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Problems in reconstructing Roman Armour

Reconstruction of archaeological specimens is an essential method by which we may gain a fuller comprehension of the use or appearance of something either incomplete, or so fragile or damaged that only by the making of a copy can we fully understand its true purpose or function.

Many reconstructions have been attempted of Roman military equipment in the past hundred years. These have taken the form of simple diagrammatic drawings, scale models, and full scale models on fully clothed figures.

The most ambitious was perhaps the large series of figures made to the order of Napoleon III by the architect Violet le Duc which until quite recent years could be seen in the Musée de l'Armée in Paris¹. They were largely based upon Trajan's column and other sculptures of the period with copies of a few genuine fragments included. Others, equally well carried out but all containing similar degrees of error could be seen at Mainz, St. Germain, and Chester whilst the *Mostra Augustea* held in Rome in 1938 contained a large collection of plaster models of varying quality².

Those responsible for these creations, and I include myself amongst them, have frequently lacked essential information from archaeological excavation so have been compelled to fill the gaps by using sculptural evidence; a hazardous source which can lead to many pitfalls.

The artistic products of the great workshops in Italy continued to be influenced by Hellenic traditions and this is particularly true in representations of military equipment. Trajan's column may be to some degree an exception to the rule for where it is possible to check the sculptures against surviving equipment one finds considerable accuracy though shields have been much reduced in size so as not to obscure the important human figures.

From the first century A.D. it is to the military sculptors that we can turn for a more authentic picture of the Roman soldier. Crude though some of these sculptures may be, they are the work of men stationed on the frontiers with the equipment constantly before their eyes. Though figures may be out of proportion, sword hilts too large or shields somewhat misshapen, the basic detail is generally quite sound so that we can piece together our excavated fragments with the aid of grave stelae or triumphal monuments executed by these military artists.

¹ A. Racinet, *Le Costume historique* (Paris 1876-1888), 6 Vols.

² *Mostra Augustea della Romanità*. Catalogo (Roma 1937/38).

From the time of Polybius to the reign of the Emperor Tiberius there is substantial evidence for the arming of the Roman legions and their heavy armed auxiliaries in shirts of mail or scale armour.

The *lorica hamata* or mail shirt is not in my opinion of Oriental origin as is so frequently stated, but as Varro says, a Gallic, or more correctly Celtic invention³.

I can find no evidence for the manufacture and use of mail in the Middle East or beyond into Asia before the 3rd century A.D. Mail shirts which have been found in isolated Scythian graves of the 5th century B.C. could have been acquired in trade or war as were so many other objects of Greek and Middle La Tène manufacture excavated from Scythian and early Sarmatian burials⁴.

The manufacture of mail requires a sedentary workshop with an adequate supply of metal, the ability to draw or forge wire, and the tools, simple though they may be, for the production of the most remarkable defensive fabric the world has ever seen.

Mail required a lively imagination for its invention and there was no lack of inventiveness combined with brilliant artistic ability amongst the Celtic peoples of Europe.

The earliest representation of mail is to be seen on the balustrade reliefs which were added to the Temple of Athena Polias Nikephoros at Pergamon by Eumenes II (197–159 B.C.) to commemorate the victories of his father Attalus I over the Galatian tribes.

Three mail shirts are shown with shoulder straps brought over from the back and fastened on the breast with a horizontal strap. With these mail shirts are piled other Galatian and Greek arms including 'jockey-cap' helmets of Eastern European type and large oval Celtic shields⁵. Almost identical *lorica hamata* and oval shields can be seen borne by the Roman legionaries on the Aemilius Paullus victory frieze at Delphi which was erected to commemorate the Roman victory over King Perseus of Macedonia at Pydna in 168 B.C.

This is the equipment of the better armed legionaries as described by Polybius who was writing at about the time of these events in the 2nd century B.C.⁶. The continued employment of mail by the Romans is illustrated by the Ahenobarbus frieze in the Louvre which dates from the second half of the 1st century B.C. It is also interesting to note that the large oval *scutum* was still being used at this time though by the early first century the rounded top and bottom had been cut off to create the familiar semi-cylindrical *scutum* of the Imperial legions⁷.

³ Varro, Ling. lat. V, 24,16.

⁴ St. Piggott, Ancient Europe (Edinburgh 1965) 240.

⁵ P. Jaekel, Pergamenische Waffenreliefs. Waffen und Kostümkunde, 3. F. 7, 1965, 94–122.

⁶ Polybius, Hist. VI, 23,15.

⁷ The frieze from the tomb of Cartilius Poplicola at Ostia which can be dated between 30 and 20 B.C., shows both oval and rectangular *scutum* and may therefore be an indicator to the period of change from one type to the other. As the monument has a strong naval character it could equally well show marines with oval shields and legionaries with the rectangular ones, the change over already having taken place in the legions.

The Arch of Orange erected circa A.D. 26–27 to celebrate the defeat of the Gallic revolt of A.D. 23, bears two fine battle reliefs, one on each side of the attic. Both horse and foot soldiers are depicted fighting against semi-naked Gauls and all except one, a cavalry officer, wear *loricae hamatae*. The cavalry officer wears *lorica squamata* or scale armour. Most of the mail shirts reach to mid thigh and all of them have shoulder straps connected across the chest with an S-shaped link. Some have a short slit at either side to permit greater freedom to the legs, particularly when mounted on horse-back whilst one legionary has a waist length shirt with a skirt of *πέρουγες* or leather straps.

First century grave stelae of legionaries and auxiliaries which represent the soldiers in their full equipment have long been the cause of controversy, for the sculptors left the surface of the body armour without detail.

It has generally been accepted that the body armour was therefore leather though one finds it difficult to imagine how a supple leather could have any defensive qualities.

Several grave stelae, such as that of the cavalryman C. Romanus and the standard bearers Q. Luccius and C. Valerius at Mainz, have large shoulder pieces which follow the contours of the shoulder and the upper arm. If such a shoulder guard was made of a leather thick enough and hard enough to resist the cut of a sword or thrust of a spear the wearer would not be able to raise his arms. The body of the cuirass would also keep the soldier rigid from neck to hips making him as helpless as a man in a straight jacket.

The stele of Valerius Crispus at Wiesbaden which inspired Dr. Lindenschmit to make a life-size model of a legionary in leather armour, may not have had the large shoulder pieces but the narrower ones of the Ahenobarbus frieze and the Arch of Orange. The surface of the Crispus relief is so defaced that it makes positive identification of such details impossible.

When these grave stelae were originally set up they were painted in naturalistic colours. With some of the less elaborate sculptures it may have been usual to apply such detail as the links of the mail shirt with rows of alternating crescentic brush strokes of a dark colour on a grey or blue-grey ground. This has been tried with some success at the National Museum of Wales with a cast of the grave stone of the centurion Facilis at Colchester. The ground colour for the armour is silver which might have been used on the sculpture of a public building in Italy but hardly on a military grave-stone in the newly won part of Britain.

Another alternative would be for the detail of the mail to have been applied in gesso as was done on some medieval military effigies in the 13th and 14th centuries. Gesso was found in the crevices of the eyes and ears on the Facilis grave stele. It is also possible that the surface of the body armour was simply painted grey to represent iron and because those who would see it knew the type of armour shown, there was no need to add to the cost further by applying the detail of mail rings.

From the late Augustan period there survives a marble relief in the Palazzo Ducale at Mantua, depicting a combat between Romans and Gauls⁸. It is a

⁸ D. E. Strong, *Roman Imperial Sculpture* (London 1961) Pl. 41.

sculpture of the highest order and the artist has paid a lot of attention to reproducing the details of the armour. One cavalryman and two legionaries wear *loricae squamatae* with shoulder-straps of moderate size joined across the chest with a chain. One cavalryman wears a *lorica hamata* and it is this figure with large shoulder guards spreading onto the upper arms which I feel convincingly proves that the armour of both legionaries and auxiliaries represented on grave stelae is of mail.

Only mail, by the very nature of its construction, could be used in this way, for it can be folded in any direction without restriction. Mail, constructed of iron rings, each one passing through four others, permitted a man to move quite naturally. When struck the rings closed up on each other, and providing a stout garment was worn beneath it, bruising of the flesh would be the only injury resulting from a blow or thrust. Mail had one great drawback, its weight, which would be about 9.072 klg. for a shirt with additional shoulder-straps.

To reduce the drag of the mail on a soldier's shoulders, for they carried the entire weight of a shirt, the *cingulum militare* was worn round the waist. On the Ahenobarbus frieze this belt is a simple leather one with the sword attached at the right side whilst on the stele of Crispus from the first century A. D. the sword is suspended on a narrow *balteus* over the left shoulder with a broad waist belt covered with ornamental plates supporting an apron of studded straps over the abdomen and, though not visible, it is likely that a dagger was attached at the left side.

Lorica squamata, or scale armour was never as widely used as mail and such evidence as we have suggests that its use was confined largely to the officers and some cavalry units, particularly in the first century.

Scale armour was not as strong as mail nor as flexible. The scales, whether of bronze or iron, were never very thick and although ribbed or embossed to give them rigidity, could be easily bent by a blow. The stitching which held the linked rows of scales to the fabric or leather foundation garment, must have required frequent inspections to assure its serviceability.

Scale armour made a very handsome *lorica* for a centurion but in a simpler form also made a cheaper armour than mail to produce for auxiliary units.

Joseph Alfs, in 1941⁹, suggested that the *lorica segmentata* was introduced at the time of the Emperor Trajan but already at the time he was writing there was sufficient evidence to prove the existence of this type of body armour before A. D. 100.

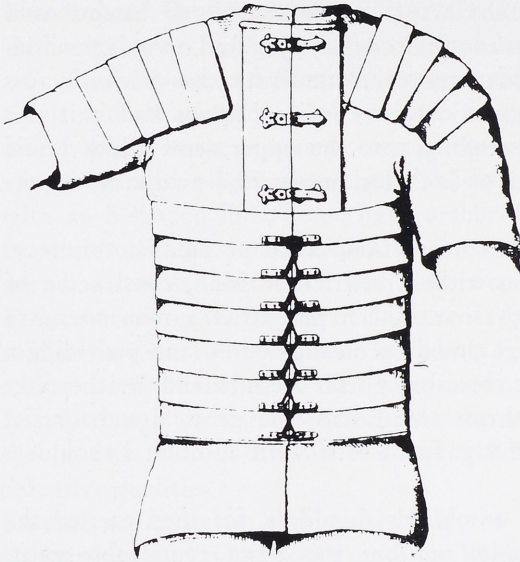
The excavations at Carnuntum in 1899¹⁰ on the Danube, Hofheim on the eastern side of the Rhine in 1913¹¹ and Newstead in Scotland in 1911¹², had yielded fragments from laminated cuirasses, all being datable to within the first century.

⁹ J. Alfs, *Der bewegliche Metallpanzer im römischen Heer*. Zeitschr. f. hist. Waffen und Kostümkunde, N. F. 7, 1941, 69–126.

¹⁰ M. v. Groller, *R. L. Ö. Z.* (1901) pp. 95–114, Taf. XVII–XIX.

¹¹ E. Ritterling, *Das frühromische Lager bei Hofheim im Taunus*. Ann. d. Ver. f. Nass. Altkde. u. Gesch.-Forsch. 40, 1913 Taf. XI, 1–19.

¹² J. Curle, *A Roman Frontier Post and its People* (Glasgow 1911) 156–158.



1 Reconstruction of a *lorica segmentata* by von Groller from the fragment found at Carnuntum.

The great advances made in Roman frontier archaeology in the past twenty-five years have provided us with much vital information concerning military equipment, especially for the first and early second centuries A. D. It has been proved that the legions were being re-equipped either under Tiberius or Claudius. It is quite possible that this new and improved equipment included the replacement of the bronze 'jockey-cap' helmet with a deeper one of iron and a modified lighter pattern of *gladius* with parallel cutting edges and a short point instead of the heavier long pointed sword of the first half of the century.

By whom or from whence the *lorica segmentata* was evolved we shall probably never know. The earliest known pieces of armour of similar construction are the laminated Greek cavalry arm guards on the Pergamon victory frieze mentioned above. They are recommended by Xenophon in his 'Art of Horsemanship' for a cavalryman's left arm and are eventually adapted by Roman gladiators for the sword arm early in the first century. The earliest gladiators have either no protection to the arms or a simple forearm plate.

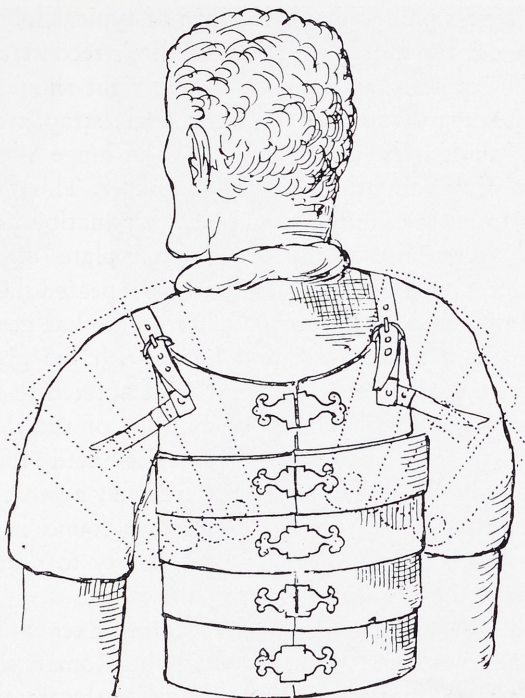
Whether this gladiator's arm guard inspired the invention of the *lorica segmentata* can only be conjecture but I am inclined to give the Romans full credit for its invention.

This ingenious cuirass, made popular by the columns of Trajan and Marcus, was probably being issued to some of the legions when the Emperor Claudius ordered the preparation of forces to invade Britain in A.D. 43. The forts of Hod Hill¹³, Waddon Hill¹⁴ and Cadbury Castle¹⁵ have yielded examples of fittings from *lorica segmentata* dating from the first ten years of the invasion

¹³ J. W. Brailsford, Hod Hill I. Antiquities from Hod Hill in the Durden Collection (London 1962) 1-6.

¹⁴ Proc. Dorset Nat. Hist. and Arch. Soc. 86, 1965, 138 f.

¹⁵ L. Alcock, A Reconnaissance Excavation at South Cadbury Castle, Somerset, 1966. The Antiqu. Journ. 47, 1967, 70-76, Pl. 14.



2 Reconstruction of the back of a *lorica segmentata* by Webster based on a plate found in London on the Bank of England site.

and occupation of Britain. These sites were occupied by units left by the II Augustan legion under Vespasian, advancing westward across the southern counties, to hold down defeated peoples in their rear.

The Hod Hill force composed of legionaries and auxiliary cavalry, left behind an assorted collection of *fragmenta armamentaria* which has provided us with a fairly clear picture of their equipment. A bronze cheek-piece from a 'jockey-cap' helmet and a fine iron cheek-piece from a new type of helmet, come from this fort as well as a number of hinges, buckle and strap fastenings from *loricae segmentatae*. This suggests a cohort with a mixture of both old and new equipment as one would expect in a period of transition.

This new iron cuirass, from which hundreds of fragments survive from military sites along the frontiers of the Roman empire, has ever remained one of Roman archaeologists' unanswered problems. Where did all of these bronze fittings really fit and what was their true function?

Von Groller made the first attempt at a scientific reconstruction (Fig. 1) from the quantity of fragments he found in the armoury at Carnuntum but he ignored many right angle strap and buckle fastenings and we can now say with certainty, incorrectly placed his hinges down the centre of the back. The hooks for securing the girdle plates at the front and the buckle and strap fastening for the breast plates have proved to be correct.

In 1960 Dr. Graham Webster published a plate from a *lorica segmentata* which had been found on the site of the Bank of England in the City of London in 1936¹⁶. This plate carried a right angle buckle and strap fastening at its

¹⁶ G. Webster, A Note on the Roman Cuirass (*Lorica Segmentata*). *Journ. of the Arms and Armour Soc.* 3, 1960, 194-197 Pl. LIII-LV.

deepest part and a half hinge of typical lobated type at its narrowest end, and under the influence of von Groller's reconstruction Dr. Webster placed this plate horizontally at the back of the right shoulder with the buckle erect to take a shoulder strap and the right angle strap attachment to connect with the back of a shoulder-guard (Fig. 2). The hinge was placed at the centre to meet the missing pair behind the left shoulder. This presented a very possible reconstruction on the limited amount of information then available. Von Groller was also the originator of the idea that the plates of the *lorica* were riveted to a leather jacket and Alfs and Webster have repeated this theory.

Laminated plate armour of any date has generally been mounted upon narrow leathers which twist and move with the plates without the rivets which hold them to the plates, tearing out. If applied to a garment, the plates would quickly tear away and this is possibly one of the reasons for the coat of plates of the thirteenth and fourteenth centuries having the fabric or leather on the outside to confine the weight of the metal closely against the wearer's body.

The plates of a *lorica segmentata* found in the fort at Newstead by Melrose in Scotland are of a different variety to those I am about to discuss and I will leave them until later.

In 1964, during the Joint Training Excavations of the Universities of Durham and Newcastle upon Tyne in the Roman station at Corbridge, an ironbound wooden chest was discovered under the floor of a wooden building close to the position of the Flavian *principia*¹⁷. Within this chest were found tools, nails, writing tablet cases, bundles of javelin heads tied with cord, a bronze sword scabbard and a quantity of iron armour. The remains of the chest and its contents were removed to the laboratory of the Museum of Antiquities at the University of Newcastle and during 1968 and '69 Mr. Charles Daniels and I pieced together the broken fragments and reconstructed the sections which make up a *lorica segmentata*.

After completing one cuirass which enabled me to proceed with a working copy (Fig. 3), Charles Daniels continued to fit together a second complete cuirass and portions of a third. There have emerged two variants of this cuirass which carry all the fittings generally found on sites where legionaries have been present.

From the fragile plates, all completely transformed into iron oxide, we have taken patterns and detailed drawings, which will shortly be published in a full report on the excavation.

The work of reconstruction was greatly assisted by the fact that all the internal leathers remained adhering to the inside of the plates, or if they had fallen away, they have left their mark on the surface of the iron. The bronze fittings were in every case still in position, and where broken would appear to have been in that condition when hurriedly packed in the chest.

The *loricae* each consist of four main sections. The halves right and left of the breast and back connected by a shoulder plate with two hinges of usual lobated

¹⁷ Ch. Daniels, A Hoard of Iron and other Materials from Corbridge. Arch. Ael. 4. Ser., 46, 1968, 115-126.



A

3 Full scale working copy of Corbridge Type A *lorica segmentata*.

B

A. front, B. back (Rheinisches Landesmuseum, Bonn).

pattern. The large shoulder-guards are permanently attached to the shoulder, breast and back by internal leathers with embossed bronze washers under the rivet heads which secure them.

Each shoulder-guard consists of a broad main plate in three sections joined by two more lobated hinges, below which are two long narrow plates and two shorter ones tapering towards the lowest and smaller plate, all overlapping outwards and mounted with bronze rivets upon three narrow leathers. Where the leathers connect with the large upper plates, washers are again placed beneath the rivet heads.

The breast-plates are of one piece, 17 cm. long by 8 cm. broad, surprisingly small and narrow, whilst the back-plates are broader and each of three horizontal plates, joined by internal leathers. Both breast and back-plates fasten with single straps and buckles with hinged attachments. The edges at the neck are rolled and turned inwards.

The girdle plates are again in two sections, each mounted upon three internal leathers. Two of the examples found consisted of seven plates whilst a third was of eight plates. The upper ones are cusped and turned at the edges to fit beneath the arms and the lowest have the bottom edge turned to rest comfortably upon the hips.

At the end of each of the upper five plates, at both front and back, are riveted the bronze tie hooks, parallel to the bottom edges. The lowest two plates are

devoid of hooks, obviously to permit the *cingulum militare* to sit closely over the plates and so making other fastenings unnecessary.

The main difference between the two types of cuirass lies in the manner in which the breast and back-plates support the girdle plates. The first method is by buckle and strap. The plate published by Dr. Webster has moved from the position of a horizontal right back-plate into that of a vertical right breast-plate. The right-angle strap and buckle fittings ignored by von Groller are here explained, for the strap and buckle from left and right halves join the plates across the wearer's chest whilst the right-angle hinged strap attachments pass down to meet hinged buckles on the front of the upper girdle plates.

At the back the fastening is internal, being made by continuing the leathers of the back-plates down to join two iron buckles on the inside of each half of the girdle plates.

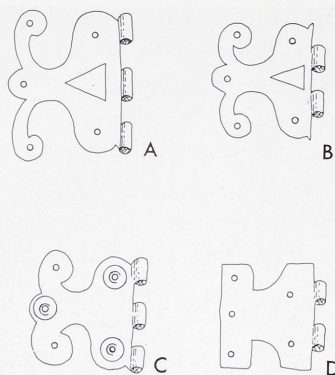
The second method, and I believe the later method of fastening, is by vertical hooks, one riveted to each half of the upper girdle plates in the front and two at each side at the back. On each breast-plate is a vertical strip of bronze projecting over the lower edge and pierced to form a loop which is engaged with the hook on the girdle plates. The pairs of strips on the lowest plates of the back sections do not project into loops but holes are drilled through the bronze and the iron beneath.

When dismantled one of these cuirasses can be compressed into a small transportable bundle weighing approximately 6.35 klg. When assembled with the front fastenings left undone it could be put on like a waistcoat and all that the legionary had to fasten was one strap and buckle and five ties; to the efficient soldier a matter of two or three minutes, and around the unfastened waist plates would go the *cingulum militare* joined by a single buckle.

If the girdle-plate hooks were secured with a long single lace as suggested by von Groller, the plate ends move too freely and get out of place. Individual ties for each pair of loops are the only practical answer and the remains of one of these of leather was found adhering to a hook on one of the sets of girdle plates from Corbridge.

It is interesting to note that on all the collar and shoulder-guard units found, the riveting points for the internal leathers remain the same measurement apart as if the armourers were provided with templates for marking out prior to drilling and leathering up. It might be more correct to say punching rather than drilling the holes, for punching would appear to be more common in Roman metal work.

The pattern of hinges used on *loricae segmentatae* may prove to have some bearing upon the date of the armour to which it is attached. The more delicate hinges that have been found are those pierced with a large triangular hole and these may in fact be the first model. With modern tools one of these hinges will take all of an hour and a half to make and the time factor may have caused the gradual decline in *lorica* hinge patterns. That there was a decline in quality may be clearly seen on the Corbridge *loricae* for the one fastening with straps and buckles has well shaped hinges of a common pattern whilst those on the one fastening with hooks has hinges which are crudely cut without

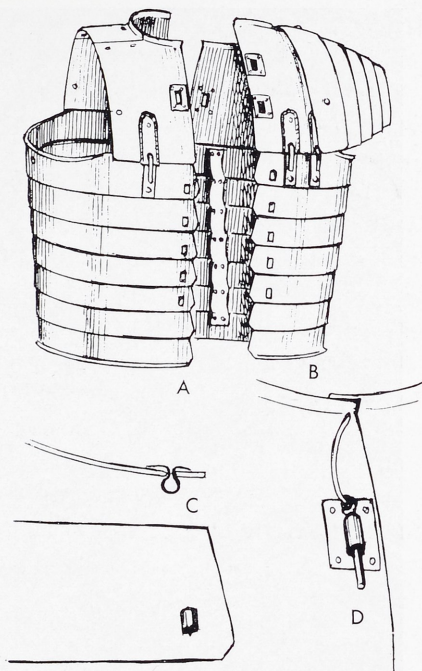


4 Hinges from shoulder units of *lorica segmentata*.

A. Caerleon. – B. Rheingönheim. – C. All sites. – D. Rheingönheim, Corbridge Type B.

5 Reconstruction of the *lorica segmentata* found at Newstead, Scotland.

A. Front shown without shoulder-guard, right half. – B. Back with shoulder-guard, right half. – C. Ribbon loop fastening of girdle plates. – D. Loop and pin fastening of breast-plate.



the scrolled lobes, being roughly T-shaped on a squared base (Fig. 4 D).

In several instances the hinges on the Corbridge pieces have been broken and instead of replacing these, the plates of the armour have been riveted solid for where connected by hinges they overlap by about 1 cm.

This decline in the quality of the hinges on the *lorica* connected by hooks and the fact that armours could be used with the shoulder plates riveted solid, brings us to the remains of a *lorica segmentata* from the fort at Newstead in Scotland which like the fort at Corbridge from which our complete cuirasses came, was destroyed between 98 and 100 A. D.

In the light of the Corbridge find I have now re-examined the Newstead fragments in the Museum of Antiquities in Edinburgh¹⁸. The result of what I regard as a preliminary examination, suggests a very simplified but extremely functional cuirass and I believe, a very much improved if perhaps less attractive model (Fig. 5).

The breast and back-plates are both considerably larger, and the latter also of one piece. The shoulder plate is no longer hinged to the breast and back but riveted to make a solid half collar, each half of the collar joining at the front and back. Bronze ribbon loops are riveted to the left side of the collar, one at the front and two at the back. These loops pass through brass bound slots where they must have been held in position by a stout pin. A small hole punched in the corner of the plates at the neck suggests a thong or lace to retain the pin when it is removed (Fig. 5 D).

¹⁸ Curle (note 12) 157, Pl. 22,11.



6 Legionaries wearing loricae of Newstead Type, Trajan Column, Rome.

The neck opening is flanged instead of turned as on the earlier cuirasses; another sign of cost and time reduction. The breast sections of the collar joined the upper girdle plates with a single hook passing through the centre of the lower edge. Large thin brass plates with punched borders take the place of the earlier bronze strips and the projecting end forming a loop has been dispensed with. At the back a double hook fastening for each half back-plate is provided.

The girdle-plates are also simply mounted. The old hooks have been replaced by simple loops of ribbon bronze with tongues passed through slots in the iron and bent outwards like a modern paper fastener. A slightly more elaborate version consisting of a flat bronze ring with a shank for riveting through the plate, has been found at Carnuntum and Caerleon. This type may prove to be an intermediate version introduced late in the first century. The original hooks do appear to have been likely to pull open under strain.

The Newstead *lorica segmentata* would then appear to be the latest pattern. The older, light and rather fragile fittings have been done away with and a new simple but strong *lorica* evolved. Legionary sites of the first century have often

yielded large quantities of broken hinges, buckles and strap attachments. All are of very thin metal and the small rivets, little more than brass nails, must have pulled away easily.

No doubt the time involved in legionary workshops repairing *loricae* must have been one of the reasons for this drastic modification which dates from before the north British disaster of 98–100 A. D.

This modified *lorica* has most of the features of those shown in second century sculpture, particularly on the columns of Trajan (Fig. 6) and Marcus.

It is to be hoped that future excavation will bring to light other pieces of equipment as complete and informative as the Corbridge *loricae* for only by such miraculous survivals can we make factual reconstructions.