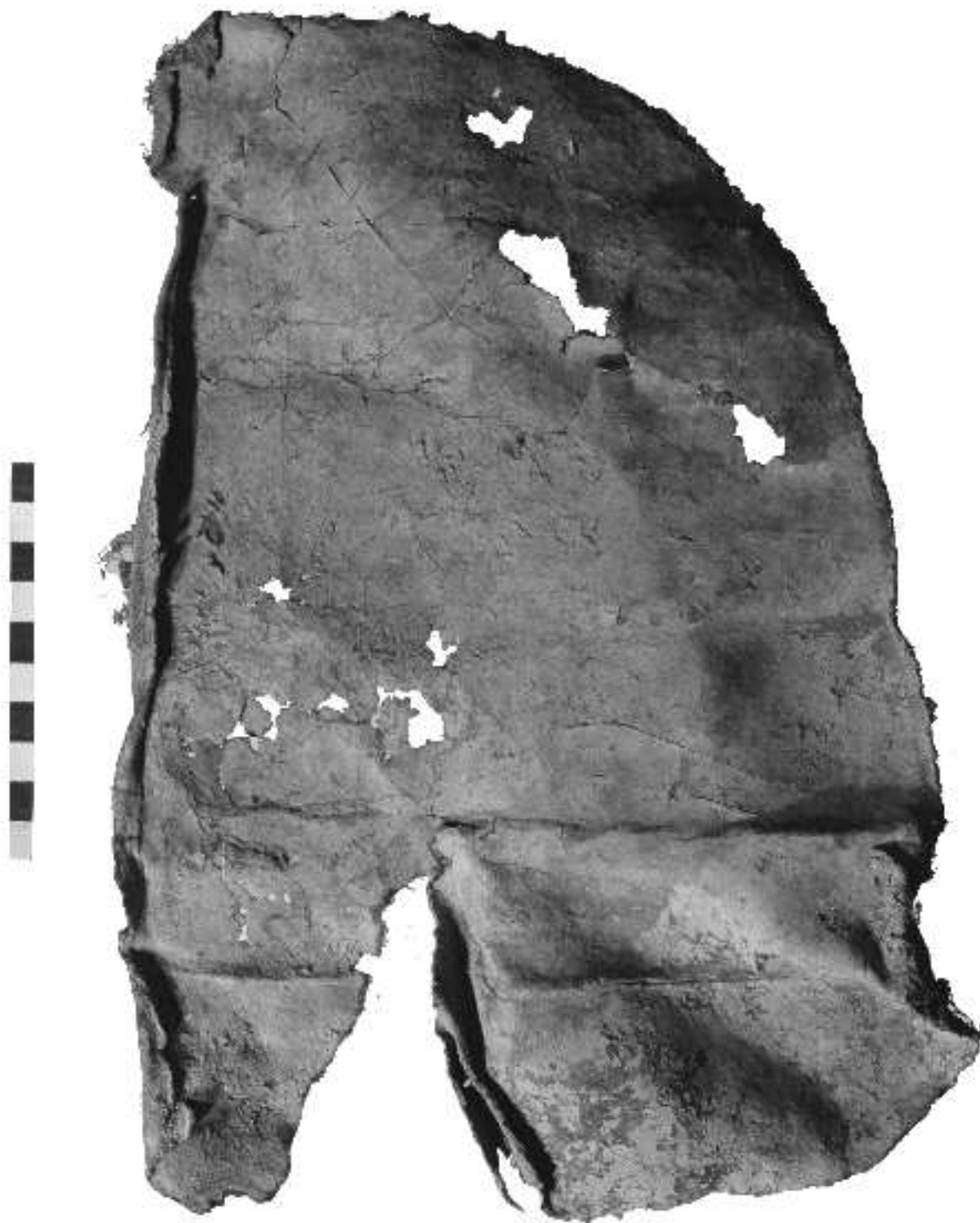


1 - Shield fragment, front and rear views (Shield No. 5)  
(Locus 92)





1 - Fragments of shield board (Shield No. 6)  
(Locus 92)



1 - Leather facing of a *scutum* – curved edge (Shield No. 7)  
(1276-1785)



(1276-1785)







1 - Stitching holes of *tabula ansata* appliqué on facing – detail (Shield No. 7)  
(1276-1785)

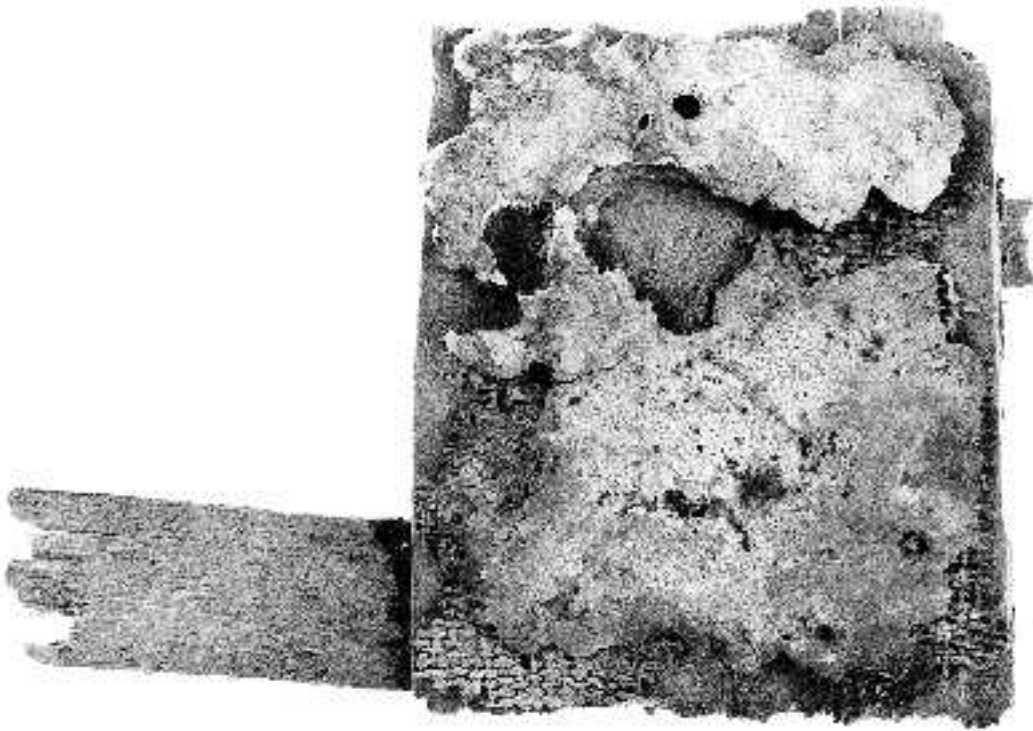


2 - Leather binding – detail of rear face (Shield No. 7)  
(1276-1785)

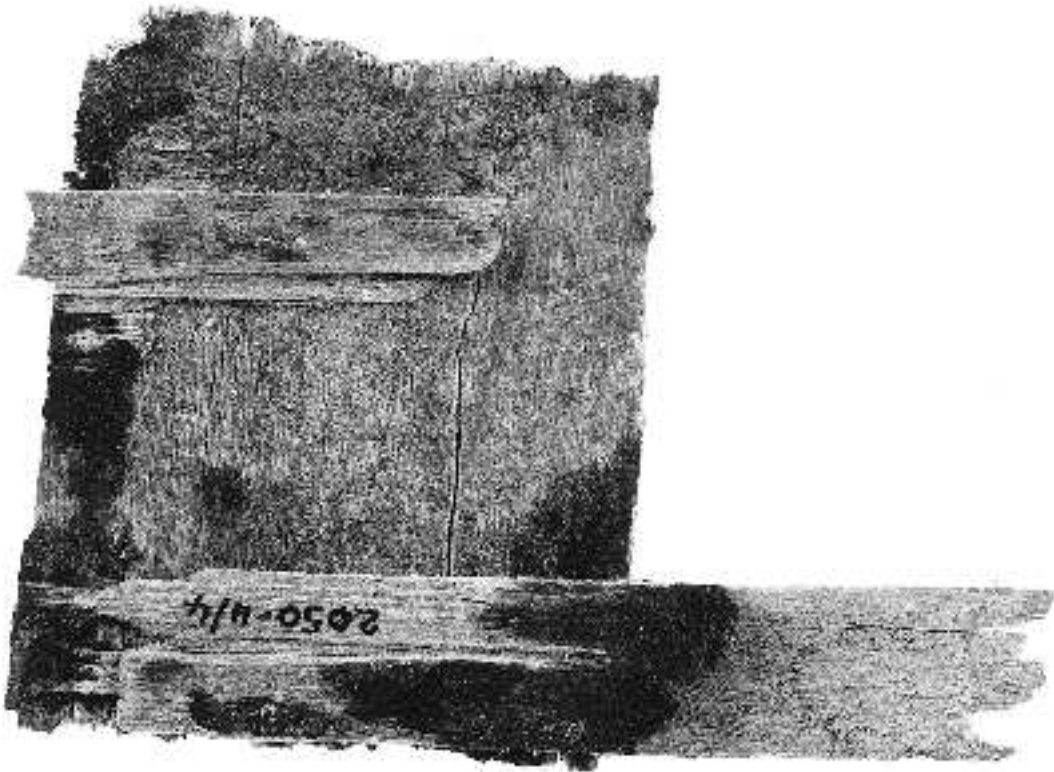


3 - Leather binding – detail of front face (Shield No. 7)  
(1276-1785)

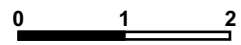




1 - Shield board - front

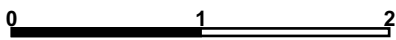


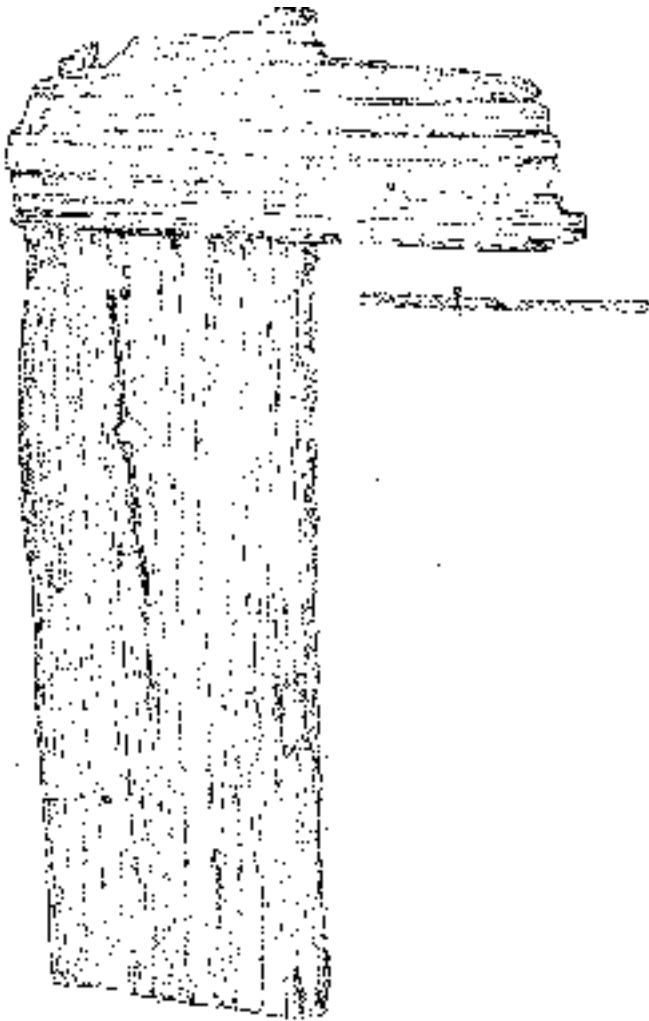
2 - Shield board - rear  
(2050-11)





1 - Shield board - detail of front face  
(2050-11)





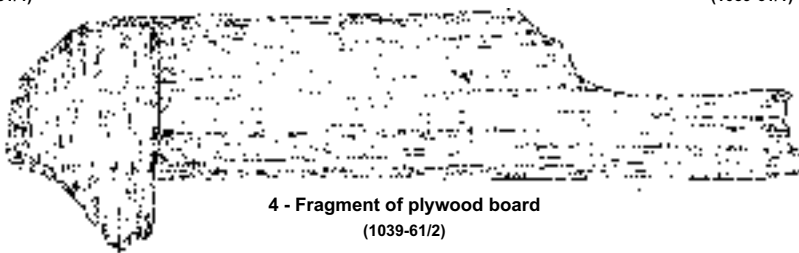
1 - Fragment of plywood board  
(1039-61/4)



2 - Fragment of plywood board  
(1039-61/5)



3 - Fragment of plywood board  
(1039-61/1)



4 - Fragment of plywood board  
(1039-61/2)



5 - Fragment of plywood board  
(1039-61/3)

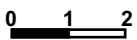
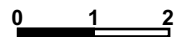


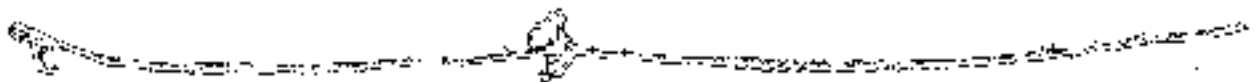
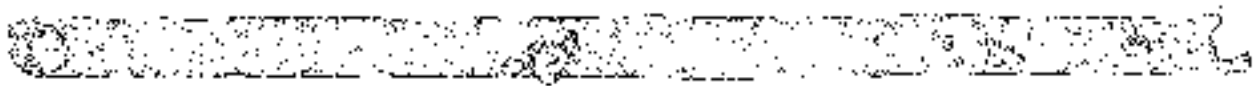
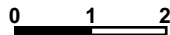
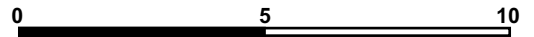
PLATE 22



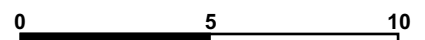
1 - Fragments of shield binding and board  
(1276-1802)

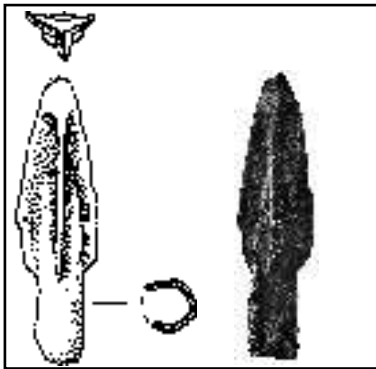


2 - Shield binding  
(1276-2268/1)



3 - Shield strengthening bar  
(1103-1751)





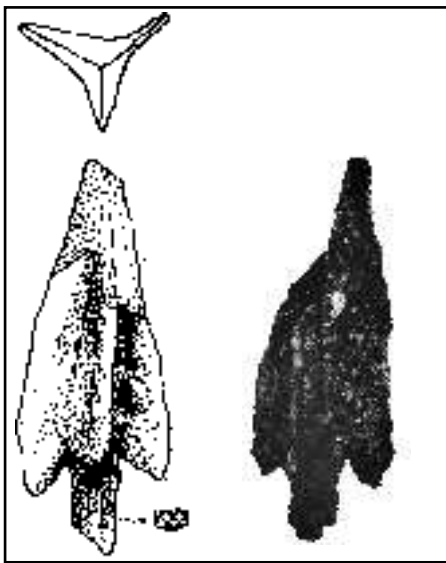
1 - Copper-alloy socketed arrowhead  
(1169-1552)



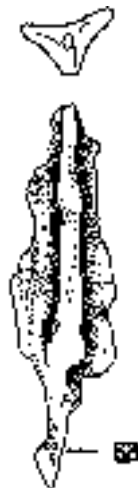
2 - Iron tanged trilobate arrowhead  
(1-82)



3 - Iron tanged trilobate arrowhead  
(456-337/4)



4 - Iron tanged trilobate arrowhead  
(401-1397/1)



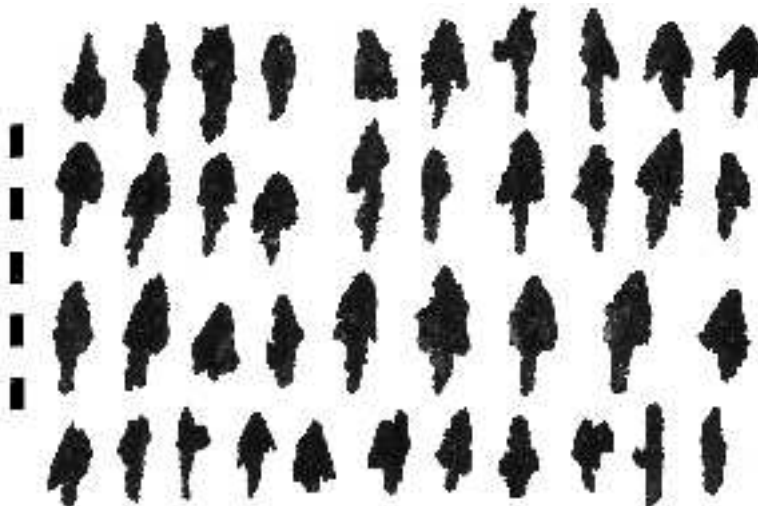
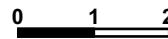
5 - Iron tanged  
trilobate arrowhead  
(126-237/1)



6 - Iron tanged  
trilobate arrowhead  
(234-1977/1)



7 - Iron tanged  
trilobate arrowhead  
(9-264/5)



8 - Group of 40 iron tanged trilobate arrowheads  
(456-337/6)

PLATE 24



1 - Iron tanged trilobate arrowhead  
(8-199/1)



2 - Iron tanged trilobate arrowhead  
(8-199/2)



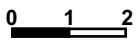
3 - Iron tanged trilobate arrowhead  
(8-199/8)



4 - Iron tanged trilobate arrowhead  
(8-199/9)



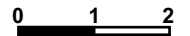
5 - Iron tanged trilobate arrowhead  
with wooden fore-shaft  
(1273-1730)



6 - Iron tanged trilobate arrowhead  
(8-199/3)



7 - Iron tanged trilobate arrowhead  
(1276-1880)





1 - Iron tanged trilobate arrowhead  
(8-187/2)



2 - Iron tanged trilobate arrowhead  
(8-187/3)



3 - Iron tanged trilobate arrowhead  
(8-199/14)



4 - Iron tanged trilobate arrowhead  
(8-199/17)



5 - Iron tanged trilobate arrowhead  
(8-199/4)



6 - Iron tanged trilobate arrowhead  
(1039-276)

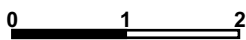


PLATE 26



1 - Iron tanged trilobate arrowhead  
(8-199/10)



2 - Iron tanged trilobate arrowhead  
(8-230/1)



3 - Iron tanged trilobate arrowhead  
(8-187/4)



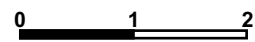
4 - Iron tanged trilobate arrowhead  
(8-187/1)



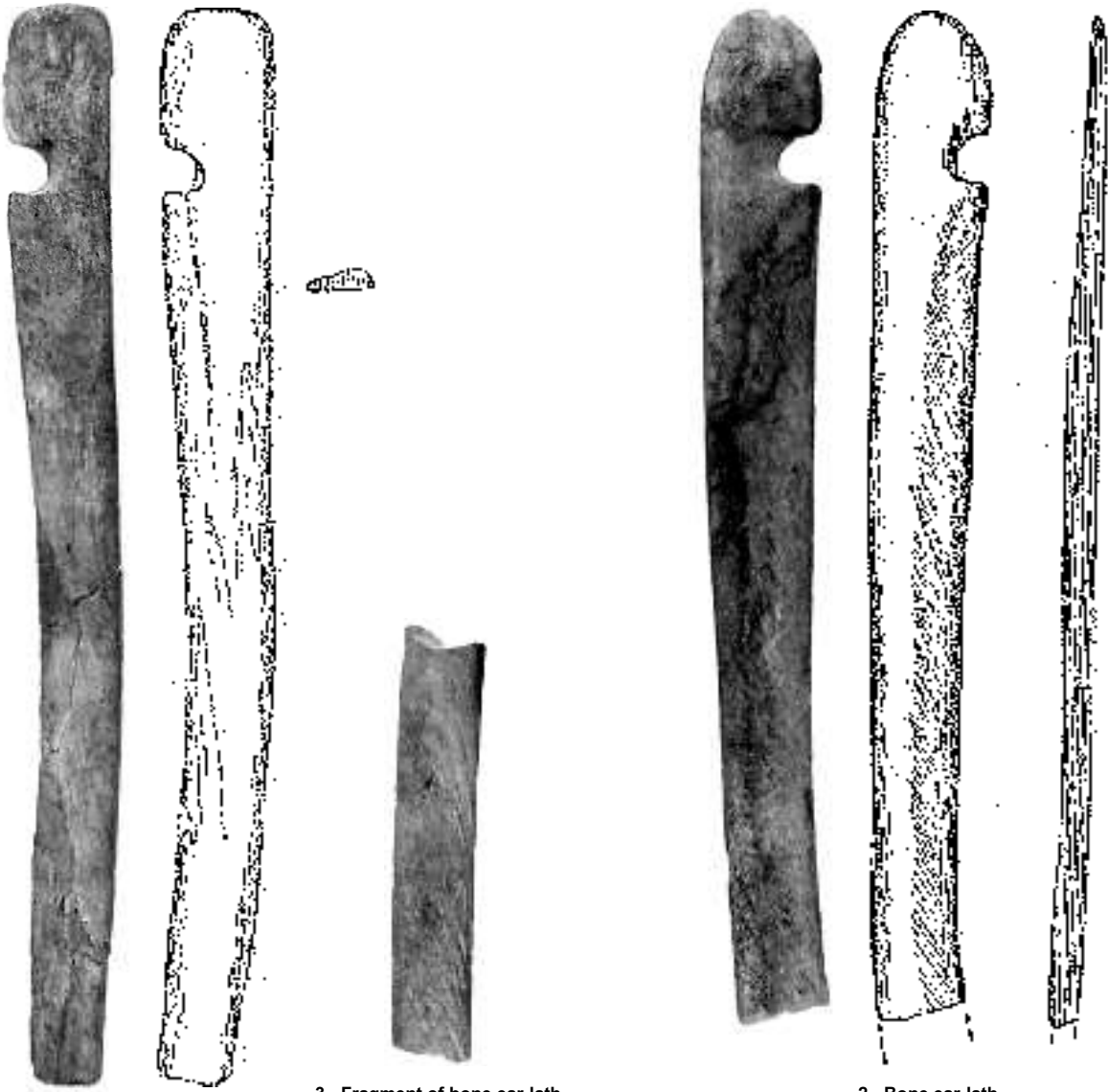
5 - Iron tanged trilobate arrowhead  
(8-199/12)



6 - Iron tanged trilobate arrowhead  
(8-199/11)



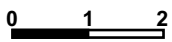


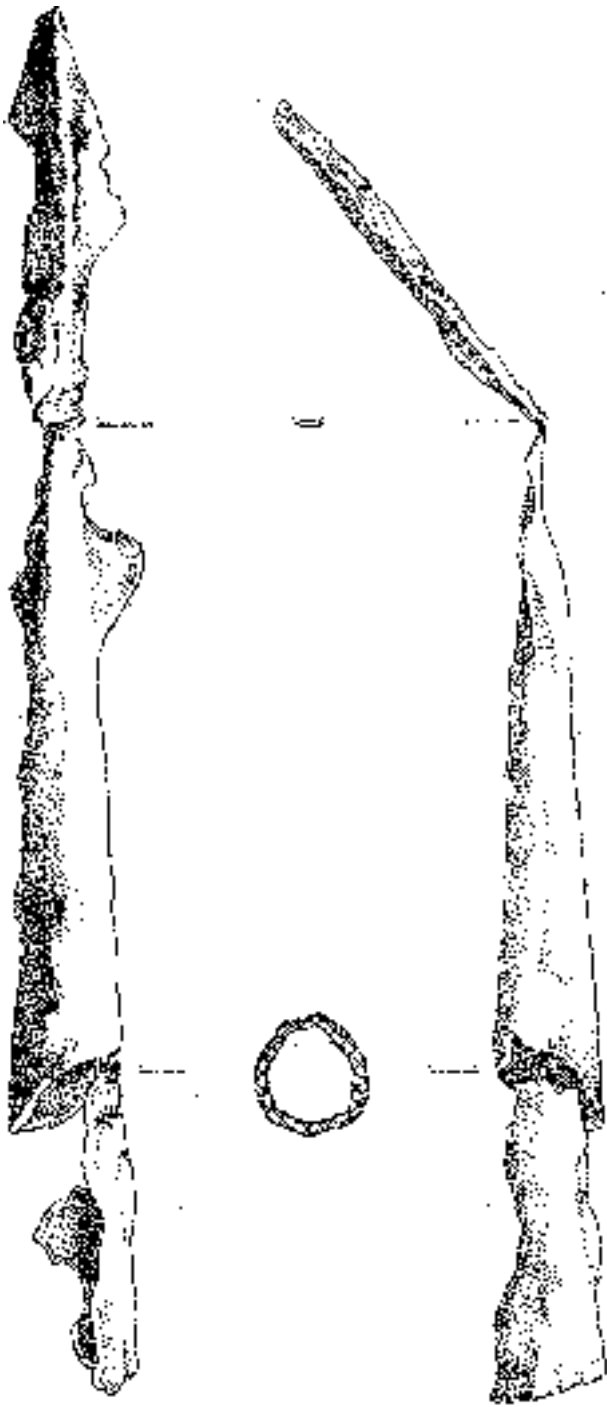


1 - Bone ear-lath  
(162-146)

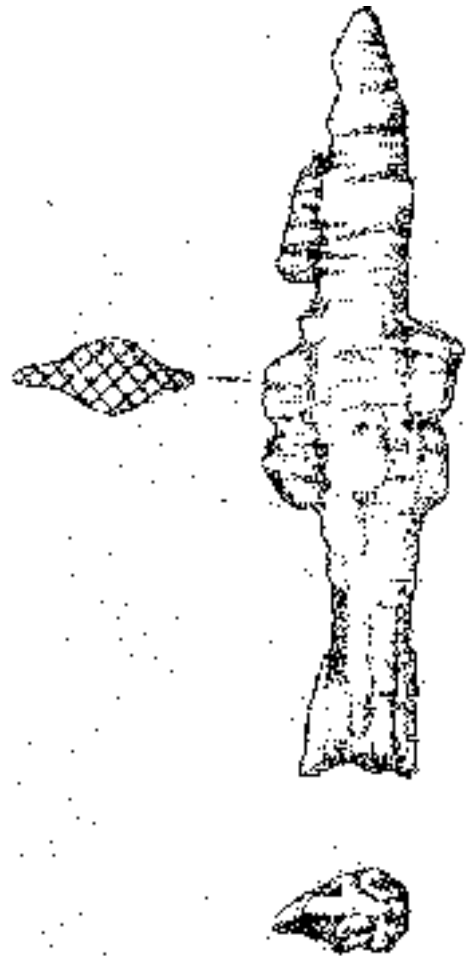
3 - Fragment of bone ear-lath  
(162-146)

2 - Bone ear-lath  
(233-1857)

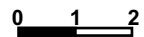


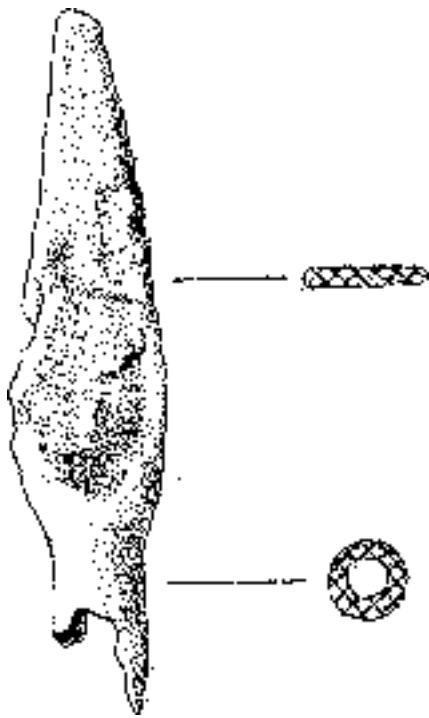


1 - Iron spearhead  
(1138-1362/1)

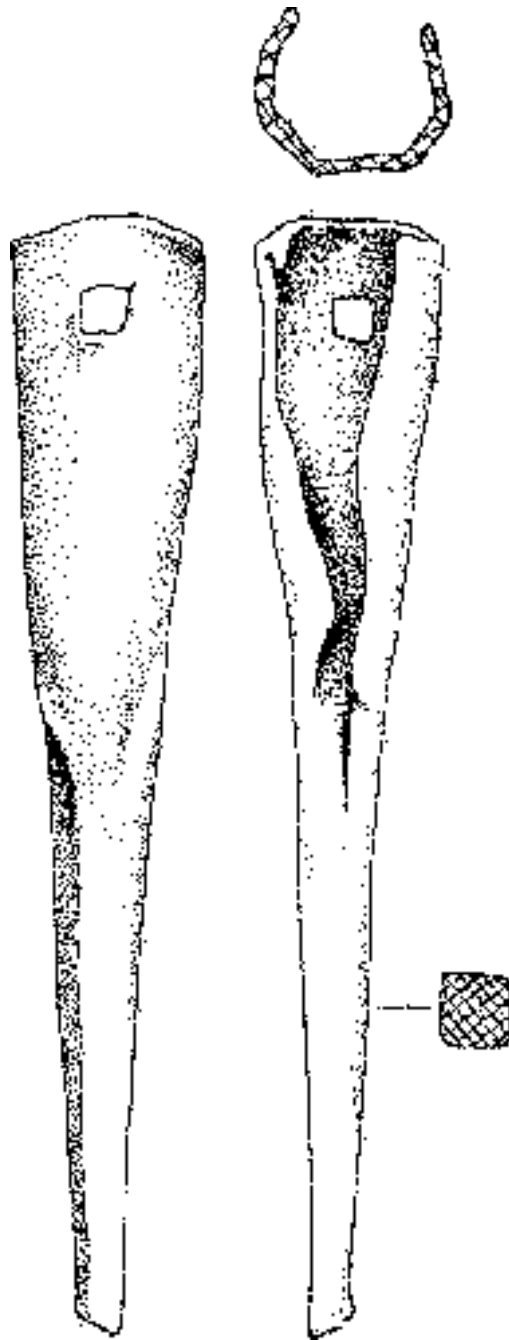
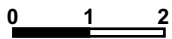


2 - Iron spearhead  
(1041-1305)



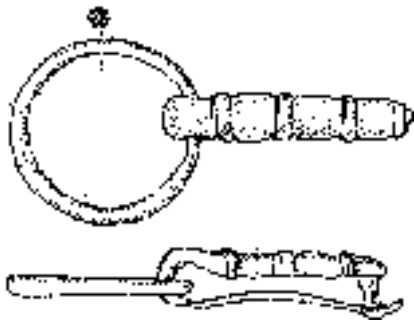


1 - Iron spearhead?  
(1159-1520)

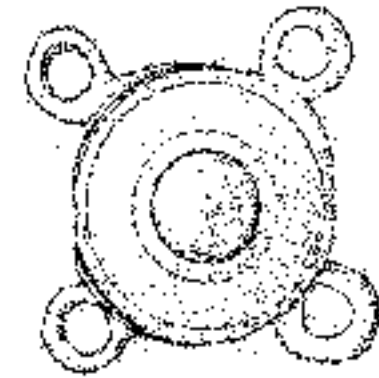


2 - Spear butt  
(1110-1505)

PLATE 30



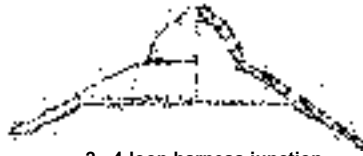
1 - Harness junction loop  
(1156-1230/2)



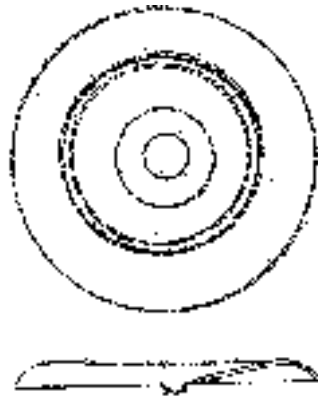
2 - 4-loop harness junction  
(360-645)



3 - Silver-plated *phalera*  
(1173-2199/1)



4 - Harness *phalera*  
(342-57/2)



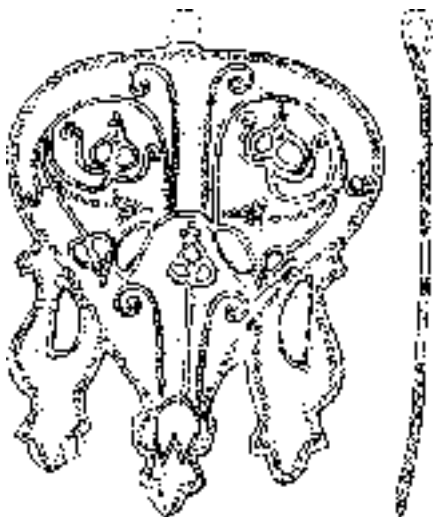
5 - Harness *phalera*  
(233-1911/6)



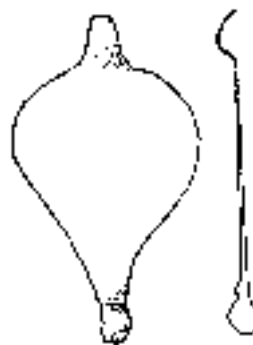
6 - Harness *phalera*  
(333-459/6)



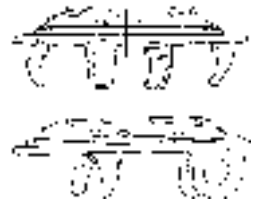
9 - Lunate harness pendant  
(145-1315/1)



7 - Harness pendant  
(1138-1354/3)



8 - Teardrop harness pendant  
(1052-1325)



10 - Harness decoration  
(311-407/1)

