

# The production of Roman ferrous armour: a metallographic survey of material from Britain, Denmark and Germany, and its implications

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Between Augustus and Septimius Severus, the army of legionary and auxiliary units numbered between some 300,000 and 400,000 men.<sup>1</sup> It is generally assumed that each soldier was equipped for protection with helmet, body armour, and shield, of which the metal components were made of copper alloy or ferrous metal.<sup>2</sup> While there were also technical complexities in the manufacture of every single component, the scale of the task of providing a single soldier with body armour can easily be appreciated. Reconstructions of the two types of cuirass represented in the Corbridge Hoard reveal that they were each constructed from over 400 separate parts, which would include some 40 metal plates.<sup>3</sup> Scaled up to meet the requirements of providing body armour for the entire Roman army, the number of metal plates alone amounts to some 12-16 million pieces; then there are the helmets and shields, and all of this equipment had to be hand-made.

The extent of standardization of types of armour at any one time across the empire is not clear. Allowing for the long life of individual pieces of equipment, the archaeological record reveals both contemporary variation and change over time.<sup>4</sup> While no doubt there was an element of gradual evolution in the process by which the entire Roman army was appropriately armoured, with new recruits tending to take on the equipment of those discharged, the equipping from new of a freshly raised legion or auxiliary regiment must have presented new opportunities for change while posing considerable logistical challenges to meet the demand. We do not know how much time was required to complete the arming of a new legion from the moment that the decision was taken to raise it. Although estimates vary, there is no dissent from the view that, overall, numbers increased between Augustus and Septimius Severus, such that new equipment would have been required. In addition, armour — particularly body armour with moveable elements, being in constant use — was bound to suffer damage or loss, whether on the battlefield or in training, and to require running repairs or replacement. Thus, notwithstanding the extent to which equipment was handed down, continuing to provide the expanding army with protective armour, as well as keeping that armour in good order, posed considerable challenges.

Against this general background of demand, which was met variously by specialist suppliers and military *fabricae*, this paper considers the evidence for the manufacture of ferrous armor which was used alongside that manufactured from copper alloy throughout the Early Empire. We do not know why both materials were used throughout, but an understanding of the characteristics and qualities of the materials used is an essential starting-point. It is also crucial to the gaining of insight into the whole manufacturing process of Roman armour. Use of one material rather than another may simply have been as much a function of its relative availability and the particular expertise required to work it, as the result of any appreciation of a difference in the technical merit of the two materials or the time needed to produce the finished artefact.

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- 1 R. MacMullen, "How big was the Roman army?" *Klio* 62 (1980) 451-60; J. B. Campbell, *The emperor and the Roman army, 31 BC - AD 235* (Oxford 1984) 4-5.
  - 2 H. R. Robinson, *The armour of imperial Rome* (London 1975); M. C. Bishop and J. C. N. Coulston, *Roman military equipment* (London 1993); M. Feugère, *Weapons of the Romans* (Stroud 2002).
  - 3 Robinson *ibid.* 174-82; L. Allason-Jones and M. C. Bishop, *Excavations at Roman Corbridge: the hoard* (London 1988); M. C. Bishop, *Lorica segmentata* vol. 1 (Duns 2002) 31-45.
  - 4 Robinson *ibid.*; Bishop and Coulston (*supra* n.2); Bishop (*supra* n.3).