SOME CHANGES IN THE MANUFACTURE AND SUPPLY OF ROMAN BRONZE HELMETS UNDER THE LATE REPUBLIC AND EARLY EMPIRE

John Paddock

I had originally intended to speak about the supply of all aspects of military equipment under the Republic, but I soon realised that this task was quite enormous and would take many hours, and indeed, that for the supply of certain items, such as body armour, the evidence is lacking. I therefore propose to concentrate exclusively on the helmet, principally because there is a large number of these items both provenanced and of known date, and that there is a reasonably large body of evidence to work with. I would like to make some remarks about the question of supply and to look at the changes in quality, form and processes of manufacture from the end of the 4th century B.C. to the mid 1st century A.D., with particular regard to the Montefortino helmet and its immediate bronze successors.

There are, in my opinion, two distinctive breaks in the continuity of the bronze Roman helmet, especially in its manufacture and the quality of the individual items, the first of which would seem to date to about the end of the 2nd century B.C. and the second to the early years of the 1st century A.D. or just before. I believe that both changes are probably related to changes in the nature of the individual within the Roman army and to the nature of the army itself.

I would like, first of all, to examine the question of the supply of equipment to the legions in the Republic. There can be no doubt that at the time of Polybius the individual legionary was responsible for supplying his own equipment, his position within the legion depending upon his age and property qualification amd the armour he could supply. Polybius, in Book VI,26,1-2,[1] leaves us in no doubt that there was a basic standard of equipment laid down for each type of soldier beyond which the individual might purchase more expensive or better equipment. This is confirmed in Book VI,39,15-40 where he tells us that the allies had their rations as a 'free gift', but the Romans had to pay for their own clothes and any additional arms they required. As we know from Tacitus (Annals I,17),[2] this situation continued into the Empire and is listed as one of the grievances of the legionaries in A.D. 14. However, by this time it would seem that equipment was held on a sort of lease-back arrangement. Again, Tacitus states this in his Histories (2,67)[3] when describing the events in Rome in A.D. 69 that the Praetorians

"when they were offered in addition the inducement of an honorable discharge, had begun to hand over their arms to the Tribunes when the news of Vespasian's war began to spread."

This is a marked change from the early to middle Republican practice, when the legionary presumably returned home with his weapons upon discharge, and is a probable result of the Lex Julia de Vi Publica and the change from a citizen to a permanent, professional army. In this context it is interesting to note that by far the majority of Republican helmets turn up in civilian rather than military contexts.

Under the Republic the soldier's equipment was his own personal property and this, allied with the stylistic variation and the differing degrees of elaboration and the decoration, would seem to indicate a small scale supply by local metalworkers on an individual basis.

Under normal circumstances this system would seem to have worked adequately, but it must have been totally unequipped to have dealt with military disasters such as Cannae, and indeed the whole Second Punic War, when the demand for men and new equipment to replace the losses was immense. At such times of national emergency it would seem logical to postulate some form of over-riding state control of metalworkers to enable the state to fulfil its commitments.

Likewise, before a major campaign the Consuls would of necessity have to stockpile replacements for equipment likely to be damaged or lost, as well as large quantities of projectiles, including pila.

Like the equipment itself, evidence for areas of supply and manufacture is scarce under the Republic, but if one looks at the Montefortino helmet from the 4th century B.C. onwards, one can discern some possible areas of production and even gain some insight into the identity of the manufacturers. There are two groups of stylistically very similar and almost identical helmets numbering about 20 in all, from graves dating to the 4th and 3rd centuries B.C., which centre around a small area of Etruria and most particularly the vicinity of Perugia. We know from Polybius that when the Consul raised an army, all citizens of military age were summoned to Rome, and after having been selected they were dismissed to arm themselves and to return to their homes. They were required to assemble at a given time and place. Although the recruit might buy his equipment at any of these locations, it seems likely that a good number bought from local craftsmen near their homes. Furthermore, a man is generally also buried near his home and in view of the great similarity in these items, this

may indicate a manufacturing centre; however, the evidence is far from conclusive.

There are three helmets (Figs.I-III) which come from Italy and date to the period between the end of the 2nd and the mid 1st centuries B.C. which bear stamped marks that can only be interpreted as maker's or armourer's marks. These marks are quite unlike the usual Republican or early Imperial inscriptions on equipment, which are usually just scratched on or executed in punctile work, and give the soldier's name and usually his unit, but are actually countersunk into the bronze with a die. This was done at the time of manufacture, as can be seen by the stamp on the helmet from Rieti, where the stamp overlies one part of the decoration, but is itself overlain by another part (Fig.Ib).

The fact that an armourer would go to the extent of making or having made a stamp for his work might seem to argue a relatively large scale production. In this connection it is also interesting that these helmets show a marked decline in the standard of workmanship over previous examples, which might be taken as further evidence of large scale production. I will return to this point later, but will say now that two of these helmets date to about the beginning of the Civil Wars and the Social War, when the large scale increase in army size would demand huge increases in the numbers made and the urgency of this demand would perhaps account for the decline in the standard.

The first of these three helmets, now in the Staatliche Museum, Munich,[5] bears a stamp 'Q Cossi Q' of Quintus Cossius the son of Quintus, probably a private artisan or entrepreneur, and seems to date to between the end of the 3rd and begining of the 2nd century B.C. It is possible that the two other helmets which bear maker's marks, that from Loreto Apruntino[6] and that from the Merrick Collection, now in the British Museum[7] carry government marks, respectively a monogram (FR) and RON (Figs.IIb, IIIb), which could stand for Rom Fecit and RON may have in fact been intended to read ROM, but I think it is more probable that once more these are of a private nature, as there is some indication that the stamp on the British Museum helmet had a letter, possibly an F, before the RON, and could therefore stand for Frontinus, as could the monogram FR.

I would now like to turn to the methods of manufacture and changes in quality.

For those who are not conversant with the raising of bronze, I would like, briefly, to outline the process. The armourer would start with an annealed bronze sheet; the metal would be formed into the desired shape over a variety of stakes, some ball headed, others not, by concentric, slightly overlapping hammer

blows spiralling downwards. The metal, as a result, would become work-hardened and require frequent annealing. The hammer used in this process would be of cross-pein form, a type comparable to a modern raising hammer and occurring on both civilian and military sites, e.g. Silchester and Newstead. Finally[8] the surface would be planished to remove the marks of the raising hammer and then decorated, ground, cleaned and finally polished.

As I said at the beginning, there is a sharp drop in quality of the helmets at about the time of the Marian Reforms. Up until then, the quality of helmets had been fairly consistent and the bowls well decorated and finished. However, after the Marian Reforms, with their resultant influx of the poorest citizens into the army, there must inevitably have been a massive demand for cheaper equipment, a situation which can only have been exacerbated by the Civil Wars and the intervening Social War, which led to the vast multiplication of armies.

Practically all surviving helmets from this period are of Montefortino type although a small number of other forms may date to this period, e.g. the Italo Corinthian helmet, and have, in general, a very battered appearance, being left rough from the raising process, the hammer blows being especially obvious on a helmet from Montenerodomo (Fig.IVa). They are often asymmetrical and very crude in form and finish and every short cut, both in time and skill has been exploited. For example, the hinge plates for the cheekpieces are held by one rivet instead of two, and are often made of re-used scrap; decoration has disappeared completely; more often than not the crest knob is off-centre and on four or five helmets are applied and not made in one with the bowl. These crest knobs are cast and soldered on, some retaining flash marks, some have moved off-centre during soldering (Fig.IVb).[9] The edges of the bowl are not thickened, and the bowl itself is noticeably thinner.

The second change that may be detected in the manufacture of bronze Roman helmets seems to occur in the early years of the Principate, possibly as a result of the establishment of a standing army following the reforms of Augustus in 27 B.C. it is unfortunate that there are no known helmets that can be definitely dated to the years immediately following these reforms, but it seems probable, given the decreases in the number of legions, that for the next 20 years or so stocks of old equipment would continue in use.

The first securely datable early Imperial helmets come from the Rhine Frontier, most noticeably around Nijmegen, and show a very marked increase in the quality of the workmanship and general finish, including edge thickening and slightly larger neckguards. And it is about this time that there occurs the

widespread adoption of spinning and other methods and techniques of mass production. A good number of the early Imperial Coolus/Hagenau[10] and at least one Imperial Montefortino from Nijmegen (Figs.V-VII)[11] have been spun and not beaten, a large number having spin marks and occasionally a punched centring point still visible. However, this is often obscured by the affixing of a cast or spun crest knob.

As with all ancient manufacturing processes, it is of course impossible to state categorically how a Roman bronze worker would set about spinning a helmet bowl, but thanks to the intuitive work of Dr. Alfred Mutz[12] we can say that it was probably not dissimilar to the technique now used by modern silversmiths.

The process known as spinning is applicable to shapes which are circular in section, although the finished form may be altered by the use of snarling irons, or reshaping on stakes. The principle tools needed are a single geared lathe, capable of 800 revolutions per minute, a forme and a spinning tool. The forme is usually a block of wood of the exact shape required, but smaller by exactly the thickness of the metal. The spinning tool would have to be a heavy bar of hardened and tempered iron/steel, highly polished and with no sharp corners to cut the work.

The annealed sheet of bronze would be placed between the forme and a suitable follower and centred. The tool would be used in gentle stroking motions from the centre to the edge as the metal disc rotated, forcing it against the forme.

Alfred Mutz has shown that this technique was used to produce vessels in the Classical World many years before its adoption by armourers. However, it is possible, and indeed probable, that given their shape and dimensions, Pilos helmets of Classical and Hellenistic Greece were made in this way. The rims of these helmets are completely circular and in all cases 10 dactyls[13] in diameter and height. Unfortunately, the final finishing process and the trimming up which would be necessary often obscure any remaining surface spinning marks, and therefore without structural analysis it is difficult to tell how far this process was used on Imperial helmets. This method of manufacture is obviously quicker, and in the long run cheaper, and is more suited to production on a large scale than is beating, and it is interesting in this context that the majority of Hagenau helmets, although falling typologically into different groups, within these are of very similar dimensions, and the internal diameters of the bowls are almost the same giving near hemispheres, consistent with spinning over a similar shape and size of former.[14]

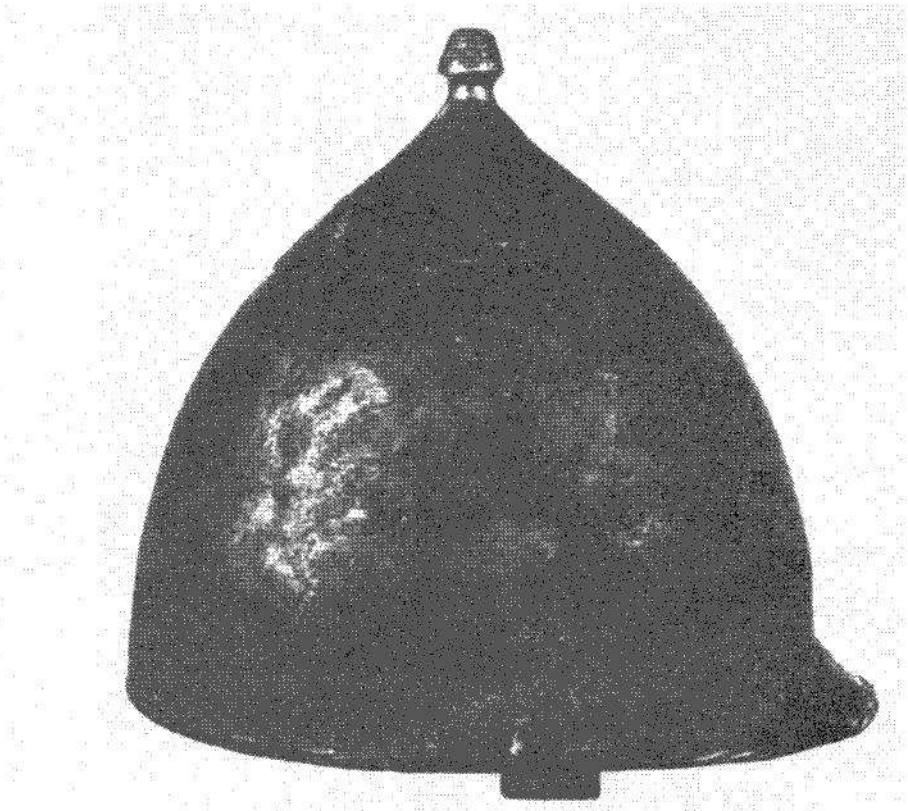
Although steel is spun today, and this process would have

worked perfectly adequately for bronze helmets, it could not have been used upon the iron Imperial Gallic varieties of helmet since the carbon content of the iron/steel being used could not have been kept constant throughout, and the smith might easily find that the material he was spinning was harder than the tool he was using, and also that any impurities in the iron would be ripped out, ruining the work. Obviously the larger dimensions of the Hagenau type of helmet would allow for, indeed demand, a greater amount of padding at the sides and back of the head and the addition of a brow reinforcement would allow for the reduction in the height of the bowl since it gives more protection to the top and front of the skull, reducing the need for padding there. The higher bowls of the earlier Montefortino helmets, with their small neckguards, would give more chance of a whiplash injury.

The reasons for the change mentioned above seem to be two-fold: first and foremost, obviously a spun helmet is quicker and cheaper to produce and spinning lends itself readily to mass production. The second reason is perhaps less tangible and relates, I believe, to a change in the nature of the army and its personnel.

The reforms of 27 B.C. left Rome with an army of 28 or so legions, designed primarily for the defence of the Empire and composed of citizens serving for a minimum period of sixteen years with the colours and four years as a veteran, and often more than this. It was a regular army with an established system of officer N.C.O. ranks, and offered a recognised career. Dhe nature of the campaigns of this period were, to all intents and purposes, different to those of the Republic. They were no longer the great wars of conquest which yielded booty and easy money to the troops to augment their meagre stipendium, but were either conquests which yielded little by way of profit, or policing actions. As a result, it proved harder to attract men into the army and obviously greater care was taken of the now trained and valuable individuals. The reign of Tiberius was to find the army taking up permanent garrisons upon the borders and for the first time the army had a period of relative peace and the military mind being what it is, obviously would start to demand greater uniformity, which is well reflected in the plan of the camps of this period, and indeed would have time to think up improvements in equipment. I cannot agree with H. Russell Robinson that this development in the helmets was an ad hoc response on a local level to the use of slashing weapons by the opponents of the Roman army, who had in fact, for the last 300 years, been using these very weapons. No previous attempt has been made by the Romans to adopt such obvious modifications, and it may be that the new helmet became a necessity with the reduction in size of the scutum at this period.

Finally, although it cannot be doubted that the new helmets show Gallic features, and are of probable Gallic origin, there is no evidence for the spinning of helmets by the Gauls, especially those of the Coolus type. It may well be that this second change in the quality and design of Roman bronze helmets is part of a larger design reflecting Imperial policy and the changing role of the Roman army, as these helmets seem to date from early in the Principate and very rapidly supercede all the old types; or perhaps, quite simply, the widespread adoption of the improved technique of spinning by entrepreneurs supplying the army.



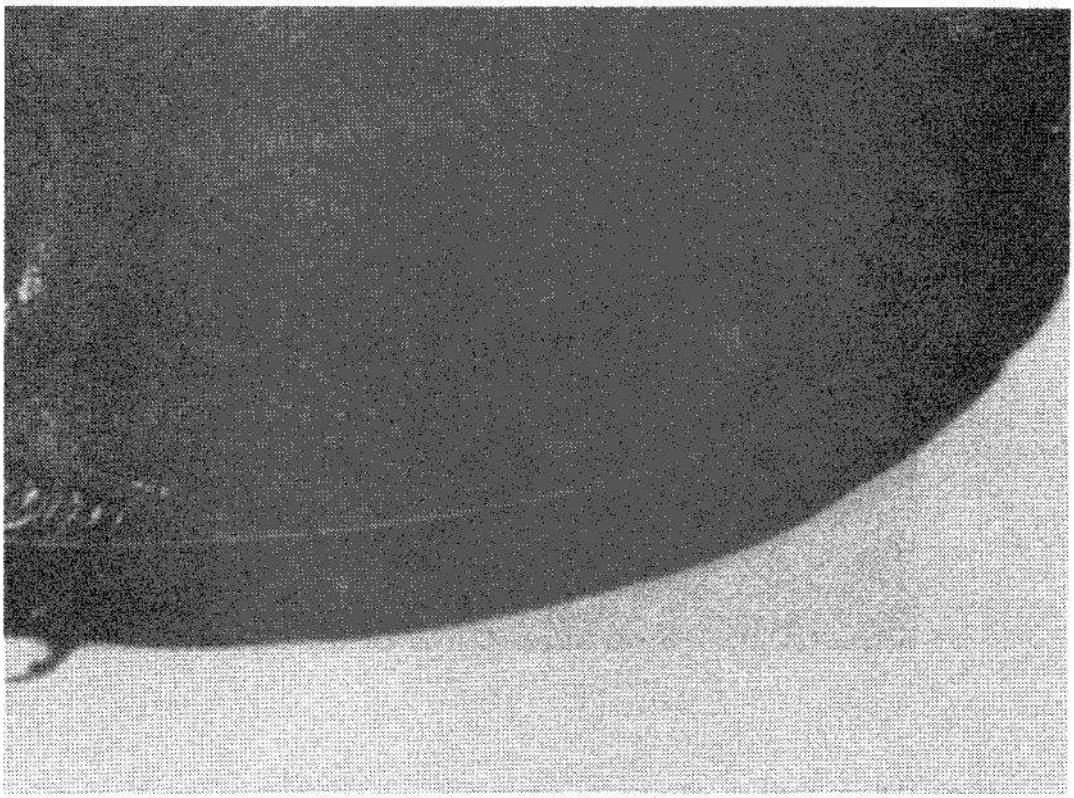
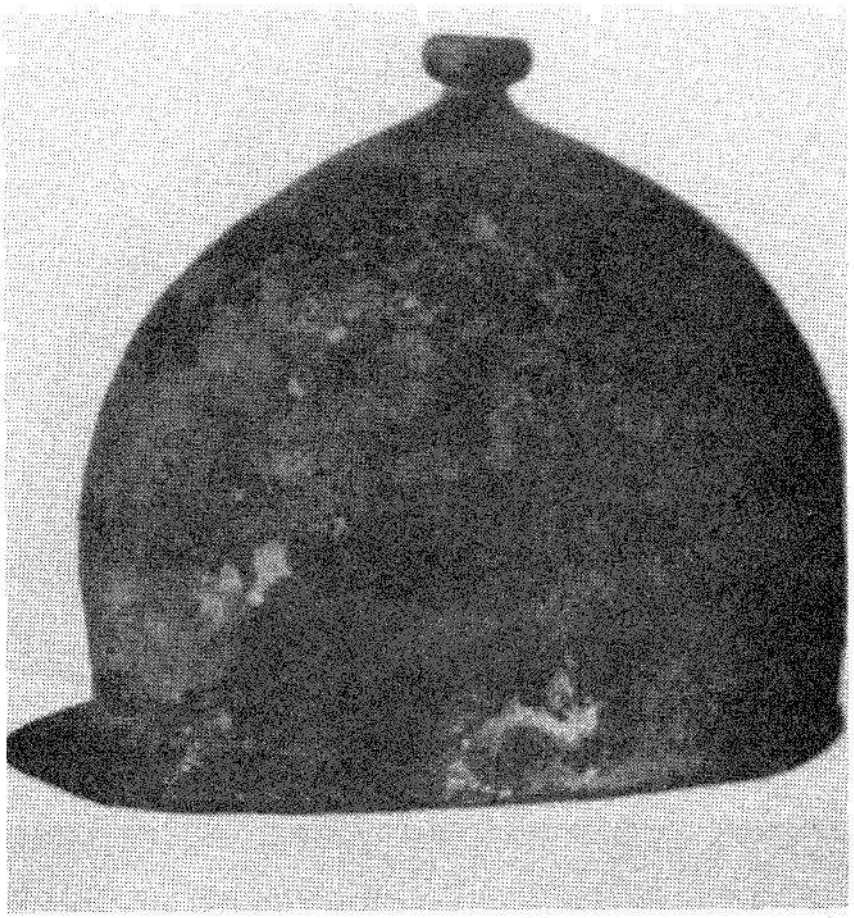


Fig. I: a) Montefortino helmet from Rieti
b) Maker's mark stamped into the neckguard



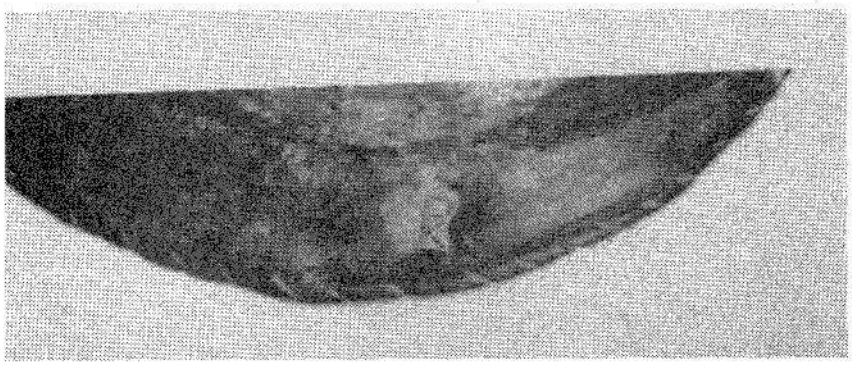
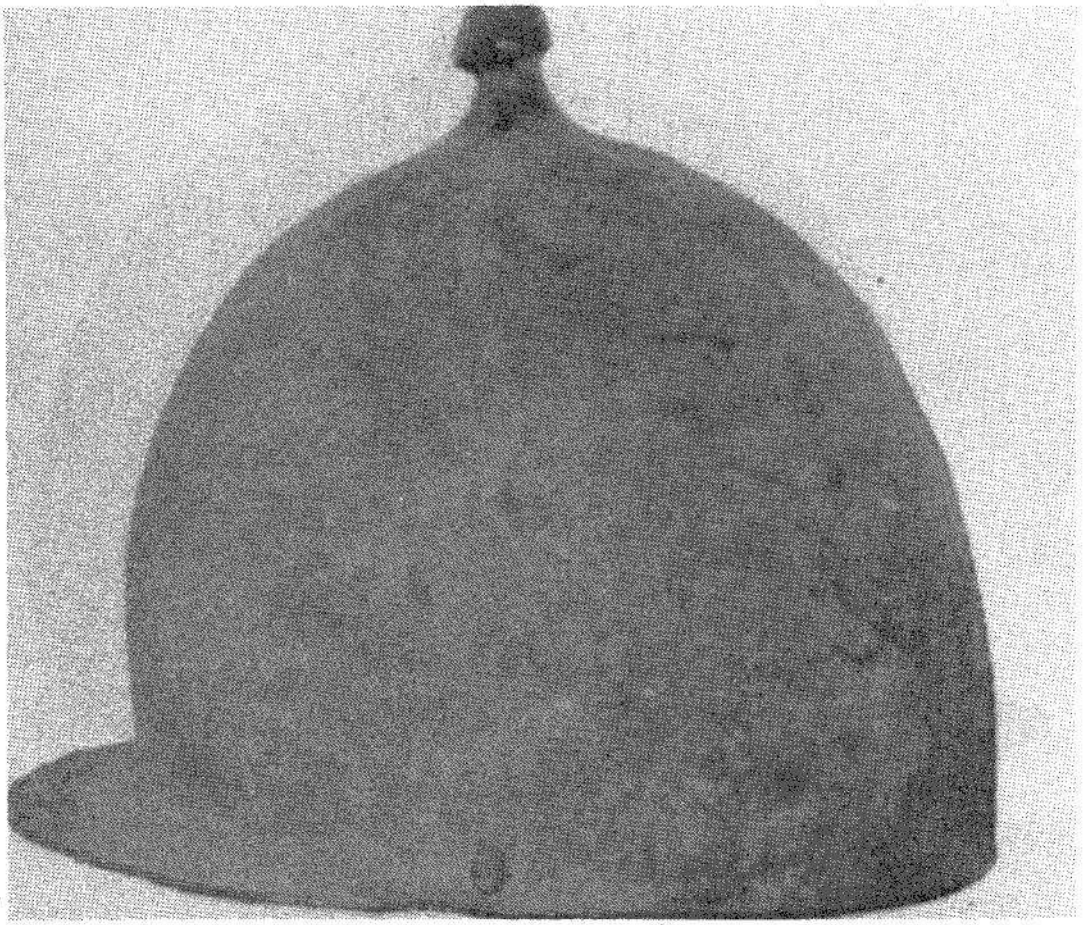


Fig. II: a) Montefortino helmet from Loreto Apruntino
b) Maker's mark stamped into the neckguard



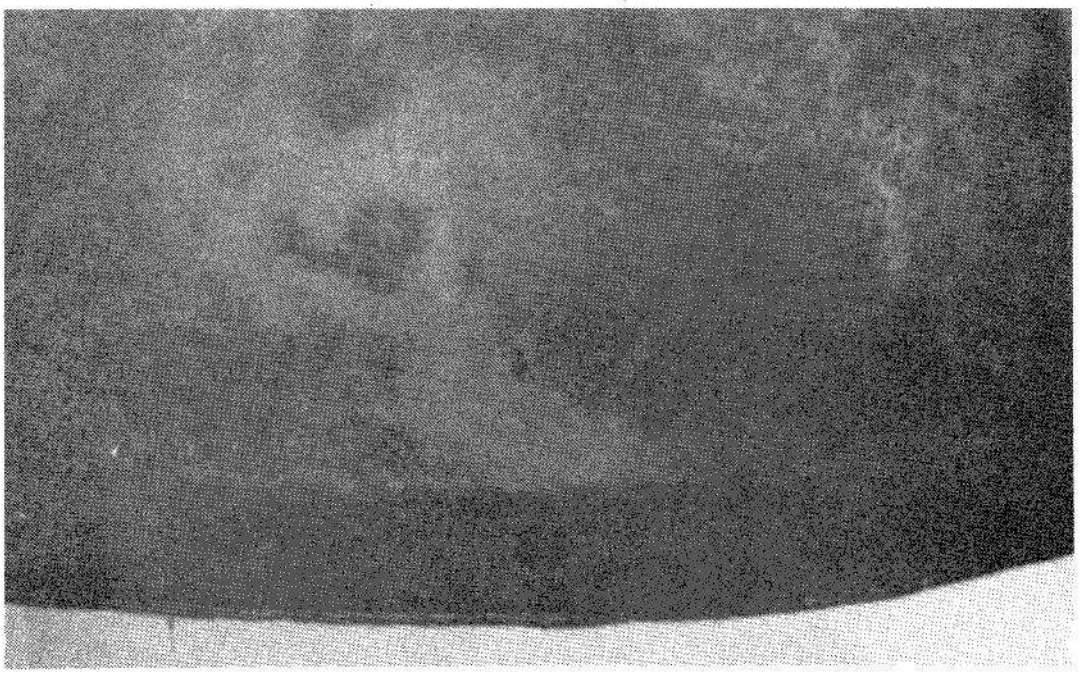


Fig. III: a) Montefortino helmet in the British Museum (81,7-25.2)
b) Maker's mark stamped into the neckguard

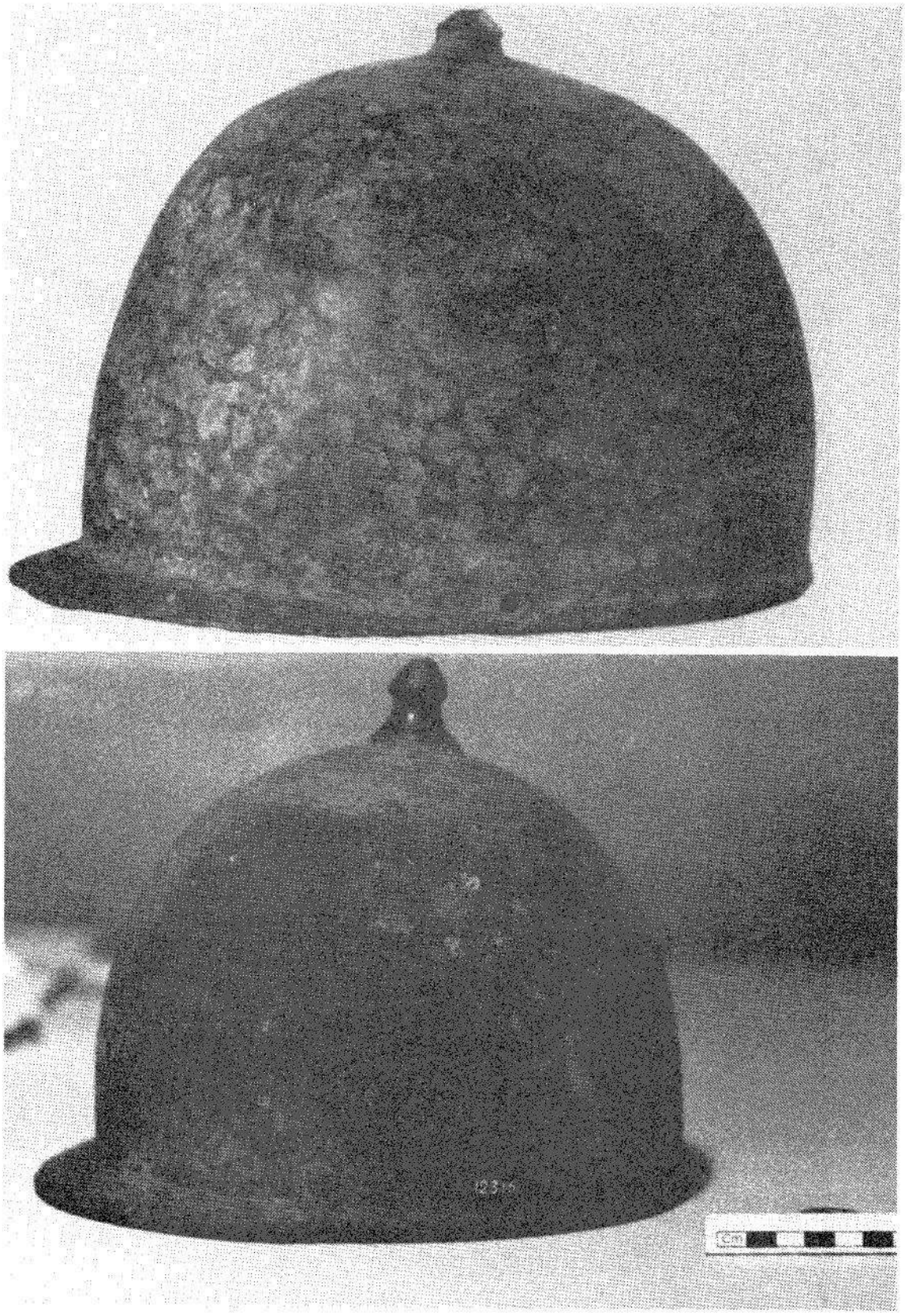


Fig. IV: a) 1st century B.C. Montefortino helmet from Montenerodomo
b) 1st century B.C. Montefortino helmet in the Vatican Museum

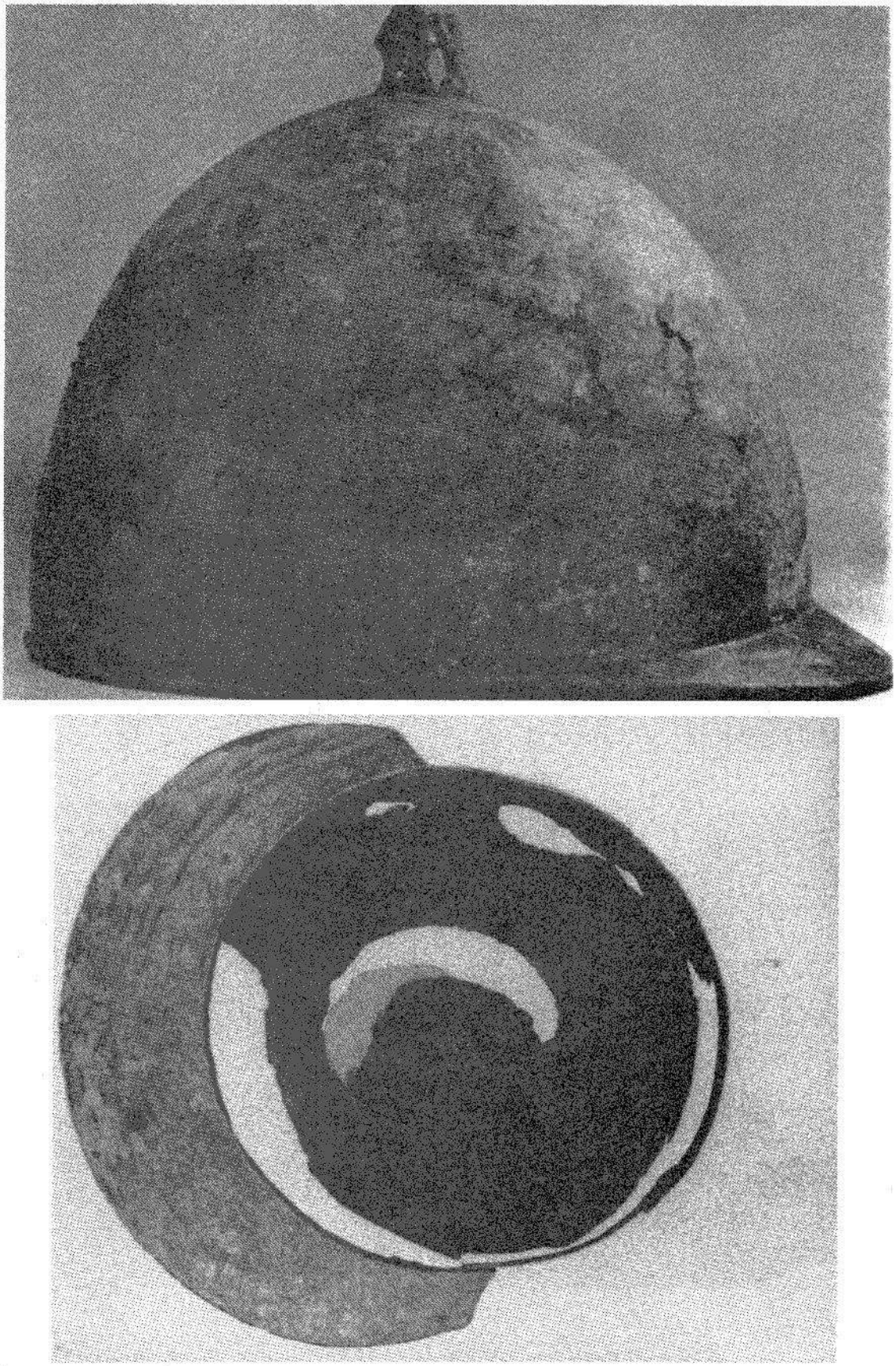


Fig. V: a) Spun early Imperial Montefortino helmet from Nijmegen
b) Spun Coolus/Hagenau helmet from Bosham Harbour

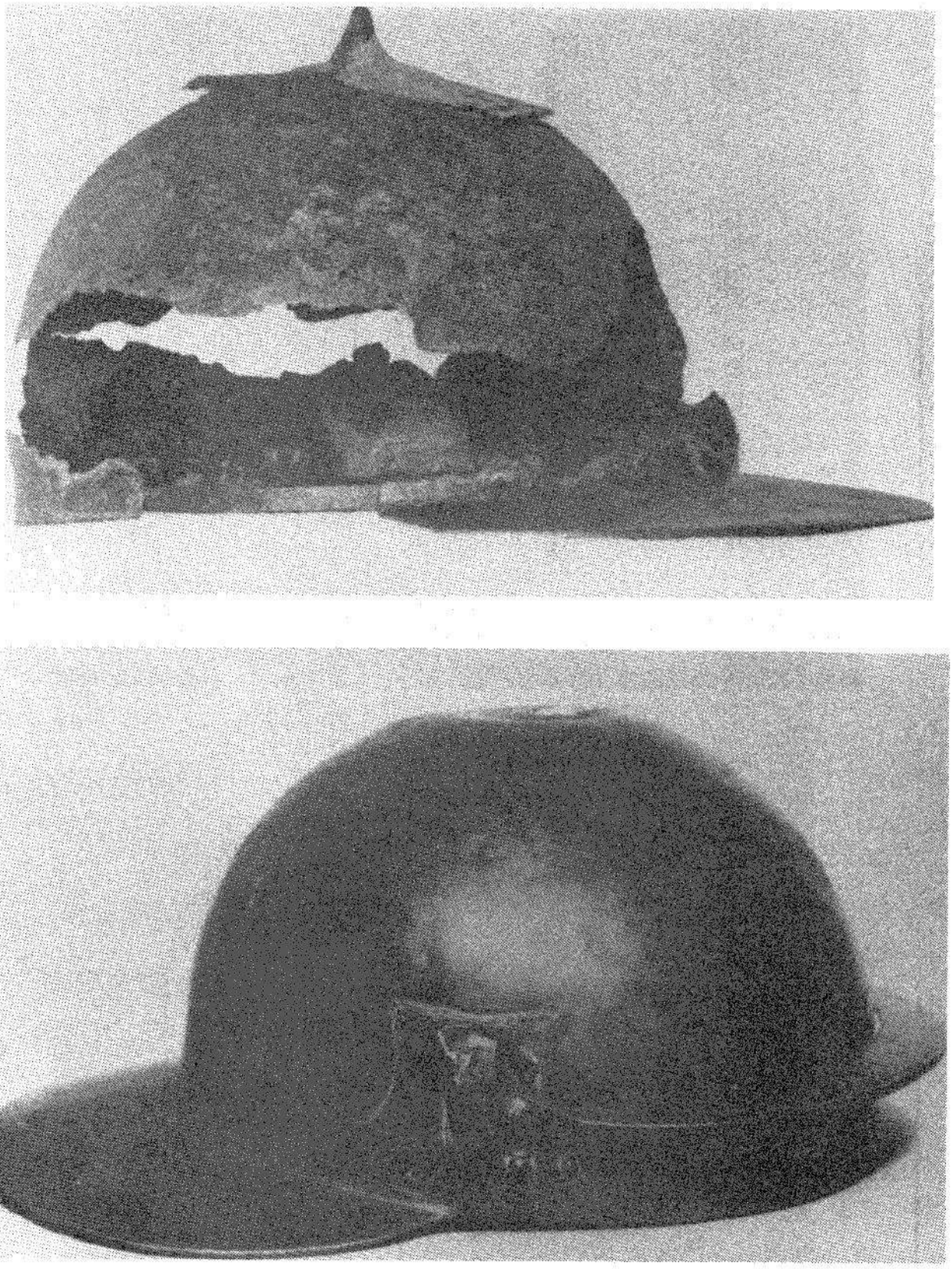


Fig. VI: a) Spun Coolus/Hagenau helmet from Bosham Harbour
b) Spun helmet from the Walbrook, London

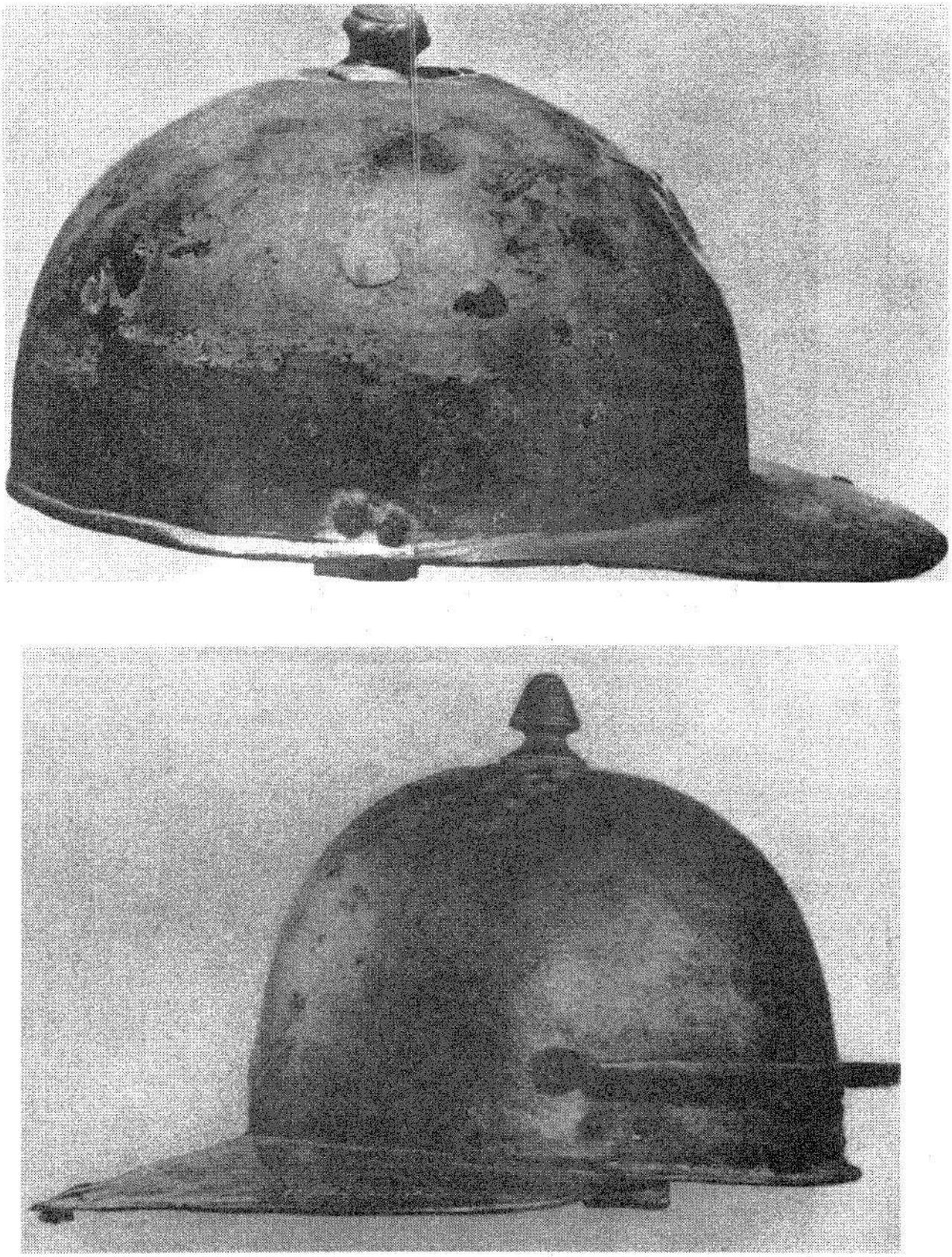


Fig. VII: a) Spun helmet from Berkhamstead
b) Spun helmet from Nijmegen

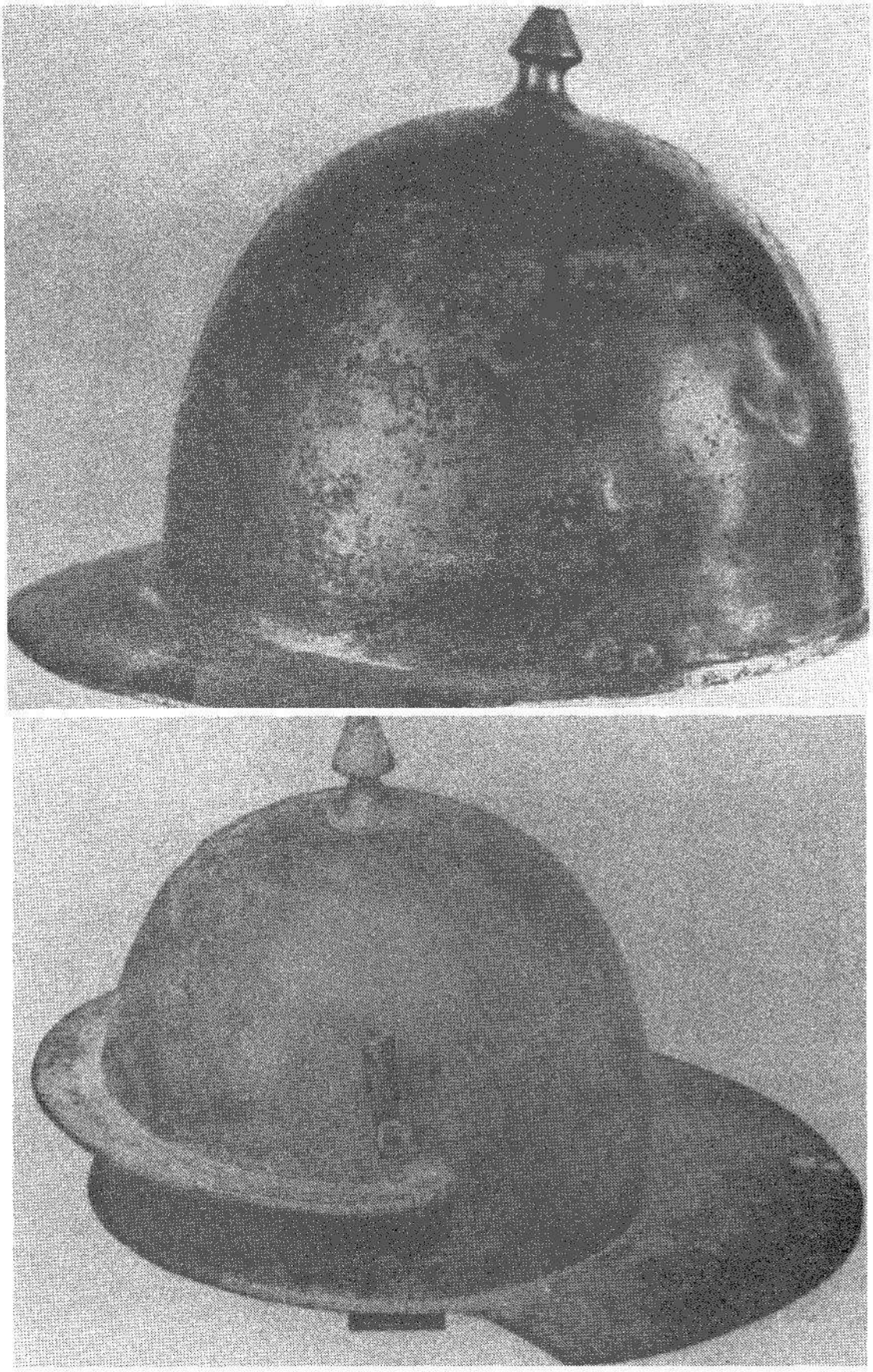


Fig. VIII: a) Spun helmet from the Sava, Yugoslavia
b) Spun helmet from Drusenheim near Hagenau

NOTES

1. Polybius Book VI,39,15-40
"Of the allies the infantry receive the same..., these rations being a free gift to the allies; but in the case of the Romans the Quaestor deducts from their pay the price fixed for their corn and clothes and any additional arms they require."

2. Tacitus, Annals I,17
"ten Asses a day was the assessment of body and soul: with that they had to buy clothes, weapons and tents."

3. Tacitus, Histories II,67
"At first they were kept apart; later the offer of an honourable discharge was employed to soothe their feelings, and they started to turn over their arms to their tribunes, until the report that Vespasian had begun war became common."

4. Polybius Book VI,26,1-2
"The Tribunes thus having organised the troops and ordered them to arm themselves in this manner dismiss them to their homes."

5. Now in the Staatliche Museum. Munich. Inventory No.69. Published REINECKE, 1951, 42; MACMULLEN, 1960, 35.

6. Now in the private collection of Signor G.B. Leopardi in Penne. No inventory no. Published CIANFARANI, 1970.

7. Now in the British Museum. Inventory no.81,7-25.2. Published ROBINSON, 1975, 21.

8. PITT-RIVERS, 1897-1905; CURLE, 1911.

9. Helmet of late second - early 1st century B.C. date from Central Italy, now in the Museo Gregoriano in the Vatican. Inventory no.10652.

10. The following bronze Hagenau/Coolus helmets all show the tell-tale signs of spinning:

    a) a helmet from Bosham Harbour, now in the Sussex Archaeological Society Museum, Lewes. Inventory no.E.1.169. Published ROBINSON, 1975, 37.

    b) helmet from the Walbrook, now in the British Museum. Inventory no.1950.7-6. Published ibid., 33.

    c) helmet from Berkhamstead, now in the British Museum.

Published ibid., 33.

d) helmet from the Legionary barracks at Neuss, now in the Clemens-Sels Museum, Neuss. Inventory no.R 5016. Published KLUMBACH, 1974, 25.

e) helmet from the Waal at Nijmegen, now in the Rijksmuseum van Oudheden, Leiden. Inventory no.NS 429. Published ibid., 39.

f) helmet from Hagenau near Drusenheim, now in the Nonin Historisches Museum. Inventory no.20714. Published ROBINSON, 1975, 39.

g) helmet from the river Sava at Rugviga, now in Zagreb Archaeological Museum. Inventory no.9228. Published POPOVIC, 1969, 120.

These helmets are the only ones where spin marks are still visible, but there are at least seven others of this type which are possibly spun out of a total of 26.

11. Now in the Rijksmuseum, Nijmegen. Inventory no.BE XIV 8B, 27. Published KLUMBACH, 1974, 21. It has recently come to the author's attention that there is at least one spun helmet of Republican date, c.100 B.C., i.e. the time of the Marian Reforms. This helmet comes from a shipwreck in Grand Basin B at Gruissan, France. But in all other respects it conforms to the usual shoddy workmanship of helmets of this period.

12. MUTZ, 1972, 14-52.

13. Ten dactyls are equivalent to 193mm, and the overwhelming majority of Greek Pilos helmets conform to between 190-195mm in diameter and height.

14. Dimensions of helmets listed in note 10

Helmet	Inventory no.	Internal Diameter Front to Back (mm)	Transverse Diameter (mm)
a	E.1.169	212	208
b	1950.7-6	212	184
c		216	208
d	R 5016	208	208
e	NS 429	204	204
f	20714	216	216
g	9228	205	200

15. ROBINSON, 1975, 26.

BIBLIOGRAPHY

CIANFARANI, 1970: V. Cianfarani Culture Adriatische d'Italia (Rome 1970)

CURLE, 1911: J. Curle A Roman Frontier Post and its People. The Fort of Newstead in the Parish of Melrose (Glasgow 1911)

KLUMBACH, 1974: H. Klumbach Römische Helme aus Niedergermanien (Kunst und Altertum am Rhein Nr.51) (Köln 1974)

MACMULLEN, 1960: R. Macmullen 'Inscriptions on armor and the supply of arms in the Roman Empire' in American Journal of Archaeology 64, 1960, 23-39

MUTZ, 1972: A. Mutz Die Kunst des Metalldrehens bei der Römern (Basel 1972)

PITT-RIVERS, 1897-1905: A.H.L. Pitt-Rivers Excavation in Cranbourne Chase I-V (London 1897-1905)

POPOVIC, 1969: Lj. Popovic Greek and Roman and Early Christian Bronzes in Yugoslavia (Belgrade 1969)

REINECKE, 1951: P. Reinecke 'Ein fruhkaiserzeitliche Bronzehelme aus der Donau bei Straubing' in Germania 29, 1951, 34-44

ROBINSON, 1975: H. Russell Robinson The Armour of Imperial Rome (London 1975)

All plates are by the author, except Fig.I (Staatliche Museum, Munich) and Fig.V (P. Connolly).