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

EDITED BY

M.C. BISHOP

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CONTRIBUTORS

M.C. BISHOP - Department of Ancient History and Classical Archaeology, The University, Sheffield S10 2TN

J.C. COULSTON - Department of Archaeology, The University, Newcastle upon Tyne, NE1 7RU

N. FUENTES - 7 Coalecroft Road, London, SW15 6LW

S. GREEP - Deputy Keeper of Archaeology, Verulamium Museum, St. Michael's, St. Albans, Herts., AL3 4SW

P.J. HAZELL - 37 Dale View Gardens, Kilburn, Derbys.

S. JAMES - Institute of Archaeology, 31-34 Gordon Square, London, WC1H 0PY

P. PRICE - Department of Archaeology, University College, P.O. Box 78, Cardiff, CF1 1XL

I.R. SCOTT - Department of Archaeology, University College, P.O. Box 78, Cardiff, CF1 1XL

Dr G. WEBSTER - The Old School House, Chesterton, Harbury, Warks.

INTRODUCTION

These are the proceedings of a research seminar held in the Department of Ancient History and Classical Archaeology at the University of Sheffield on 21st March 1983.

The initial reason for organising a seminar on Roman Military Equipment was to attempt to provide a forum for discussion amongst postgraduate students working in the field. It soon became clear, however, that interest in the subject ranged far beyond university departments, so the final list of contributors included a mix of those who study the subject full time, and those who do not. It was apparent at the seminar how useful this blending of interests could be and the general feeling was that it was a worthwhile experiment; so much so, in fact, that every effort should be made to establish it as an annual event.

This first seminar was mainly concerned with establishing the various interests of its participants, but future events will almost certainly be far more wide-ranging, possibly pursuing specific themes in detail, although the emphasis will hopefully always be on informality, with plenty of opportunity for discussion.

I should like to take this opportunity to thank all of the contributors to these proceedings, as well as Chris Haines and the Ermine Street Guard for a practical demonstration of some of the problems involved in reconstructing Roman military equipment.

M.C. Bishop

INTRODUCTION TO REVISED EDITION

This new edition of the first military equipment proceedings differs mainly in the inclusion of the long-lost Fig.5 from Stephen Greep's article and the use of a more 'reader-friendly' typeface, although various typographical errors have been corrected (and, hopefully, no new ones incorporated). At only 90p, the first edition made a slight loss, but profit was never the aim of the volume: its prime task was to promote interest in military equipment, and I think it can be judged to have enjoyed some modest success in that.

Details of forthcoming military equipment conferences are published in *ARMA, Newsletter of the Roman Military Equipment Conference* (contact the editor for further information).

MCB, Ryton, September 1989

GRAHAM WEBSTER - Decorated dagger scabbards - a brief note of work in hand

The normal issue of daggers and their scabbards is shown from the hoard of weapons found in an *armamentaria* of the *principia* at Kastell Künzing in 1962.[1] The scabbards are all of simple construction with rounded edges joining at the chape and with top and medial cross pieces, the leather sheaths having totally decayed. These weapons would have been issued to auxiliaries, but legionary daggers, as with other equipment, would have been the same type, as seems clear from the tombstone of Flavoleius of *Legio XIIII* at Mainz.[2] Another Mainz tombstone, however, shows a soldier, presumably a legionary with a highly decorated dagger scabbard[3] and a number of similar examples have been found, mainly at legionary fortresses. Most of them are very finely made with gold, silver and enamel inlays and it is reasonable to assume that they were made by local craftsmen and purchased by the soldiers. The patterns of decoration show regional styles or possible chronological changes. Unfortunately, they are found in very poor condition due to the electrolitic action between the different materials in damp soil conditions and they present serious difficulties to the conservators. Hence, only a few have been published with all their decorative details visible and comparison between examples is difficult. K. Exner listed 23 examples in 1940,[4] but since then more have been added from Vindonissa by Dr. Ulbert[5] and J.E. Bogaers and J. Ypey from Nijmegen and other sites in Holland,[6] and by Edit Thomas from the Danubian provinces.[7] They have also been found in Britain from Colchester, Gloucester,[8] Lincoln, Usk, Waddon Hill,[9] Hod Hill,[10] Richborough,[11] and Loughor. I have so far listed 55 which excludes those from Usk, not yet published, and I am hoping to do a full study for the report on the Lincoln example which is still being cleaned.

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SIMON JAMES: The arms and armour from Dura-Europos

Dura, called by Rostovtzeff 'the Pompeii of the Syrian desert', was excavated by French and American archaeologists during the 1920s and 30s, and is today generally best remembered for such treasures as the synagogue and its murals (the best general introduction to the vast Dura literature is Clark Hopkins, *The Discovery of Dura Europos*, Yale University Press, New Haven and London, 1979, which includes an extensive bibliography).

The military remains from the site are also well-known. The city was a major Roman garrison town on the banks of the Euphrates, straddling the road from the Persian capital at Ctesiphon, across Mesopotamia and up the right bank of the river, leading ultimately to Antioch. After a siege in the mid-250s A.D. the city was destroyed by the Persians and never reoccupied. Remarkably, the Persian siege-works and Roman defences survived largely intact and were explored in detail by the excavators. The towers of the city walls and the mines beneath them produced some remarkable finds of military equipment, largely in an excellent state of preservation. Many isolated finds turned up throughout the town.

Various items of equipment were published in the *Reports on the Excavations*, which were issued as work progressed. The fullest accounts were of the painted shields and the two armoured horse-trappings in *Reports* VI and VII. Other pieces received varying degrees of coverage, from detailed description to a passing mention. It is also now clear that much that was found was never referred to at all.

The original intention of the excavators was to bring all the evidence for the weaponry together into one volume of the series of *Dura Final Reports* which have been appearing sporadically since the war. However, very little progress was made, and so the projected *Volume VII, the Arms and Armour* has never appeared.

Like the rest of the finds from Dura, the weaponry was divided between Yale and the Syrian National Museum at Damascus. However, in the event, Syria retained only a small proportion of the material, most notably one of the horse-armours and a sword. The great majority of objects went to Yale, where they are now in the collections of the University Museum and Art Gallery. Some items, including Yale's horse-armour are on loan to the John Woodman Higgins Armory Museum, Worcester, Mass.

The writer is currently engaged on the writing of a PhD thesis on the Dura arms and armour. This is on the basis of examination of the Yale collections, and the excavation archives which are also housed in the art gallery. It has not yet been possible to examine the Damascus material, but the small quantity of this, and the fact that the two major items are published, makes this a relatively minor omission. With the approval of Ms Susan Matheson, assistant curator in charge of the collection, it is intended that the work will form the basis of *Final Report VII*.

The Dura assemblage is arguably the most important

collection of arms from any single site in the empire. In scale, it compares well with those from the forts of the Rhine/Danube *limes*, but exceeds them in diversity. Conditions of burial at Dura have led to the preservation of organic components rarely, if ever, seen in Europe, such as the fabric backing of scale armour, complete painted shield-boards, and dozens of catapult bolt and arrow shafts (one of the latter with intact fletching).

Secondly it is, to date, the only armour assemblage worthy of the name from the entire Roman East. As such it gives a unique opportunity to see what equipment was in use on the Persian frontier and to investigate how far it differed from that used in Europe.

Finally, deposition is exceptionally well dated, as numismatics and epigraphy place the siege and destruction of the city in A.D.256, plus or minus a year at most.

However, like most collections, it has its problems. The greatest is the difficulty of matching objects in the store with the site records. Cross-referencing of the site catalogue and museum accession numbers was never completed due to shortage of resources, and many objects have since lost their labels. In any case, the standards of excavation and on-site recording were not adequate to give a reliable stratigraphic context for finds, with a few notable exceptions. For example, well-sealed deposits came from between the collapsed floors of Tower 19 (horse armours, *scutum*, arrows) and the Roman countermine beneath it (bodies of *c.* 16 Roman soldiers with their equipment). The latter find is particularly instructive. The site records consist of an imperfect written description, and a few poor sketches of the tangled mass of bodies and artefacts. There is no way to establish the site-catalogue numbers of the objects depicted, and so it is now impossible to prove which objects at Yale came from the mine.

Despite these and other limitations on the use of the Dura evidence, the work has at least demonstrated that the material falls into two discrete groups. On the one hand, there are objects which are not paralleled in Roman contexts and which may therefore belong to the attackers, or represent orientalising influences (e.g. the lamellar armour, the reed-and-rawhide shields). Others are undoubtedly the property of the defending Roman force, but there is no comparable material from Europe (bolts, arrowshafts), while a few objects are almost certainly Persian (e.g. the so-called Persian skeleton from the Tower 19 countermine, identified as such by the association with an oriental spiked helmet and a sword pommeled with Chinese jade).

On the other hand, there are the pieces which are clearly part of the Roman tradition. These are particularly remarkable in that the items which are diagnostic of second/third century Roman equipment in form or style - such as scabbard fittings or helmets - are not just close to European examples, but are indistinguishable from them, even in fine detail. This is impressive evidence for the degree of standardisation in the equipment of the third century army, from one side of the empire to the other.

P.J. HAZELL: Roman military equipment - an appraisal of methods and aims of research

We are here to discuss methods and aims of research: a wide and unspecific subject even in the context of our own corner of the discipline. The formula which I evolved for my own research purposes and which served well enough to tempt me to the presumption of recommending it to others, comprises three simple components:-

a) Statistical analysis.
b) Ergonomic analysis.
c) Dialogistical examination of the conclusions drawn from the previous components a) and b).

a) STATISTICAL ANALYSIS

1) *Statistical Data*

As we all know, this is the wearisome task: the amassing of statistical data pertinent to the subject concerned. The definition of that data 'considered pertinent' should remain as wide as sound reasoning will allow. If we are dealing with objects; pertinent data will embrace the design classification of these objects, mode of decoration, if any, their respective provenance, dating where available, geographic location of provenance and the environment in which the respective objects were found. Particularly with regard to 'small finds' - illustrations of these objects are suitable grist for the statistical mill.

There is an unfortunate tendency among authors to illustrate small finds, e.g. buckles, strap-ends, decorative and fungiform studs etc, only in isolation from each other - with no reference, by sketch or photograph, to the juxtaposition in which they were found. In the case of metallic harness components especially, be they harness for horse or man, the original juxtaposition of the components can yield important information concerning the likely original configuration of the harness, or section of it, to which the objects belonged. Even in the instances of discarded (scrapped) equipment it is unlikely that, again for example, buckles and strap-ends would always have been disposed of individually. It is far more likely that a whole section of harness, complete with worn fittings, was consigned to the rubbish heap.

2) *Misleading Data*

One must, of course, always be alert and watchful for the 'traps' of statistical analysis. For example, I am fairly well convinced that a number of pugio, or Celtic dagger blades, are lying about in provincial museums masquerading as 'spearheads', not to mention ballista bolt-heads designated as 'arrow-heads' or 'small spear-heads'. Thus classified under their respective misnomers, they stand fair to remain unidentified for eternity.

If I may digress for a moment; an interesting line of research may well be a recataloguing of the various standard sizes of those objects classified as Roman army nails.

This may sound odd but a recent and very unofficial

study carried out by a small team of production engineers on a socketed ballista bolt-head, indicated that the simple iron billet from which such an object could best be quickly and easily manufactured was one precisely in the shape of a fairly large, headless, tapered nail - square in cross-section. At least seven of these objects, conforming pretty accurately in dimensions to the production team's specifications, were found at Corbridge over forty years ago. One wonders, perhaps, how many other such billets might currently be languishing in museums and masquerading as 'nails'. It may even be that at least *some* of these standardised billets were capable of serving a dual purpose - a) as the stock material for manufacture of arrow and bolt-heads or b), with the simple addition of a hammered head - become large nails. It is noteworthy to remember the large hoard of nails found at Inchtuthil. In this instance, they had been carefully buried beneath the site of the dismantled and subsequently burnt Roman fort. Plainly, transport adequate to remove them was not available and such valuable logistical material could not be allowed to fall into enemy hands.

I suspect that a recataloguing or iron nails and a statistical review of their weights and dimensions might reveal an interesting correlation with similar data pertaining to arrow and ballista bolt-heads.

3) *Emerging Patterns*

Having amassed the statistical data and discarded or re-allocated the misleading items, one may breathe a sigh of relief in the pious hope that the end of the most tedious stage is within sight.

The data may then be sorted and classified according to the limitations of pertinence already set. When one resorts to representation of the data in the form of graphs, curves, histograms etc., a pattern *will* then begin to emerge - if only a confusing one.

Assiduous study of this pattern, or patterns, however, may well yield hitherto unsuspected information. It may not only revise the researcher's opinions but even re-focus his attention in an entirely different direction. One must therefore be prepared to change one's original conceptions and realign one's sights if the statistical pattern points that way. Recently, in my own case, which involved researching the pedite gladius, one of the unexpected indications which the data pattern threw up was the curiously large proportion of these swords found in a water environment; i.e. rivers and lake beds etc. The proportion was so large as to indicate deliberate rather than accidental deposition; possibly a votive act involving specially selected examples of the spoils of war. It is known that the Germanic tribes at least indulged in ritual deposition of captured weaponry in water. It also follows that the 'selection' of such votive offerings would most likely be concentrated upon those items of most splendid and unusual appearance. Therefore, that large proportion of swords recovered from a water environment may well be quite untypical of the standard weapon, or weapons, of the day.

b) ERGONOMIC ANALYSIS

To look back 2,000 years and to study the ergonomics of the Roman soldier is not an easy undertaking. Neither is it a simple matter to perceive the adaptation and development of equipment which took place in the interests of his maximum efficiency.

To return again to my own pursuit of the marching gladius; apart from confirming that it was carried on the right hand side of the body, a wide review of sculptured data failed to provide any conclusive evidence regarding the functional details of its scabbard ring attachments and suspension harness. I admit that at this stage I grew more than a little disillusioned with sculptured evidence as a reliable research tool. I did discover exceptions to this rule however and would recommend the Caesarean triumphal arches at Orange and Carpentras as worthy of close scrutiny. The necessity of approaching the problem along more practical lines became obvious. Consequently, a replica gladius, cingulum and baldric were manufactured and by a process of trial and error, a workable, convincing harness attachment system arrived at.

The criteria of a 'workable and convincing' harness were defined as conforming to the following standards:-

i) It must provide minimal interference and nuisance while the wearer is performing such everyday field duties as marching, working on construction and excavation sites and foraging.

ii) Similarly, it must not inhibit the wearer's movements when running or discharging a pilum.

iii) Most important of all; in that situation when the scutum wall has been raised and the 'moment of truth' has arrived, the blade must come out of its scabbard smoothly, quickly and easily.

It is interesting to note that after aiming undeviatingly at these criteria and finally arriving at a system which satisfied them all, the metallic fittings found most suitable for the 'developed' gladius harness matched up very well with those illustrated by Hawkes and Hull in the Society of Antiquaries Research Report No.14 (Camulodunum).

The paramount importance of criterion iii) and the criticality of the blade length, scabbard positioning and attachments equation was dramatically demonstrated during an international symposium which took place at a Midlands University in 1981. A local gentleman who is a highly skilled armourer was invited to demonstrate his gladius and harness arrangement before the assembly. Suitably accoutred he made two futile attempts to withdraw his weapon (it refused to clear the scabbard) he made a third, desperate effort. The thing flashed out in a whistling arc and came within a hair's breadth of truncating the wrist of a lady bystander. The upshot of the whole affair was damn near a grisly one.

c) DIALOGISTICAL EXAMINATION OF CONCLUSIONS DRAWN

This component of the formula is, again as we all know, both simple and effective, if occasionally somewhat painful. The researcher should procure himself a 'Devil's Advocate' a fellow researcher in the same field (preferably

one who is not a close personal friend) and prevail upon him to study the monograph, weigh the evidence and conclusions and criticise accordingly. In the subsequent defence (or modification) of his reasoning and conclusions the original researcher will, I feel sure, become more than appreciative of the evidence already yielded by his statistical and ergonomic analysis.

PETER PRICE: An Interesting Find of Lorica Plumata from the Roman Fortress at Usk.

Abstract - this paper deals with a find of lorica plumata from the Roman fortress at Usk in South Wales.

In his book The Armour of Imperial Rome[1] Russell Robinson briefly discusses a form of mail armour made from bronze rings with a pendant facing of minute bronze scale. This he suggests may be the mail known as LORICA PLUMATA, so called because its appearance was similar to the feathers on a bird.

Fragments of this type of armour are known from several areas in the empire, notably a cuirass now in the Augsburg Museum in Germany, which is described by Robinson as being made from 'the finest bronze mail covered on the outside with alternating iron and bronze scales. Each scale 1cm long and 7mm broad, with a medial rib and joined by four rings passing through holes in its upper edge'.[2] Other similar finds are known from Holland and from Newstead. The Dutch find comes from Ouddorp and is now in the museum at Leiden. This fragment has a mail backing of 3mm diameter bronze rings with tapered, ribbed scales measured 6mm wide and 11mm long attached to the front. The other find comes from the Roman fort at Newstead in Scotland and is now in the museum at Edinburgh.[3] The Newstead mail had 5mm diameter links and 3mm links mixed with scales of 10mm long and 7mm wide.

During the examination of the ironwork from the Neronian legionary fortress at Usk, Gwent fragments of an unusual nature were identified by X-radiography. Upon a close inspection of the badly corroded pieces it was found that they consisted of a very fine chain mail with a covering of extremely small scales. The two principal fragments measured 10cm by 4cm and 3.5cm by 8cm, both pieces appeared to be part of a much larger cuirass and had the appearance of being either chopped or cut up. The lorica plumata from Usk seems to be relatively unusual in that unlike other fragments that have been described, both the mail and the covering scales appear to have been constructed solely of iron, with no traces of bronze scales being found.

The backing mail is composed of 3mm diameter links, and the tapering scales that cover it are 7mm long and 4.5mm wide. Although badly corroded it is just possible to make out the method of attachment of the scales, which is similar to other scale armour of this type, namely each scale having its upper edge turned back at right angles to the face of the scale, with four holes punched through for the mail rings that are inserted before being riveted together.

As well as the iron plumata a small fragment of bronze plumata has been recognised from Usk, this fragment measured only 1cm by 1cm and was very badly corroded, but it appears to be formed of 3mm diameter bronze links, with a single scale measuring 7mm by 3mm present.

Finally it should be noted that the fortress at Usk has also produced a number of fragments of lorica hamata

(mail) with the largest pieces measuring 13cm x 10cm and 8cm x 8.5cm. Of the 23 pieces that have so far been identified all except one had a link diameter of only 3mm, the only exception being a fragment with link diameter of 7mm.

It is of interest to note that these items of mail armour were only found because of the policy of systematically X-raying every single iron artefact which was clearly not a damaged nail or obviously identifiable without such an examination. Had this not been done, it is doubtful whether a number of the smaller fragments would have been identified. In fact when found they looked and felt like fragments of cinder or clay. Because of the light weight of the corroded mail and the coating of earth adhering to them it would have been very difficult to identify the very small fragments at all. Indeed it was noted that even fragments of lorica segmentata gave a great deal more information after X-raying, and several armour fittings were found in this way that could not be seen because they were concealed beneath an extremely heavy layer of corrosion. One is therefore left wondering how many more fragments of segmented and mail armour may be lying in museum stores unrecognised or have been discarded on site.

ACKNOWLEDGEMENT

I am grateful to Professor W.H. Manning for his valuable comments on this text, and for allowing me to publish details of the Lorica Plumata from Usk, in advance of the published report.

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NICHOLAS FUENTES: On the *scutum*, legionary marching order, surveying and colour in the Roman army.

My research is largely into the practical aspects of Roman military equipment. Although I am a member of the Ermine Street Guard and some of my work has been developed in conjunction with them, it is only fair to both parties that I should state that our views on various aspects of military equipment do frequently diverge.

In my general approach I like to bring together artefacts, their representations and their literary references before attempting reconstructions, rather than concentrating on only one aspect. This method has shown how widely-held opinions and artistic reconstructions, be they modern or ancient, can probably be wrong (at the seminar it was possible to demonstrate in a practical manner some of the points brought out in this paper).

For example, there is a considerable body of opinion which sees the *scutum* of the 1st and 2nd century A.D. being of the size and design of the decorated item from Dura Europos.[1] I would dispute this view because:

a) well-executed reliefs and mosaics of the period all depict a *scutum* of a smaller size.

b) if the decorated Dura *scutum* is to be cited in upholding this view, then the second smaller *scutum* from the same site demands an explanation and should not be ignored.[2]

c) using the horizontal handle of the Dura *scutum*, it is virtually impossible to raise the shield in order to parry a blow. If however a vertical handle is used (as depicted for example on the late 1st century relief of an *optio* of the I Legion Adiutrix from Brigetio[3]) then it is very much easier, particularly if the shield is smaller.

d) it is very difficult to march with a slung *scutum* of the size of the decorated example from Dura because it hits the back of the calf.

Similarly, the Roman marching order as represented on the bridge-crossing scene on Trajan's Column, shows various items of equipment being slung from the end of a long pole which is carried over the left shoulder;[4] this depiction has been reproduced by many reconstruction artists.[5] When however a simulation of the various items is made up, hung from a pole and held in the manner of the depiction, it is immediately clear that the torque exerted by the cluster (which weighs *c.* 9kg/20lbs) requires both hands to hold the pole in that position. If the cluster is lowered onto the shoulder by sliding the pole down, the it can be held in position by only one finger. I would also mention that I see the 'pole' as often being the handle of one of the various entrenching tools which Vegetius describes as being carried, for example, the *dolabra*, *ligo* and *pala*.[6]

The reconstruction of the haversack itself has been based for general appearance on the Trajan's Column depictions,[7] for size on the Bar Hill 'satchel',[8] for design on the modern envelope (in order to incorporate a flap to keep the contents dry), and for a closure mechanism on the studded ring found on many Roman military sites.[9]

A number of experiments with reconstructed *gromae* indicate that the instrument can not only be used to

measure right angles but also angles of 45°. Thus, with two *gromae* at a fixed distance apart on a base line it is possible to survey in a square using triangulation by angles rather than by measured distances. This discovery perhaps explains in part why centuriation is laid out in squares and why the Roman military seemed to favour square patterns in castrametation.

Other aspects of the Roman army which are currently engaging me include a corpus or references or depictions of colour of tunics, shields, flags and so forth; the detailed design of a tunic, so that the off-the-shoulder effect can be achieved; the hanging of the sword scabbard, so that it can be slung either from a baldric or a belt; the general problem of crests; unit identification from shield designs; and lastly the use, or perhaps non-use, of the drum in the Roman army.

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STEPHEN GREEP: Approaches to the Study of Bone, Antler and Ivory Military Equipment.

My interest in Roman military equipment is conditioned by the material of which they are made - that is bone, antler and ivory. This has formed a small part of a wider study of Roman objects manufactured from these materials, principally from Britain but altogether consisting of an examination of approximately 100 unpublished collections in 10 European countries. The small number of objects (around 600) which forms the basis of my work on Roman military equipment constitutes 3% or less of the total assemblage of objects I have studied. The total number of objects of *all* types, not merely militaria, from Britain and the Continent I have had occasion to study amounts to some 20,000. Of all the material I have examined less than 5% has been published although military equipment is rather better than other object forms in this respect.

My aim was not a comprehensive study of all objects from limited areas but I have stressed the importance of an 'over-all' view rather, at least initially, than of a specific and detailed examination of a smaller area or restricted range of types. I have placed the emphasis on the objects themselves, working techniques and industrial organisation. Typological considerations have always been accompanied by chronological and functional discussions often making comparisons with like objects in other materials.

Concentrating on osseous materials presents its own problems. The majority of mid and late Roman sites in Britain lie in areas of acidic soils i.e. much of Wales, the Pennines, Northern England and Scotland, which is hardly advantageous to the preservation of such objects. The distribution of mid and late Roman bone military equipment such as late second - third century scabbard chapes (fig.1) demonstrates not only a relative lack of such material from these areas but throw into highlight the quantities of military equipment at these periods from civilian areas, principally towns and villas and should serve to remind us all not to neglect such collections in our search for information. The scabbard chapes are, for example, found at Canterbury, Colchester, Exeter, Silchester, Verulamium and Wroxeter, all sites with no obvious permanent military connections in this period.

Unfortunately few individual British sites have produced more than the occasional object of bone militaria. On the continent however, material from sites such as Cologne, Heddernheim, Mainz, Niederbieber, the Saalburg, Vindonissa and Zugmantel fill many of the typological and chronological gaps presented by a study of the British material alone and demonstrates the danger inherent in a purely insular study.

The materials with which I am concerned are, particularly where larger objects survive, identifiable from the finished products. The surface of antler is marked by numerous channels, its centre solid, tines curved not straight. Bow stiffeners (fig.2) consist of long slightly curving strips obviously derived from sections of antler

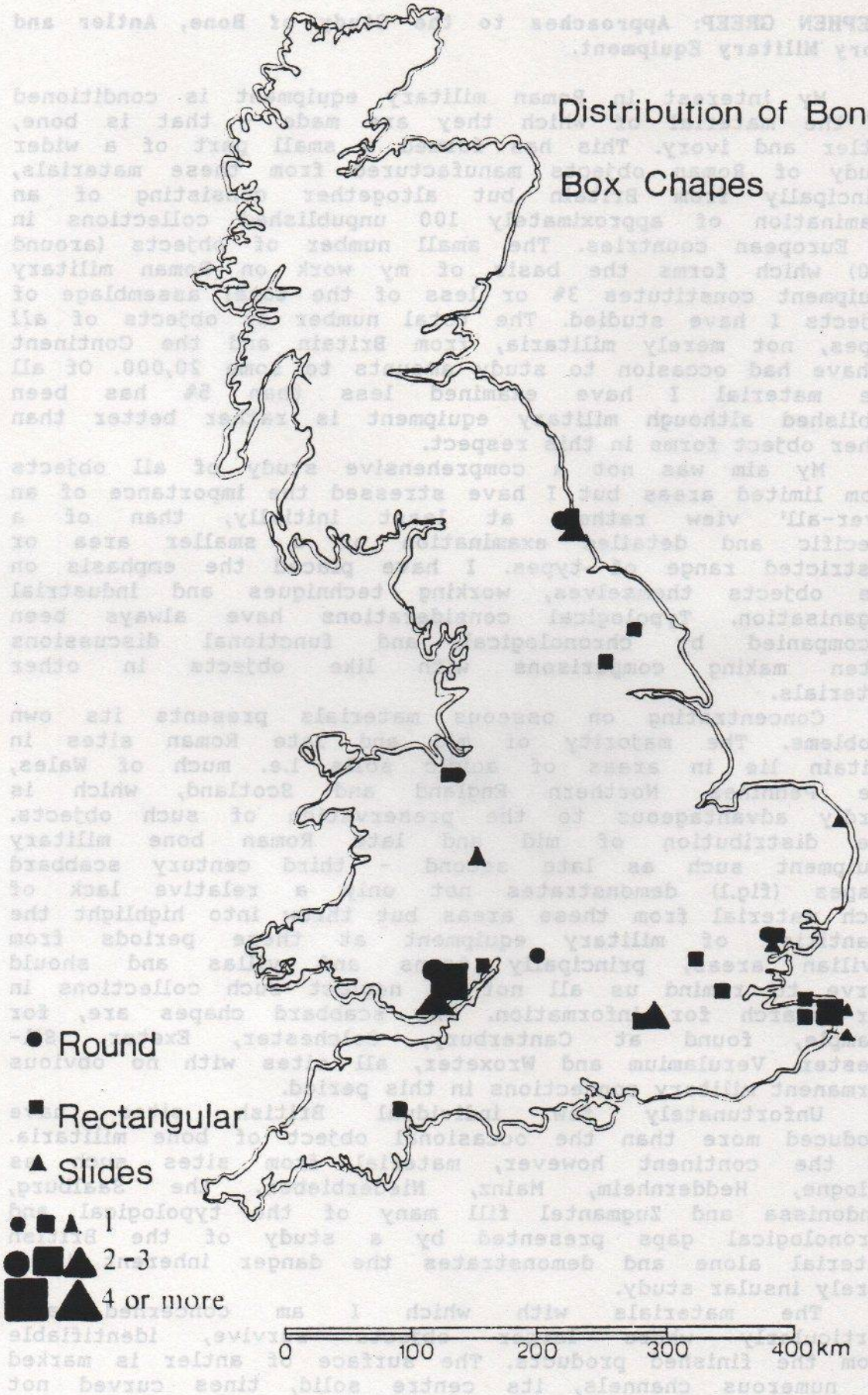

Distribution of Bone
Box Chapes
Round
Rectangular
Slides
1
2-3
4 or more
0
100
200
300
400km

Figure 1

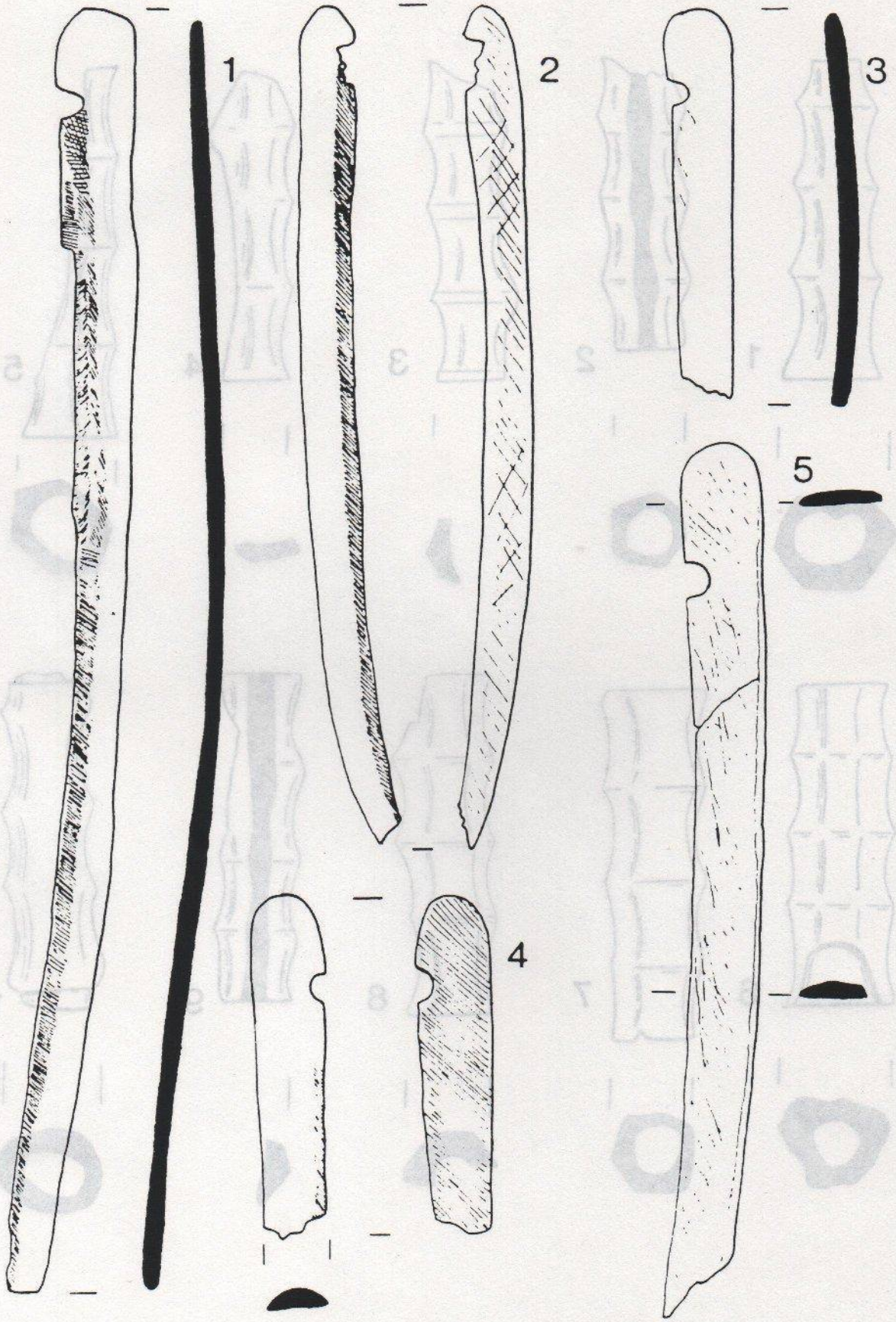


Figure 2 (2:3)

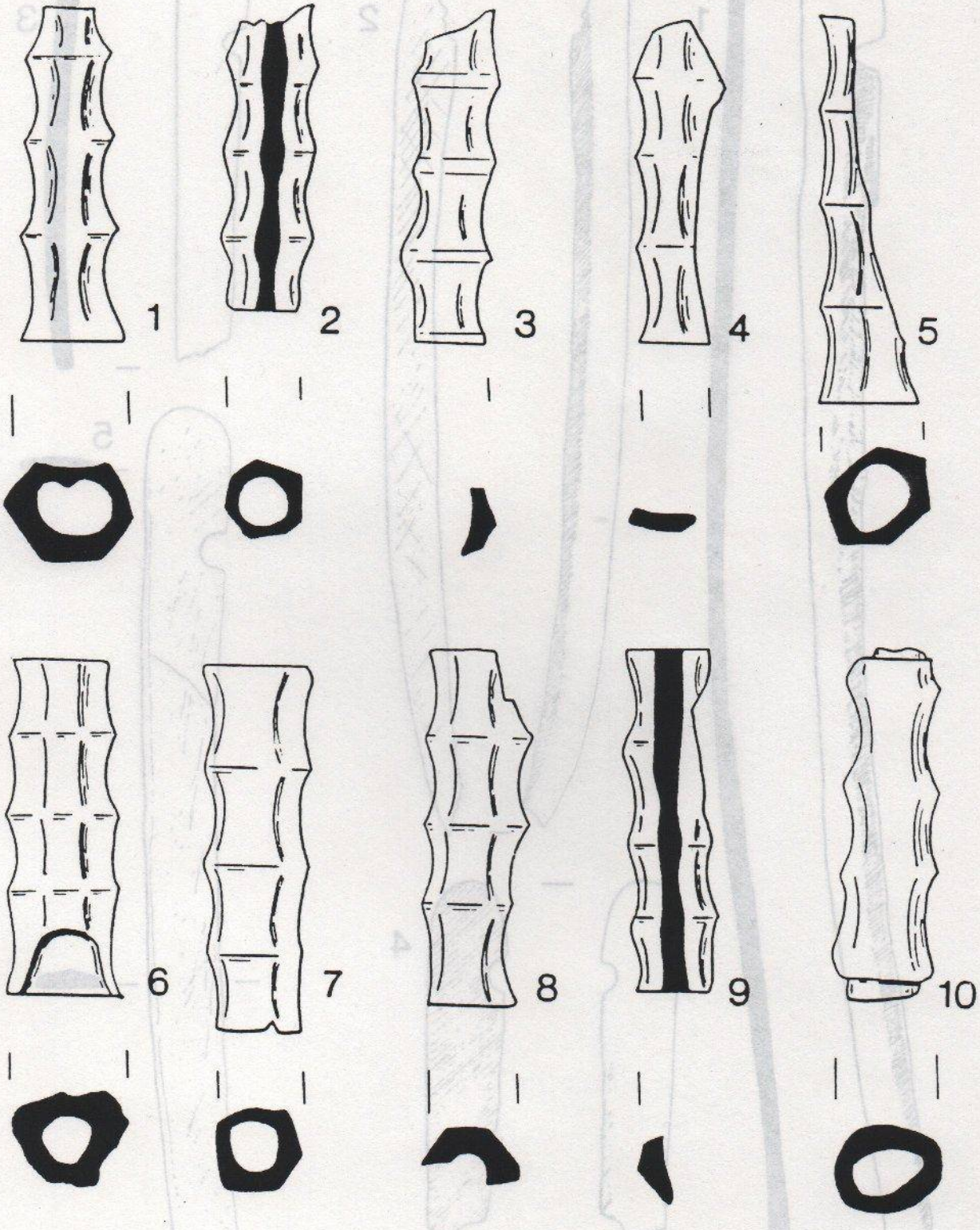
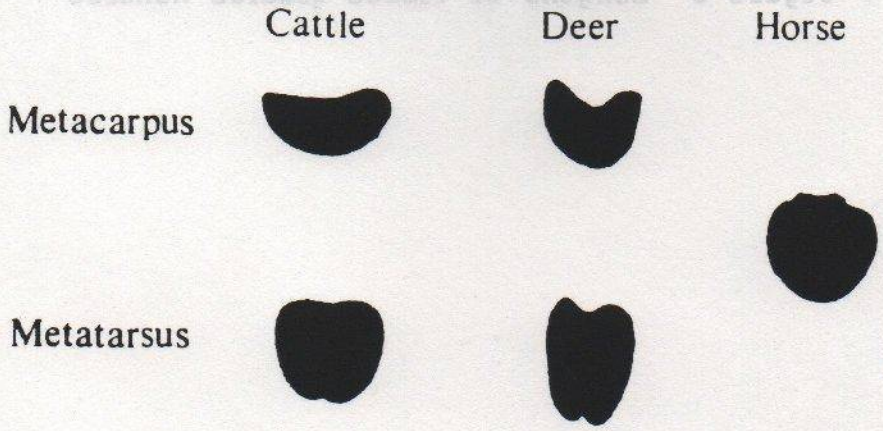


Figure 3 (2:3)

tine. The only bone which could have been used, rib bones, were favoured as a source material in the Prysg Field, Caerleon report on the basis of a number of complete examples of this bone associated in the same deposit. But the tissue of antler and ribs are significantly different and examination of both the waste and finished products shows that antler is by far the most common used.

Bone is a rather different material with a hollow cross-section. A number of individual bones have characteristic cross-sections occasionally enabling identification not only of bone types but also of species. The cross-section of ribbed *gladius* handles for example (fig.3) betray that they were made from cattle metapodia (fig.4) with one exception (fig.3,10) probably from a horse metapodia. An examination of the lengths of complete ribbed *gladius* handles shows that only one, a particularly small piece and possibly for a dagger, lies outside the restricted range 75-100mm. Their length is naturally conditioned by the size of the hilt they were expected to fit, but that there is a mere 25mm difference in size between all handles from as far apart as Newstead and Vindonissa is perhaps surprising (fig.5). This is however, approximately the length remaining after the removal of the epiphyses of the bone.

Ivory is identifiable partly by colour but principally and more reliably by the presence of numerous criss-cross lines through which it is even, if an appropriate cross-section remains, possible to determine exact species.



Distinction between bos, cervus and equus metapodial cross-sections

Figure 4

A comparison of bone militaria from Britain and the Rhine demonstrates little variation in forms despite the fact that there is evidence for bone and antler working at a large number of military sites. Through work on other bone and antler objects it has been possible to draw clear distinctions between site assemblages as well as demonstrate local regional and provincial distributions and it may well be that further work, particularly in France, may identify similar trends in items of military significance.

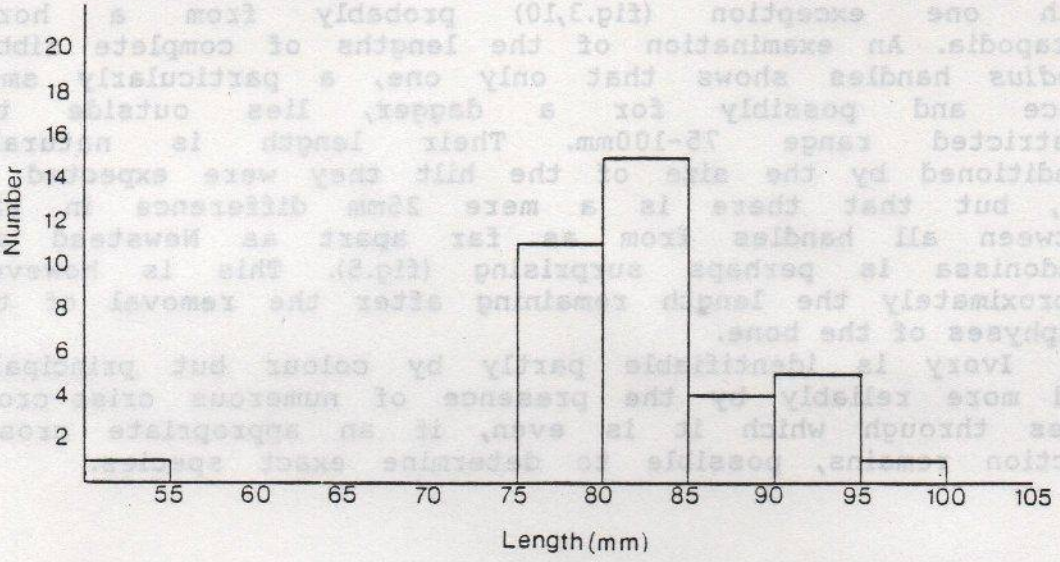


Figure 5 Lengths of ribbed gladius handles

M.C. BISHOP: Roman Military Equipment in the First Century A.D.

A large amount of evidence is available for the study of military equipment in the first century A.D., arguably one of the most formative periods of Imperial history, but no overall synthesis has yet been attempted; the research for my doctoral thesis will not, naturally, lead to such a synthesis, but it can attempt to go some way towards this goal, concentrating on the reliability of the source material.

My main objective is to establish a chronologically sound typology for equipment, but this naturally requires a detailed investigation of the evidence. A microcomputer is used to catalogue, sort, and study the published archaeological evidence, helping form the core data for this work. Fieldwork at a number of European museums has accumulated detailed information on some of the most important sculptural evidence, mostly provincial tombstones, while scientific analysis of some surviving artefacts (atomic absorption spectroscopy, X-ray fluorescence, and metallography) will hopefully be used to establish details of the construction of military equipment.

The time taken to prepare data for computerisation is one of the main problems with this approach, but it has the distinct advantage of producing great familiarity with that data. Another difficulty is often the quality of the published information: this can range from relatively small matters such as inaccuracies in the scales of illustrations, to a failure on the part of the excavator to allow an artefact to be related to its archaeological context and associated dating evidence.

A careful assessment of the evidence is obviously fundamental to a study such as this. For archaeology, this entails considering our present understanding of the archaeological process, as well as past and present methods of information recovery. Matters such as loss and recovery rates, along with the interpretation of recovery patterns, are also of importance here. Similarly, the contribution of experimental archaeology needs to be taken seriously.

Representational evidence is another important source, although it is mainly sculptural for this period. Questions that need to be examined include the methods of production, the effect of fashion, and the accuracy of these media. Comparison with the archaeological evidence is a key factor in the assessment of this category of evidence.

Literary evidence is, by comparison, less common than the other two and is fraught with its own difficulties, which must be isolated before its contribution to the study of military equipment can be appreciated.

Matters that arise from the attempt to construct a typology need to be considered in depth. What were the mechanisms for the transmission of form amongst those manufacturing equipment and how did concepts of shape affect them - moreover, what were the factors influencing form? What is the evidence for some sort of central control, as opposed to spatial determinants? What role was played by taste in the army and how much was this

influenced by the Celtic element within it? How was decoration used and what did it signify?

The techniques of manufacture and decoration are also important to an understanding of military equipment, and scientific analysis, particularly of Roman copper alloy objects, will hopefully shed some new light on this. Oldenstein's work on production of equipment by the army must be taken further, while the implications of the incidence of scrap in the archaeological record are equally important. Once again, the question of centralised or geographical production is relevant and computer simulation can be used to produce various possible models which can then be tested against the available evidence.

Finally, the typology itself can be produced, covering virtually the entire range of what has been defined as 'military equipment'. The criteria by which this typology was produced may then be considered, along with other such typologies, leading inevitably to the question of whether any typologies are valid and how subjective and objective elements can best be reconciled.

J.C. COULSTON B.A. M.Phil: Arms and Armour in Sculpture.

The aims of a programme of Roman sculptural research in progress may be summarised as follows:-

1) To expand the sculptural body of material used by Robinson to illuminate his small-finds and to formulate his conclusions in *Armour of Imperial Rome*. One can, thereby, bridge many gaps in that work and modify some conclusions which were based on too little data.

2) To study the comparative reliability of *all* categories of sculpture, even the most 'baroque', fully using the archaeological, artistic and literary evidence.

3) To work towards a corpus of depictions of Roman military equipment in all media. This is especially necessary for regions of the Empire which lack any corpora and for other, well published areas e.g., Germania, which have corpora not dealing specifically with military subjects or which are outdated and incomplete.

4) To study Roman *armamentaria* in the widest geographical and chronological context, emphasising the continuity of technological development. Specific problems such as the evolution of horse-armour, archery and the use of the 'lance' may then be examined.

The first-hand examination of as much material as possible, especially in under-published areas, is vital. A corpus is obviously a very long-term project but one which will be greatly aided by the appearance of new *CSIR* fascicules. Work in museum stores must be done in conjunction with the handling of small-find collections which provide some standard by which the reliability of sculpture may be gauged.

To test reliability, and thus the degree of stylisation, however, the simple comparison of objects to sculpture is insufficient in many regions because of gaps in the small-finds record (especially in the Eastern Provinces), and because of 'art historical' factors which play a part. The question 'how reliable is it?' must be followed up by 'if not, then why not, and what bearing does this have on other comparable pieces?'. Whatever the answers, the direction of enquiry must be towards the greatest possible observation of detail and the fullest possible body of data before reliable conclusions can be drawn. Hence the compilation of the corpus.

The 'official' sculpture of the metropolitan centres and the 'provincial' work of the frontiers present differing problems of interpretation, dictated by the sculptor's sources of information about the equipment and by the artistic *koine* within which he is working. One can postulate as sources for the monuments of Rome copybooks, campaign sketches, observations of frontier troops in triumph or of the troops permanently stationed in Rome and captured weapons carried in triumph for barbarian depictions. These may all lead to stylisation depending on the sculptor's knowledge and understanding of the subject and on the physical scale and position on a monument of the sculpture. The scaling down in size of shields, cheek-pieces, horses and scenery, for example, is the result of artists of the Hellenistic style concentrating on the human

form.

Work carried out so far on Trajan's Column, for example, demonstrates that although the monument has been seriously studied since the Renaissance, there are still many new dimensions to be examined by observation of the *details*. The incidence of certain helmet types, *cingula*, *baltei* and *gladii* on *legionarii*, for instance, may be reduced to computer data from which distribution 'maps' may be drawn up. These will hopefully tell us more about the putative cartoons followed by the sculptors, and their methods, all in turn contributing to the evaluation of the accuracy of the details and of the spiral overall as a narrative document.

Provincial depictions theoretically have the frontier armies as their model. This results, firstly, in the details of belts, buckles, scabbard fittings etc. being well represented, but secondly, in the common knowledge of sculptor and client (often himself a soldier, *ex testamento*) leading to shorthand in details saving time and cost. A case in point is Robinson's revelation that the 'leather' armour was in fact mail. The scaling down of the horse to fit into an *aedicula* precludes any conclusions concerning horse breeding and size. Small cheek-pieces, extra-large sword-pommels, distorted shield sizes and shapes, frontal heads with obliquely viewed helmet crests (Cf. C. Valerius Crispus, Wiesbaden; Lepontius, Strassburg) and 'undress' depictions without body armour all lead to other pitfalls. The formalised stance of the cavalry tombstone precludes conclusions as to drill commands and fighting methods (which have been drawn in the past!). Naked cowering barbarians on British and German stones may just be following convention and be of little help in determining native dress and there may be a parade equipment complication in details of horse-harness, plumes and some helmets. The squared rosette in *pugio* and *cingulum* representations may be just an insidious 'space filler' supplied by the sculptor, not by the real objects. Tombstone figures in particular, however, serve to explain the role and positioning of various small-finds such as apron mounts and *cingulum* fittings. In addition the reconstruction of perishable details of clothing, leather equipment and shields may be provided.

Small-finds can illustrate physical workings which cannot be determined from the sculpture and which may even have been misunderstood by the sculptor. Here one has in mind the Corbridge *loricae segmentatae*, and the importance of ear and grip laths in the reconstruction of Roman composite bows.

The use of small-finds to indicate the presence of certain classes of troops *cannot be done* in many cases. The exceptions are when certain artifactual classes used only by *legionarii* (*lorica segmentata* fittings and *pila*) or cavalry (sports helmets) are present, or when a type of artifact is present in such great numbers as to make pronouncements justified. Some *legionarii* (Adamklissi Metopes; Marcus Column) have *hastae*, *loricae hamatae* or *squamatae*. Finds of saddle-fittings or horse-harness mounts are not diagnostic for the presence of cavalry, given the

possible presence of horses for officers, scouts, dispatch-riders and baggage. Finds of arrowheads or composite bow laths only demonstrate the widespread practice of archery (for mural defence and general training) *not* that a unit in garrison was designated *sagittariorum*. The temporal transition of weapon types (and their names) for various elements of the Army, the longevity of armour circulation and putative ethnic or provincial/regional variations all confuse the picture. At Longthorpe or Hod Hill, for example, the assemblage *is* large enough to make meaningful 'garrison' conclusions. At a fort like Great Casterton, however, a *pilum* shank and a lobate hinge only indicate the presence of *legionarii*, not necessarily a legionary garrison, at some point in the fort's history. A caretaker function, builders or just men passing through might be involved. Even with a massive assemblage such as that from Dura-Europos, backed up by papyrological and epigraphical evidence for garrison identities, the small-find contexts and chronic inefficiency of excavation preclude (with the possible exception of rectangular *scuta*) the assignation of finds to troop-type.

The proper methodology for the study of arms and armour is, of course, to critically use the literary, archaeological and artistic sources in conjunction, not separately. The sculpture can provide some form of historical framework whilst the small-finds correct artistic stylisations. Given that such a large proportion of archaeological artifacts are from undated contexts (old excavations; rivers and bogs - possibly with a votive element) chronological problems are bound to arise. The documentary sources can supply details which neither sculpture nor small-finds provide, such as the putative names of weapons and, in some cases, the period of their introduction and use. A nice example of the three classes of data together is the introduction of the *draco* standard. Used by Dacians and Sarmatians, it is in Roman cavalry use under Hadrian, field use from the Antonines onwards, and possibly in infantry use from the second half of the third century onwards.

To date, the fieldwork programme has concentrated on the monuments and museums of Rome; the museums of Italy; museums in the Eastern provinces, excluding Egypt, working especially on Palmyrene sculpture; collections in Britain and on the Rhine. Ubl has catalogued most of the Danubian pieces; Esp érandieu covers Gaul which has few pieces away from the Rhine; Spain has even less; North Africa is also well published. One eventual aim, necessitating the fullest gathering of data, is simply to construct typological and chronological maps of sculptural distribution.

I.R. SCOTT: First Century Roman Military Daggers with Inlaid Sheaths.

All previous studies of Roman military daggers have concentrated on the inlaid sheaths to the almost total exclusion of other aspects. The emphasis has been on a discussion of decoration and on attempts to recognise styles and traditions. Considering the small sample involved - perhaps 60 inlaid sheaths from what may loosely be termed the western half of the Roman empire - this has been a largely futile exercise; although it may prove more fruitful when more material comes to light.

The two principal workers in the field in recent years have been Edit Thomas in Hungary and Gunter Ulbert in Germany. The main studies produced by Thomas and by Ulbert, taken with the detailed publication, by Ypey, of 4 daggers from The Netherlands, are the basis to which new discoveries are to be added, and upon which new research is to be built. However, by concentrating on the decorative elements of the sheaths, it seems to me that Thomas and Ulbert neglected a source of material and information that was already to hand; this was the daggers with which the sheaths would once have been associated. This is most noticeable in the case of the material from Vindonissa. Ulbert has published a study of the inlaid sheath plates from this site; a study in which he considered 7 of the 12 sheath plates, but did not deal with the 14 dagger blades, nor with the 13 'T' shaped hilt plates (of the type generally associated with 1st century daggers).

The need to study these objects - daggers and sheaths - together, should be self-evident, and was brought home to me while preparing the report on the dagger and inlaid sheaths from Usk. There is one sheath plate inlaid with silver and comparable in general terms with material from Vindonissa; there is also a complete dagger and sheath. Although heavily corroded and fused together by various accretions a surprising amount of detail has been discernible. For example, the suspension rings have been identified, and these proved to be most unusual, though now paralleled by a recent find from Velsen in The Netherlands. The dagger itself proved illuminating for it showed clearly that the 'T' shaped hilts, associated with Roman daggers but usually found on daggers with flat riveted tangs, were also used on daggers with simple tapering tangs.

The association of this dagger with a sheath led me to look at other Roman daggers, the majority found without sheaths, and it became increasingly obvious that the sheaths and daggers could not be treated in isolation. The obvious corollary was that it was essential to distinguish forms both of daggers and sheaths and to work out associations between the forms. Once done, this increases our options by enlarging the sample available for study. This allows greater certainty about the chronology ot types of dagger, and linked with this, the increased likelihood of identifying different workshops.

ROMAN MILITARY DAGGERS OF THE FIRST CENTURY A.D. - PROVISIONAL TYPES

Tangs

Type I - Flat tangs, the dagger handle is fixed by rivets through the tang, and, sometimes through the top of the blade.

Type II - Simple tapering tang with no rivets; the tang and blade are held together by tightness of fit.

Blades

Type A - Broad blades with simple midribs and tangs of Type I.

Type B - Blades with well defined midribs with pronounced grooves, marked waists and long tapering points; found with both Type I and II tangs.

Type C - Narrow blades, no more than 4.5cm broad at the shoulders, often only 3.5 to 4cm broad, with only slight waists, and found with Type II tangs.

Sheaths

Type A - Iron sheaths with elaborate inlaid patterns in a variety of materials, including enamels, silver, and yellow metal. Suspension is by means of free running bronze rings attached to the scabbard by cast bronze loops held by decorated rivets.

Type Bi - Organic (wood and leather) sheaths with a metal plate fastened to the front by means of the rivets that also attached the suspension rings. Extant rings are not free running and are in the form of elaborate crescentic loops with internal scrolls. The decoration on the plate is usually inlaid with silver wire; occasionally red enamel is found. Bi sheaths are usually *c.* 5.6cm wide at the mouth.

Type Bii - Similar to Type Bi but narrower, being *c.* 4.5cm wide at the mouth. The form of suspension ring is not known, but probably as for Bi.

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