

Body Armor

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Introduction

According to the 6th-century CE etymologist, Isidore of Seville, the Latin word for armor, *lorica*, was derived from the word for (the absence of) thongs (*loris*). A variety of forms of body armor were used by the Roman army throughout its long history and the clearest evidence for these comes from archaeological finds. However, as a source, archaeology is not without its problems and has to be balanced against representational (principally sculptural) evidence.

Padded Body Protection

The efficacy of body armor is limited without adequate padding worn underneath (such as an *aketon* or arming doublet, widely used in the medieval period) and there is clear evidence for its employment in the Roman period. The anonymous 4th-century CE author of the *De rebus bellicis* (15.1–2) described a garment (which he called the *thoracomachus*) worn under armor that was used in earlier times. This term only occurs in this source, but it has been equated with the *subarmalis* mentioned by the *SHA* (*Sev.* 6.11) and in several subliterate texts. Its necessity can be inferred from the reconstructed shape of *lorica segmentata* which, rather than being designed to fit the sloping shape of the human neck and shoulders, required a horizontal area that can only have been provided by additional padding, presumably supplied by the padded body protection. It was to the latter that the *pteryges* (feathers or plumage) were attached. These were strips of leather or, possibly, stiffened linen that provided some minimal protection to the upper arm and lower abdomen, presumably helping avoiding chafing in these regions too. As such, they are frequently depicted in the iconographic sources, and, from the 2nd century CE onwards, with depictions of segmental body armor.

Pectorale

Among the earliest forms of body armor used by Rome's armies was the *pectorale*, a small breast defense used by a variety of Italian peoples in the 1st millennium BCE. As its name implied, it was primarily intended to protect the wearer's heart and could thus be small and comparatively light. It continued to be in use by the *hastati*, *principes*, and *triarii* of the republican army described by Polybius (6.23).

Depictions of the early Roman army do not show these defenses, preferring instead (as Burns has pointed out) to depict legionaries in mail. No square examples of the *pectorale* have been recovered in a Roman context but a circular plate was excavated in the Camp of Marcellus near Numantia.

Mail Armor

Ring mail armor (*lorica hamata*), sometimes, but less correctly, "chain mail," saw widespread use within the Roman army throughout its existence. The arrangement of the rings is now largely agreed to have consisted of alternating rows of stamped and riveted pieces, usually ferrous but occasionally of copper alloy, arranged in a quincunx fashion, so that each riveted ring was joined to four stamped, or each stamped ring was joined to four riveted pieces. The dimensions of Roman-period rings varied, but diameters between 5 mm and 12 mm are commonly found (with wire thicknesses of 0.95 mm to 1.7 mm).

Representational evidence depicted mail in a variety of ways. In sculpture, it could be shown as a lightly chiseled zigzag pattern on the surface of a defense (e.g., Trajan's Column, Rome), drilled holes (the Adamklissi metopes, Romania, or the Arch of Severus and Column of Marcus Aurelius in Rome), or more elaborate attempts at an accurate representation (such as the Vachères, armored figure or on the pedestal of Trajan's Column). Robinson (1975) argued that armor depicted on tombstones which had long been thought to show leather was in fact intended to

represent mail, possibly using a coat of gesso and paint to complete the illusion.

The form the armor took varied considerably. Late Republic-period soldiers (presumed to be legionaries) are shown on the so-called Altar of Domitian Ahenobarbus in the Louvre, wearing belted thigh-length short-sleeved armor with shoulder doubling. This doubling provided additional protection for the shoulders and upper back and it indicates the essentially tubular nature of the armor with no side opening. By the 1st century CE, tombstones from the Rhineland, depicted infantrymen and cavalry wearing what is probably hip-length mail. Similar defenses are shown on the early 2nd-century Trajan's Column in Rome, but the contemporary Adamklissi metopes in Romania still show the use of thigh-length mail. During the 2nd century, a type of defense was introduced with closed shoulders and no shoulder doubling, but with a broad neck opening that was fastened with breast- and back-plate closures. Later depictions, such as a relief in the Museo Chiaramonti in the Vatican, show the continued use of the longer form among infantrymen, but they also mark the introduction of coifs, as shown on a manuscript illustration of the *Vergilius Vaticanus* from the 4th century and suggested on the fresco of the Battle of Ebenezer from the synagogue at Dura-Europos, Syria (although it is possible that scale was intended here). A fresco in the Via Latina catacomb in Rome may be intended to depict (by means of reddish-brown paint with black dots) a wrist- and knee-length copper-alloy mail shirt.

Archaeological finds of fragments of ring mail are comparatively rare. Complete cuirasses are known from South Shields, England, and Augsburg, Germany, the latter incorporating a grid of copper-alloy rings for decorative effect. The South Shields shirt, dating to the late 3rd or early 4th century CE, had rings with a diameter of between 7 mm and 8 mm and wire thickness of 1 mm to 1.8 mm. Comparison with modern reconstructions suggests it would probably have employed over 50,000 rings and have weighed around 6 kg. Other substantial finds include those from the mine beneath Tower 19 at Dura-Europos, one of which was being worn by a Sassanian Persian soldier and was adorned with a trident motif executed in copper-alloy rings, and from the so-called Waffnenmagazin in the legionary base

at Carnuntum (Bad Deutsch-Altenburg, Austria). Apart from contemporary Danish votive finds, complete shirts have been found at Wallsend, England; Buch, and Chassenard, France, the last stored inside the facemask of a cavalry helmet. Smaller amounts of mail do occur in the archaeological record but are much rarer than finds of scale or plate armor. This may be due to the greater fragility of the latter types of armor, with the significant use of organic components, rather than reflecting the rarity of use of mail, which modern reconstructions demonstrate possesses greater natural integrity in its form and is easy to repair.

Representational evidence depicts its use by both citizen troops (the Arch of Orange and the Adamklissi metopes) and auxiliary infantry and cavalry (Trajan's Column). If Robinson's assertion (1975) about the depiction of mail by means of paint is correct, then this type of armor is also shown on a number of Rhineland and Danubian tombstones, including those of legionaries (Crispus from Wiesbaden and Victor from Budapest) and auxiliary infantry (Firmus and Pintaius, both from Bonn), and cavalry (Flavius Bassus from Cologne).

Reconstructions of mail shirts indicate a likely original weight for a cuirass of between about 10 kg and 20 kg when employing riveted and stamped rings. Weight could obviously vary according to a variety of factors, including the number of rings, itself dependent upon the thickness of wire and diameter of rings used, as well as the length of the defense and whether it had shoulder doubling or an integral coif.

Scale Armor

In its earliest Roman form, scale armor (*lorica squamata*) consisted of scales (*squamae*) where each was attached to its neighbor horizontally by a twist of wire through pairs of punched holes, at the same time overlapping in one direction (left to right or right to left). These rows of scales were then sewn to a fabric or leather backing, and overlapped from top to bottom. The scales could be of copper alloy (bronze or brass) or iron, with steel now identified in a number of cases. They were normally straight (but not necessarily parallel-sided) with a flat top and a rounded or pointed base.

Scale armor is shown on 1st-century CE figural tombstones such as the legionary *aquilifer*

Sertorius Firmus from Verona, Italy, and the auxiliary cavalrymen Vonatorix from Bonn, Germany, and Longinus from Colchester, England. It is also shown being used by citizen troops on the Adamklissi metopes but is absent from Roman troops on Trajan's Column with the exception of hybrid archers equipped in a similar manner to Sarmatian cavalry (and often misleadingly identified as Levantine archers). It appears on the Great Trajanic frieze and on the Column of Marcus Aurelius in Rome, as well as a relief on the Arch of Galerius in Thessalonica. One of the latest depictions is on the Arch of Constantine in Rome. As has already been noted, the fresco of the Battle of Ebenezer from the synagogue at Dura-Europos may be interpreted as depicting the use of scale coifs.

One of the most significant discoveries came from the Waffenmagazin at Carnuntum, where the excavator was able to categorize a range of types of scale, both copper alloy and iron, according to the arrangement of wiring holes around the periphery of each scale (although there are obviously other ways of classifying scales, such as by shape or cross-section). He defined nine basic types of scale:

1. two pairs of vertical holes centrally in the top edge;
2. one pair centrally at the bottom and single holes in both top corners;
3. one vertical pair centrally on either side and a single hole centrally in the top edge;
4. one vertical pair centrally on either side and another pair centrally in the top edge;
5. one vertical pair centrally on either side and a horizontal pair centrally in the top edge;
6. as type 5, but with an additional single hole centrally at the bottom;
7. as type 5, but with an additional vertical pair centrally at the bottom;
8. as type 5, but with two vertical pairs centrally at the top;
9. one pair in each corner and centrally at the top, one pair in the center of each side, and one centrally at the bottom.

Type 7 (and type 9, a variant of it) actually represents a significant development in scale-armor defenses which first appeared in the 2nd century CE, whereby each row of scale was wired to its neighbor vertically as well as horizontally, form-

ing a semirigid and thus less flexible defense than the traditional form. However, the degree of flexibility in this type of cuirass depends to some extent upon the amount of play in the wire ties. These semirigid cuirasses seem invariably to have been fastened with decorated and embossed breast- and back plates similar to the contemporary mail shirts. Finds of semirigid scale include examples from Corbridge, England, Carnuntum, Austria, and an unprovenanced example allegedly from Hebron. Embossed breastplates are known from a number of sites, including examples from Orgovány, Hungary, and Muov-Burgstall inscribed with the name of *legio X (Gemina)*. A breastplate from Carlisle, England, still had its attached scales wrapped around it, patterned with one copper-alloy scale for every three ferrous.

Other finds of scale include a number of rows of joined scales from Ham Hill demonstrating the practice of tinning alternate copper-alloy scales for visual effect, as well as slight convex dishing to provide added strength. Part of a scale cuirass was recovered from the early 3rd-century CE fortress at Carpow, Scotland, and this preserved some of the leather edging from the neck opening, as well as the textile backing and lacing, and the metal ties. Similar edging was also found on a number of fragments from Dura-Europos, Syria, and it was this site that produced near-intact examples of both ferrous and copper-alloy scale trappers (horse armor) from a collapsed tower. Another portion of semirigid scale armor from Carlisle, apparently from the shoulder area of the neck opening, revealed the careful tapering of the scales to assist in the fitting of the defense and again demonstrated the use of copper-alloy scales for decorative effect in a mainly ferrous section.

Armor scales could vary widely in size but examples include 29 mm in height and 13 mm in width at Newstead, Scotland, and 23 mm in height and 16 mm in width at Ham Hill. The scales of the semirigid form of the armor were usually proportionally longer, ranging between 28 mm in height and 9 mm in width (Corbridge) and up to 35 mm and 18 mm (Carnuntum) respectively, although the earliest examples from the early 2nd century CE (from Carlisle and, possibly, Carnuntum) tended to be similar in proportion to standard scales. A portion of scale armor from a neck opening, found in Carlisle,

had tapering scales varying between 47 mm in height and 21 mm to 26 mm in width. They were used by legionaries and auxiliaries.

Reconstructions suggest weights of between 6 kg and 15 kg, dependent on the number of scales, thickness of the metal, the degree of overlap of the scales, and the coverage provided.

Mail/Scale Armor Combinations

This form of armor, identified from a number of sites, is often equated with the *lorica plumata* mentioned by Justin (*Hist.* 41.2.10) and described (although not named) by Silius Italicus (*Pun.* 5.140–1). The defense was effectively a layer of very fine mail overlain by small scales, employing both copper alloy and iron. Examples are known from several sites, including Augsburg, Germany; Ouddorp, the Netherlands; Usk, Wales; and Newstead, Scotland. These share very small ring diameters (3 mm, with 0.5 mm thick wire) and small-scale sizes (typically between 4.5 mm × 7 mm and 7.5 mm × 13 mm). The cuirass from Newstead had copper-alloy scales and mail, while both components of the one from Usk were ferrous. The example from Augsburg had copper-alloy scales on ferrous rings. Unlike ordinary scale, the *squamae* of these smaller examples were folded back at right angles and pierced to attach them to the underlying rings. The scales were not attached to each other in any way and would thus (it is argued) be free to move up and down in the manner of feathers, as suggested by the epithet *plumata*, although this could equally have referred to the central vertical ridge embossed on these minute scales.

Since no clear depictions of this type of armor have been identified, the type of troops who may have used it remains uncertain. A weight of around 16 kg might be expected for an average cuirass of this type of armor.

Lamellar Armor

Lamellar armor was distinct from scale armor in having the scales sewn or laced to each other. The rows overlapped upwards, rather than downwards, and lamellae were aligned vertically, rather than in quincunx fashion as with scale.

While lamellar armor is widely shown in the Byzantine period, its use by Roman troops is much

more difficult to demonstrate. Relief sculptures of Palmyrene gods commonly show eclectic combinations of Parthian and Roman dress and equipment. Such reliefs frequently depict lamellar armor, but it is unclear whether this is a Roman or Parthian component. Similarly, an armored cavalryman on a graffito from Dura-Europos appears to wear lamellae on his torso, but the origin of this image is much disputed and its identification as Roman by no means straightforward, since it could equally well be Parthian or Sassanid Persian. The horse of the Sassanid king Khusro II is depicted with lamellar armor on a relief from Taq-i-Bustan.

Metal lamellae are conspicuous by their absence amongst archaeological finds from the Roman Empire, but a burial from Atalka included colored leather lamellar armor, so it may well be that this type of armor is underrepresented in the archaeological records simply by virtue of its being exclusively formed of leather lamellae. A section of leather lamellar armor from Dura-Europos has been identified as a *cuisse* (thigh guard).

Plate Armor

Articulated plate armor (known since the Renaissance as *lorica segmentata*, although the original Roman term is not recorded) was first introduced in the late 1st century BCE. Three main variants have been recognized: the Kalkriese, Corbridge, and Newstead types.

This form of armor is best known from depictions on monuments in the metropolitan tradition, notably the Columns of Trajan and Marcus Aurelius, and the remaining fragments of the Great Trajanic Frieze. The latest representation is on the Arch of Septimius Severus in the Forum Romanum in Rome. Plate armor is not depicted on the Adamklissi metopes and it is likewise rare among other provincial monuments. It is not shown on any high-quality tombstones such as those from the Rhine or Danube regions, nor is it mentioned in the literary or subliterate sources.

This form of body armor consisted of four principal components. The upper part consisted of two matching shoulder sections, each comprising four lesser shoulder guards, an upper shoulder guard, and a collar plate with breastplate and backplate. The lower comprised two

matching girth or torso sections (often referred to as girth hoops) with a varying number of plates (usually between six and eight), which covered the torso below the armpits. The number of plates was once thought to have varied with time, but it is more likely that it was tailored to the size of the individual wearer. All analyzed plates have been shown to be made of steel. Each of the four principal components was articulated on a system of riveted leather straps and could be simply attached to its neighbor by buckles, hooks, or ties. Internal leathers only survive as mineral-preserved remains and may therefore have been made of oiled, rather than tanned, leather. Copper-alloy rivets were often fixed through decorative brass fittings, the most elaborate of which was a series of hinges with lobate plates that articulated the elements of the upper shoulder guard.

Archaeological evidence for the Kalkriese type comes from a series of sites in the northwestern provinces (including Dangstetten, c.19 BCE), but it is most famously associated with the presumed Varusschlacht site of Kalkriese, dated to 9 CE. It is known still to have been in use during the invasion of Britain, examples of fittings come from a number of southern British sites including Chichester and Waddon Hill. Its distinguishing features include copper-alloy-edged breastplate and collar plate, non-lobate hinges on the shoulder components, and buckles to join the shoulder components to the girth hoops. In its earliest form, buckles mounted on straps riveted directly to the breastplate were used for both horizontal and vertical fastenings. The form of girth hoop fastening is unknown.

A collection of material found in a chest at Corbridge provided the best-known find of this type of armor. While the Corbridge Hoard (with sufficient components for a minimum of three and maximum of twelve cuirasses) remains the most significant find of this variant of segmental armor, other important discoveries have been made, including numerous fragments probably from one cuirass from Ribstissen, Germany, a shoulder assembly and a virtually complete breastplate from pre-Flavian London, and a set of girth hoops from St. Albans, England. The Corbridge type was introduced during the second quarter of the 1st century CE and while most archaeological

finds suggest it continued in use into the middle of the 2nd century, evidence from Spain has indicated that there at least it saw use into the early 4th century. The distinguishing features of this type include small lobate hinges on the two shoulder components, girth hoop fastenings in the form of tie loops riveted to the plate and fastened with a leather tie, buckles to join the shoulder components, and either buckles or hooks to join the shoulder components to the girth hoops. Robinson (1975) identified three variants based on the form of the fastening between the upper and lower components: buckle and strap (A), copper-alloy hook and eye (B), ferrous hook and eye (C).

The Newstead type was introduced during the second quarter of the 2nd century CE and continued in use into the 3rd century, although again evidence from Spain suggests use there at least into the early 4th century. Its distinguishing features include large lobate hinges on the two shoulder components, girth hoop fastenings in the form of rings on one hoop passed through openings in the matching plate (although the means of securing these is unknown), rings passing through openings to join the shoulder components, and hooks to join the shoulder components to the girth hoops.

The fragments excavated at Newstead in Scotland and in the Waffenmagazin at Carnuntum can be compared with backplates from Eining in Germany, and Carlisle in England, and girth hoops from Zugmantel in Germany, and Stillfried in Austria. One of the backplates from Carlisle, along with numerous cuirass fragments from León, Spain, suggest the use of this variant into the 4th century CE. Large deposits from Carnuntum and in the legionary fortress at León illustrate the contemporaneity on Corbridge and Newstead types, while the latter also shows the use of Corbridge type armor into the later Roman period.

Representational evidence only ever shows the use of plate armor by citizen troops (as on Trajan's Column, although there is good reason to suspect that differentiation between troop types was being used symbolically there) and never by auxiliary infantry and cavalry. Some writers have used archaeological finds of this type of armor from sites thought to be purely auxiliary to suggest that it was used by both

citizen and auxiliary troops, but such arguments inevitably lead to circularity, since the assumption of the exclusively auxiliary nature of a site is seldom beyond dispute, as subliterate records from Vindolanda have shown.

Composite Armor

A relief from Alba Iulia, Romania, depicts what appears to be a form of composite armor comprising a mixture of *lorica segmentata* and *squamata*. The figure is shown with segmental bands around the torso and scale armor covering the upper body and shoulders, apparently fastened by breastplates of the type normally associated with 2nd- or 3rd-century mail and scale armor. It is possible that some of the excavated components identified as coming from *segmentata* and *squamata* may in fact have derived from such cuirasses.

Muscled Cuirasses

The muscled cuirass is one of the iconic images of Roman martial art, especially in the depiction of emperors. It was normal for such defenses to overemphasize the musculature of the male torso, highlighting the pectoral and the rectus abdominis muscles, and depicting the nipples. Imperial statuary frequently incorporated elaborate decoration, as with the Prima Porta statue of Augustus (c.19 BCE), which depicts the return of the missing eagles from Crassus's 53 BCE defeat at Carrhae. Many also include a central Medusa motif on the breast, presumably at least partly for talismanic and apotropaic purposes. Such cuirasses normally comprised two main components, a front and rear half, joined at the sides, with additional shoulder reinforcers, in imitation of those found on linen cuirasses of earlier periods. One of the earliest ferrous muscle cuirasses was that found in the Hellenistic Tomb 2 at Vergina, frequently associated with Philip of Macedon.

This type of armor seems to have been worn only by officers with the rank of *tribunus* and above, although the evidence for such an assertion is at best tendentious. A tombstone from Sitten depicts T. Exomnius Mansuetus, a *praefectus* commanding *cohors II Hispanorum*, wearing what is almost certainly a muscle cuirass, while one from Pompeii is

similarly equipped. If this was indeed the case, then muscle cuirasses probably only represented less than 1 percent of the body armor in use by the Roman army at any one time. Moreover, the officer class was evidently (with a few exceptions) less exposed to danger than the centurionate, and so less likely to suffer damage to their armor, while the simplicity of this type of cuirass will have ensured a lower attrition rate than for complex armor like scale or articulated plate.

Leather Armor

Leather armor found some limited use within the Roman army, as with the lamellar cuisse from Dura-Europos or the chamfrons from Newstead and Vindolanda (see below). However, claims by some commentators for its widespread use in the Roman period remain unsubstantiated and largely depend upon interpretation of ambiguous sculptural evidence and parallels drawn from use in later periods. Some have even gone as far as identifying *lorica segmentata* depicted on metropolitan monuments as having been made originally of leather, but this is a minority view which runs counter to the archaeological evidence and has not found serious acceptance by scholars. Some garments of crocodile skin from Egypt in the British Museum have been suggested as armor but may well be priestly garb. However, it remains the case that leather would have been an extremely impractical form of defense by comparison with the high-quality copper alloys and steels to which the Romans had access and it is more likely that it found a role in protecting metallic armor in the form of under- or over-garments similar to the *thoracomachus* described by the anonymous author of the *De rebus bellicis*.

Sports Armor

Robinson (1975) identified a class of armor that he called sports armor, although it is occasionally referred to (almost certainly erroneously) as parade armor. He considered it to have been used with the elaborate cavalry maneuvers known as the *hippikē gymnasia* described by Arrian. Amongst body and limb armor belonging to this type he noted elaborately

embossed greaves for the riders, with mythological scenes, and decorated breastplates for mail and scale, although it is now believed that these were in fact part of everyday combat armor. Embossed greaves have been identified as belonging to the sports armor used in the *hippikē gymnasia*. These were typically decorated with embossed mythological figures and normally hinged just below the knee. A number of examples were included in the 3rd-century hoard from Straubing, incorporating representations of Minerva and Mars.

Limb Armor

Limb protection was in two principal forms in the Roman army: greaves for the legs and articulated defenses for the arms.

Polybius (6.23.8) describes how republican legionaries used greaves to protect their lower legs. This practice had evidently declined by the early Imperial period, although centurions still used them, as is demonstrated by the 1st-century CE tombstones of Favonius Facilis from Colchester and Calidius Severus from Carnuntum among others. However, the Adamklissi metopes show citizen soldiers using greaves during the Dacian campaigns and plain examples have been found in the archaeological record from the 2nd century CE, as at Carlisle and in a find supposedly from Hebron, while a 3rd-century CE hoard from Eining included several plain greaves.

Thigh guards (*cuisses*) were used, particularly for cavalrymen (whose upper legs were vulnerable in combat). The example from Dura-Europos has already been mentioned. However, a laminated copper-alloy defense from Newstead, identified by Robinson (1975) as a *cuisse*, can now be shown to have been an articulated armguard.

Armguards of this type are shown on the Adamklissi metopes being worn on the sword arm of citizen soldiers, as well as on the Alba Iulia relief, which depicts composite armor. Archaeological finds are now numerous, near-complete examples having been identified from Carnuntum, Newstead, Carlisle, Ulpia Traiana Sarmizegethusa and León. These defenses consisted of a large rectangular upper plate with a series of strips that reached to the wrist or even

the back of the hand. The articulated plates (or lames) were arranged to overlap upwards from wrist to shoulder, the whole series being articulated on internal leather straps by means of rivets. As with plate armor, even in anaerobic conditions, these straps only survive as mineral-preserved remains and may have been made of oiled leather. Two of the examples from Carlisle included hooks or loops on the upper rectangular plate, which may have been part of the harness for attaching the armguard to the arm or body of the wearer.

The latest examples of segmental limb defenses are depicted among the manuscript illustrations of the early 5th-century CE *Notitia Dignitatum* and the *De rebus bellicis*, while a 4th-century example of such an armguard was found at Bowes Moor.

Manufacture, Maintenance, and Distribution

Vegetius (probably using a lost work of Frontinus as his source) stated that Roman legions were self-sufficient in arms production and it is likely that the majority of armor was supplied in this way. However, there is evidence to indicate a degree of independent manufacture: a papyrus letter from Egypt (*P.Giss.* 47, probably early 2nd century CE), recorded the purchase of a cuirass of brass, along with a number of other items. Unfinished components confirm production within the army and that the overwhelming evidence for repair demonstrates an active program of maintenance and recycling and a high degree of cannibalization of badly damaged armor to aid in the upkeep of less-damaged pieces. The armor in the Corbridge Hoard and the finds from a building adjacent to the *principia* at Carlisle graphically demonstrate such recycling and cannibalization. Armguards at Carlisle had been constructed from pieces of several donor defenses, while at Corbridge whole plates had been moved between shoulder sections on different sets.

Damage could be caused by everyday use, *loricae segmentatae* evidently suffering a high component attrition rate, being structurally intricate and lacking robustness. Through its use of both ferrous and copper-alloy components, segmental armor was especially prone

to bimetallic electrolytic corrosion as well as the stresses that would be placed on internal leather elements through constant dampening, drying, and flexing. Scale armor was similarly prone to damage, albeit to a lesser degree, to judge from the finds of individual or small groups of scales. Both plate and scale armor had key organic components which could fail. Ring mail, on the other hand, due to the simplicity of its design and its resultant integrity was much less likely to suffer damage in normal use. It is probably these vulnerabilities that are reflected in the archaeological record, rather than the proportions of the types of armor used. Further damage was of course possible through attrition in combat. Some of the Corbridge Hoard armor, as well as a *lorica segmentata* breastplate from London, clearly suffered in this way.

Experimental Archaeology

Work by David Sim has shown likely construction times for various types of armor. Mail made with a combination of stamped and riveted rings is the most time-consuming, followed by scale armor, with segmental armor the least demanding. This suggests that ease of manufacture would have been as attractive for the army as the undoubted weight saving of plate over ring mail armor.

Troop Type Identity

Representational evidence makes it clear that both auxiliary and citizen troop types, whether infantry or cavalry, used mail and scale body armor without differentiation in the early Principate. The situation with plate armor is less clear, as the representational evidence is preponderantly provided by stylized metropolitan

monuments such as Trajan's Column, where the message of the monument was served by suggesting a clear differentiation between citizen troops (in *lorica segmentata*) and auxiliaries (mainly in mail but occasionally also in scale). This supposedly clear differentiation is clouded by the Adamklissi monument, where legionaries engaged in the same wars as those depicted on Trajan's Column are shown wearing mail and scale but no segmental body armor (although they do wear armguards).

In the late 20th century, a few archaeologists, led by Ulbert and subsequently followed by Maxfield and Sauer, suggested that finds of 1st-century CE segmental armor from Raetia, a province that lacked a legionary garrison, proved that plate armor was used indiscriminately by auxiliaries. However, demonstrably legionary equipment has been recovered from Raetia (such as a helmet with a legionary inscription from Burlafingen), while other types of equipment (notably the *pilum* and curved body shield) are only ever depicted in a legionary or praetorian context on both provincial and metropolitan sculpture.

See also HELMET; SHIELD.

REFERENCE

Robinson, H.R. (1975) *The Armour of Imperial Rome*. London.

FURTHER READING

- Bishop, M.C. (2002) *Lorica Segmentata* (vol. 1). Chirnside.
- Bishop, M.C. & Coulston, J.C.N. (2006) *Roman Military Equipment from the Punic Wars to the Fall of Rome* (2nd edn). Oxford.
- Coulston, J.C. (1990) Later Roman armour, 3rd–6th centuries AD. *JRMES* 1: 139–160.