Medical Care for the Roman Army on the Rhine, Danube and British Frontiers in the First, Second and Early Third Centuries AD

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To my parents Peter Cyril and Agnes Cecilia, my brother Philip Blaise, sister Paula Jean and husband Carl Joshua for their never ending support, encouragement and awareness that archaeology is never static and always open to challenge and new interpretations.

ABSTRACT

The study of Roman frontiers tends to concentrate on the historical development and military tactics, in construction and actions, of the Roman army. Little attention has been given to the daily life of the soldiers; and those studies that address daily organisation tend to rely upon interpretations that were made about the Roman army in the late 19th and early 20th centuries. Furthermore, the scholars who have researched this aspect tend to apply their arguments to the army as a whole, believing it to have been an homogenous group of people. The early interpretations were often based on anachronistic views that the Roman army was organised and operated in a similar manner to the military system of the time these early archaeologists were writing. One area of the organisation of the Roman army that requires greater deliberation is health care, many aspects of which are taken for granted or interpreted on the basis of understandings made by scholars early on in the development of the discipline. The more recent theories about the system of medical care in the army are also based on rather sparse supporting evidence. It is, therefore, the aim of this thesis to make a two-fold examination of the subject by examining legionary and auxiliary fortifications on the Rhine, Upper and Middle Danube and British frontiers.

Queries are raised about previous scholarship in order to see if there is sufficient evidence to support the interpretations and understandings on which more recent scholarship is based. Following this, new questions are asked of the archaeological and epigraphical material, in the context of more recent anthropological, historical and theoretical archaeological methods not previously applied in studies of Roman military medicine. The main issues are: to see if there is evidence to support the idea of a single system of medical care in the army or if the evidence shows variation within the system, either between the provinces or units; whether there was a difference in care offered to the auxiliary and

legionary units; if there is evidence for civilians being treated by military doctors; and if there is evidence for cultural variation of medical practice within the units.

The questions are broached by comparing the epigraphical, archaeological and architectural remains relating to medical treatment. Inscriptions mentioning doctors are examined to see if these support the idea of differences in the types of doctors employed according to frontier and unit type. In order to gain information about the cultural background of doctors and the development of medical care in the army the home of the doctors and the dates of the inscriptions are also examined.

Medical instruments are employed as a source of evidence to determine the distribution and range of health care in the army. Not only are the instruments compared between fortifications and frontiers to see if there is evidence for medical variation, but they are examined for their context and deposition. It is argued that depositional processes can tell us much about how people understood medical tools and their associations with disease, wounds and death.

Finally, the archaeological evidence of buildings identified as military hospitals is considered. In particular, it is questioned whether there is enough evidence to support the definition of the 'hospitals' as hospitals. Artefactual remains from within 'hospitals' are examined and compared when known, as are the plan and layout of each structure that has been recognised as a hospital. The description of Roman hospitals is frequently presented as if they were planned to serve the same functions as modern hospitals, so a comparison of these buildings and their functions, both civilian and military, is made with later (medieval and early-post-medieval) hospitals. Questions of the cultural construction of space are brought into this chapter as a means of demonstrating that the construction and use of buildings is culturally variable and not always undertaken according to a common sense or functional approach as understood in the modern west. It is apparent that our current identification of certain structures as 'hospitals' is far from secure.

The thesis concludes by arguing that there is no solid evidence for the existence of a single medical system within the Roman army. A combination of military events and circumstances along with cultural variation in the make-up of the units provides the most plausible explanation for this pattern of variability.

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CHAPTER ONE
Beyond the traditional: why Roman military medicine can be approached from new perspectives

1.1 Objectives

This thesis is an examination of Roman military medical practice on the Roman frontiers of the Rhine, upper and middle Danube and Britain in the 1st, 2nd and early 3rd centuries AD. The main issue is to gain a clearer understanding of Roman military medicine by challenging the supposition that there was a universal system of health care provided for the legionary and auxiliary units in the Roman army, a supposition that is the basis on which most scholarship about military medicine is built (i.e. Davies 1969; 1972; Jackson 1988: 133-4; Nutton 1969; Penn 1964; Richmond 1952; Salazar 2000: 76-81; Wilmanns 1995a & b). This basic understanding has not been challenged in modern studies. However, there is no reason to assume that medical care in the Roman army was standardised. First of all, the archaeological evidence does not point to a standardised system, as shall be demonstrated, and secondly anthropological examinations into medicine teach us that there are varying cultural attitudes towards health and the body, which manifest themselves in a very varied range of medical practices even within superficially homogeneous cultural systems.

The study is made by re-examining the archaeological remains of medical instruments, literature, inscriptions and structures that have been identified as hospitals to question the underlying assumption of standard medical treatment in the army. In so doing, other questions are addressed to see if it is possible to learn more specific details about medical treatment in the Roman army. These questions consider whether the available information can suggest differences in care provided to the legionary and auxiliary units; if the data suggests any treatment having been offered by military doctors to civilians who lived in the area of the fortifications, or vice versa; and it questions the location of the soldiers' treatment. To try and answer these questions, one must not only look at what the remaining material evidence (including literary sources) can tell us, but consider how medical care might have been influenced by other factors such as military events, provincial policy and the cultural background of the soldiers. Moreover, consideration will be given to attempt to understand the perception of illness and how this might have affected possible variations in medical practice between the different military units and between the units and the Romans. (In this thesis the term Roman is used to define groups from Italy and Rome itself, as opposed to others who lived within different parts of the empire: the empire consisted of many different societies of people with varied cultural practices, languages and possibly even understandings about their bodies and medical practices.)

1.2 Order of thesis

Having established the salient points and questions for this study it is now necessary to explain the basic structure of the thesis. The chapters are arranged in a successive manner so that the reader will first gain a basic understanding of the history of the scholarship related to the field of study, and the methodology used in the examination, before the evidence is looked at to answer the main concerns. It is hoped that by approaching it in this manner a clear argument will be presented suggesting new ideas about military medical care.

Before looking at the evidence for medical care a general background of the history of classical medicine, classical medical literature and the scholarship related to Roman military medical care will be provided (Chapter 2). Chapter 3 will define the area of study: the Roman frontiers on the Rhine, Britain and the upper and middle Danube. Theories of what constitutes a frontier will be described, followed by a discussion on how anthropological approaches might be used to enhance our understanding of the frontiers. Chapter 3 will conclude with a general survey of the main military events that occurred in each of the relevant frontier provinces. This chapter is crucial in order to appreciate how the development of the areas and interaction between the Roman army and the native communities may have influenced the health care provided for each frontier and unit type.

The main questions of the thesis will begin to be addressed in Chapter 4. It is here that the classical philological sources, including literature, papyri and epigraphic remains will be reviewed to provide an account of what is most probably known about health care for the soldier from recruitment to retirement. By looking at the expectations of health regulations for military recruitment, the question of what the Romans thought to be a fit and healthy body will be considered. A comparison of the epigraphic evidence relating to the type of doctors will be made as a means to determine whether certain provinces and/or types of units were receiving different standards of health care.

Taking further the examination of the organisation and standardisation of medical care offered to the soldiers, a consideration of the archaeological remains of surgical instruments will be the focus of Chapter 5. A catalogue is provided of the surgical tools from a sample of fortifications on each of the pertinent frontiers, and a comparison of these instruments is made to determine a number of issues. It will be questioned whether a certain type of implement was common in all areas, only specific regions, or in fortifications with units from the same areas, and the possibility will be explored that medical procedures were regionally and/or culturally distinct. There will also be a consideration of whether different tools appear in legionary fortresses and/or auxiliary forts. Such a juxtaposition might help to demonstrate whether certain units or areas were receiving more, or rather, different types of care than others, or whether procedures were fairly consistent throughout the frontiers. The deposition of the instruments will also be noted and examined as a means of determining whether there were differences in attitudes towards medical treatment and the body that might be reflected in the disposal of tools. Finally, the instruments might provide some insight into whether certain doctors might have cared for civilians, as is suggested by a single inscription from Dacia (Appendix 2, Table 8, number 41). At the moment the only means to test this consideration is to study the artefactual remains of gynaecological instruments. Since one of the main functions of these instruments, if related to the literary sources, was to be used on females, they can be used to try and designate whether there was medical treatment for people other than soldiers.

The topic of *valetudinaria* will be the main issue of Chapter 6. The structures will be examined to see if there are signs of architectural variation among military units. Secondly, the question of the identification of *valetudinaria* will be raised. The identification of Roman military hospital buildings (*valetudinaria*) was made at the beginning of the 20th century (Koenan 1904) and has never been challenged in spite of many new archaeological interpretations and methodologies. Questions have not been asked about the context of material remains in many of the structures identified as *valetudinaria*, or if it is possible to identify a structure on the basis of a ground plan alone, which has been the main means in previous scholarship to determine the function of many of the buildings within fortifications. An important issue that has yet to be raised with much critical discussion about hospitals is how the Romans perceived a *valetudinarium* to be. Hyginus (Gromat. *Lim.* 4), the only extant source providing information about military *valetudinaria*, mentions that *valetudinaria* were to be placed in quiet areas inside the fortifications, but he does not describe their ground plan or how they were supposed to be arranged. In spite of having no other written evidence about the structures, Roman *valetudinaria* are often described as if they were modern hospitals, having operating theatres, residential areas for the doctors, kitchens, baths, latrines and wards. As no more descriptions are presented of permanent *valetudinaria* in any other extant classical literary source, archaeological evidence is the key to understanding these structures. By re-examining the archaeological material questions will be brought forth to see if these buildings have been properly identified as *valetudinaria.* In this thesis the provenance of the surgical instruments has been recorded, when available, to see if the majority are appearing in so-called *valetudinaria*, or in another area that might imply a different building for a *valetudinarium* or place of treatment. Artefacts from buildings that have been identified as *valetudinaria* will be discussed, when known, to see if they provide any information about the identity of the structure.

1.3 Which theoretical and methodological approaches to use?

Since medical practice is culturally defined an anthropological, or historical archaeological approach is used in this study, rather than a strictly typological study of the archaeological remains, to question whether there is evidence for variation within medical care in the Roman army. Roman archaeology can, and in many cases should, be approached with the methodology of historical archaeology. A general definition of historical archaeology, as defined by Deetz, is "the study of cultural remains of literate societies that were capable of recording their own histories" (1977: 5). Since the Romans did write their own histories, along with leaving records through inscriptions, papyrus fragments and military diplomas, to name a few, there is no reason why the archaeology for that time should not be broached from an interpretative standpoint common in much post-medieval archaeology and even in prehistory. When one is interested in making interpretations about the lifestyles of those who lived in the past using both literary and artefactual evidence, an understanding of such methodologies makes for more critical evaluations of the evidence. Although the common approaches to classical archaeology are helpful when it comes to dating and understanding specific styles, the descriptive approach does not allow for much interpretation beyond the identification, date, possible function and stylistic relations of objects, or structures. Classical archaeology has come under much critical scrutiny recently by anthropologically trained archaeologists, not because of the typological approach used, although it is an issue, but mainly because other means of interpretation are not being considered (e.g. Barrett 1989: 236; Jones 1997; Johnson 1999: 154; Shanks 1995, 1999; Small 1999: 122-3). Having been trained in the fields of anthropology, including historical archaeology (Baker 1990) and classical archaeology (Baker 1994; 1995), the author has found the field of historical archaeology far more accepting and open to different interpretative stand points than in the field of classical archaeology (here taken to include some styles of Roman provincial archaeology). Yet, such criticism of the subject should not be perceived as a means of discrediting the study, but rather as an exciting means of creating new understandings of the classical world and expanding on topics that have been frequently discussed. There has been an attempt to rectify this with the emergence of the Theoretical Roman Archaeology Conference that began in 1991. Many areas of Roman archaeology have been re-assessed, or thought about for the first time in these conferences such as funerary ritual, colonisation and the role of architecture in the social construction of space (e.g. Baker *et al.* 1999; Cottam *et al.* 1994; Forcey *et al.* 1998; Medows *et al.* 1996).

More specifically related to this thesis, the methodology used by those who study the frontiers will be examined in detail in Chapter 3. However, it should be mentioned at this time that frontier studies, too, have remained fairly traditional in their methodology. With the exception of a recent trend to define the term frontier (e.g. Whittaker 1994; Elton 1997), it is clear from the most recent volume of papers presented at the *limes* congresses (Groenman-van Waateringe *et al.* 1997) that critical interpretative stances are taking a while to take hold. Much of the scholarship presented in this volume is very similar to the first Roman Frontiers conference held in 1949 (Birley 1952). Many of the papers concentrate on descriptions of sites (e.g. Manning 1997: 33-40; Ottaway 1997: 135-42), developments, dating and phasing of the frontiers and fortifications (e.g. Stather 1997: 159), supply of the frontiers (e.g. Birley 1997: 273-80; Bounegru 1997: 311-16) and recent excavations of military sites (e.g. Szirmai 1997: 527-30; Wilmott 1997: 581). These studies provide a useful source of information; however, when looking through these volumes, one is struck by the paucity of discussions on topics relating to soldiers' lives, identity and even religion, which could be made when using the information brought forward in the more traditional examinations. Those studies that do address these issues tend to simplify situations by describing the military as a homogeneous unit, or in discussions of Roman and native contact, emphasis is placed on the superiority of the Romans over the natives (e.g. Allason-Jones and Dungworth 1997: 318, 319; Wilson 1997: 589). The main question that is raised by this is why do scholars not ask more from the wealth of information available to provide new interpretations in this area of classical archaeology?

On a more general level, it might also be asked why there is such a reluctance in classical archaeology to use new methods of interpretation, material culture studies and anthropology? Shanks observes that the subject began with an idea that the Greek and Roman worlds were considered the zenith of western civilisation, and this attitude remains deeply ingrained in the basis of classical archaeology (1996: 96-7). Moreover, Shanks supports this with a statement from the former editor of the *American Journal of Archaeology* who stated that "the achievement of classical archaeology was to recover and reconstruct as much as possible the betterment of mankind; this is Hellenism." He further observes that "classical archaeologists have not, like anthropological archaeologists, been examining the ideological and theoretical basis of the discipline, but have subconsciously accepted the late 19th century founding ideology of their discipline, while dropping the most imaginative components" (Shanks 1996: 97-8). This sadly demonstrates a prejudicial nature to the subject, because there is an assumption that classical societies were somehow superior to other groups of people who lived and interacted with them. This attitude allows scholars to be dismissive of the fact that Greek and Roman societies were heterogeneous and influenced by other cultures with whom they came into contact. Although more scholars are starting to consider attitudes towards ethnicity in the classical world there is still much work to be done. Greek identity in Rome or Italy is being considered (e.g. Cornell and Lomas 1997), but it was not only the Greeks who lived in Italy, and it is important to make note of this. There was no single Roman society, but one that was influenced by a variety of cultures (Woolf 1998: 6).

Roman provincial studies do look at the interaction between the Romans and other groups, but have mainly concentrated on Romanisation, or the influence of the Romans on the provincial groups. Romanisation is a one-sided explanation used by many scholars about how the Romans influenced the indigenous population (e.g. Creighton and Wilson 1999; Cunliffe 1988: 126-7; Millett 1990; Wilmanns 1995: 133-4). Overall Romanisation is described in terms of progress and civilisation passed from the sophisticated Romans to the backward barbarian (Hingly 1999: 139). There are very few instances where there is a consideration of the reversal of these cultural influences, but Barrett (1989) and Okun (1989) discuss the importance of considering such. It is only recently that scholars have started to question the validity of a one-sided approach to understanding the Roman provinces. Clarke, for example, looks at the architecture of indigenous peoples living around the Roman fort at Newstead in Scotland where there seems to be little Roman influence, and argues that this could have resulted from the deliberate strategies on the part of the natives to maintain their identity (1999: 36-45). Post-colonial theory, a study of how societies have influenced the indigenous population of the land they colonised, has also been used to interpret interaction and attitudes of the conqueror and the conquered (Gosden 1999; 197-203; Webster 1994). One might expect that such theories would be used in Roman military studies, but in the most recent examination of cultural interaction with the Roman army (Creighton and Wilson 1999) the contributors to this volume continue to examine Roman structures and artefacts, but say very little about those of the indigenous people unless they show Roman influences (e.g. Krausse 1999: 54-70; Sommer 1999: 160-98; Wigg 1999: 99-124). These few examples demonstrate that there is still an ethnocentric attitude towards the Roman world by some scholars, and this has affected the way in which data has been interpreted, including that relating to medicine.

1.4 Cultural variations in medical care

As mentioned above, anthropological methods are rarely employed in the field of Roman military studies and Roman medical archaeology. However, anthropological fieldwork on medical practice is an important consideration for any study of medicine because it teaches us to be critical of our understandings and assumptions of medicine in past societies. Medical anthropology also informs us that there are invariably complicated underlying beliefs and perceptions about health care and the body. Although, from an archaeological perspective, we may never be able to gain a precise understanding of these complexities, we are at least made aware that they would have existed. Obviously one cannot use an anthropological example as a direct analogy to past events, but the understanding provides a critical awareness that people in both the present and the past do not understand the world in the same way and this can be said about understandings of the body and medicine. The reason this issue has not been raised in the majority of scholarship on Roman military medicine can be found in the nature of Roman military studies. Usually, as mentioned above, scholars who study the Roman frontiers do not look for cultural variations, but instead seek to define the extent of Roman influence on conquered groups. This process of Romanisation is far too simple because it assumes that there is one Roman culture, and that it would have been adopted by the soldiers without question (Woolf 1998: 243). The cultural background of the soldiers must be considered to understand how the organisation worked. It is known that Batavian auxiliary soldiers retained their own cultural traditions in burial practice and treated their dead comrades differently to other units, showing a distinct selection of their Iron Age values over the Roman ones (Woolf 1998: 245). Material culture also shows that soldiers were not always adopting a Roman (again meaning that from Italy) lifestyle. The pottery remains from Saalburg and Zugmantel, for example, are stylistically similar to that of, if not actually made by, people living outside the empire in Germany (Wells 1999: 136). Much of the pottery at Roman military sites in Germany is indigenous rather than imported styles used in Italy (Wells 1999: 142-3). Thus, if soldiers were continuing to use their own pottery, or that of a local group, it is possible that they continued to maintain the use of other aspects of their cultural background, or adopted cultural practices that were not particularly Roman.

It is often forgotten that medicine and ideas about the body are culturally defined. Even in Rome the literature expresses the idea that there was no standard practice of medicine, as there were many different medical philosophies and beliefs. Celsus (*proem.* 30-1) stated that medical treatments were not the same in all areas of the empire. According to him the methods of practice were subject to the nature of localities, and he exemplifies that one method was required in Rome, another in Egypt and another in Gaul. He felt that if the causes of disease were understood by all cultures to be the same, then the different groups should employ the same remedies. Despite this, he was aware that even if different groups had the same understandings of a specific cause for a disease, for example, ophthalmia, or wounds, different treatments were still employed: "*Differre quoque pro natura locorum genera medicinae, et aliud opus esse Romae, aliud in Aegypto, aliud in Gallia. Quod si morbos haec [causae] facerent, quae ubique eadem essent, eadem remedia quoque ubique esse debuisse. Saepe etiam causas apparere, ut puta lippitudinis, vulneris neque ex his patere medicinam*" (proem. 30-1). Soranus mentioned the different ways Germans, Scythians and even some Hellenes treated their new-born infants in comparison to Roman practices, by plunging the infants into cold water to test their ability to survive (*gyn* II. 12), suggesting the knowledge of cultural differences in medical treatment throughout the classical world. The variations of medical practice discussed by both writers did not, however, simply differ between cultural groups within the empire, but within practical Roman medicine itself. Although we refer to medicine from the Roman era as 'Roman medicine', which implies a standardised system, it is actually difficult to give an exact definition of what 'Roman medicine' was because of the lack of standardisation. There were different philosophical viewpoints on ways to treat the body, and no universal means of training or testing doctors (Nutton 1995: 44-6). In conjunction with this, there were many folk remedies and religious ideas about treatments in existence (e.g. Pliny *NH*) that contradicted the medical writings, indicating that a doctor's care in the Roman world would differ according to the way in which the individual was taught medicine. With these variations in mind it is questionable why, so frequently, studies made of medical care in the Roman army describe the organisation of medical care as if it were a uniform system throughout the entire empire (e.g. Callies 1968; Davies 1969; 1972. 1989; Jackson 1988: 133-4; Nutton 1969; Salazar 2000: 74-81; Scarborough 1968; Wilmanns 1995a & b)? Although there are different views about how the system was organised (e.g. compare Davies 1989 with Wilmanns 1995a & b or Scarborough 1968 with Nutton 1969) it is most frequently referred to as a medical service, implying homogeneity.

An example of how homogeneity is assumed in Roman military medical practice comes from Wilmanns (1995b: 133-4), who argues that the units in the 2nd and 3rd centuries would have adopted Roman medical practice without question, this being based on evidence that there were more inscriptions from the frontiers mentioning *medici* dating from this period. Moreover, she believes that the Roman army would have been a good means for the spread of Roman medicine to other groups of people who had contact with the military (1995a: 121). It is possible that ideas about Roman medical practices could have been transferred through the army to auxiliary units, or groups of indigenous people living in the provinces.

Yet there were differences in medical teaching in the Roman world and most likely cultural differences in practice, one would need to question the type of medical knowledge that was being transferred because it would most likely not have been standardised.

Many anthropological studies have demonstrated that, on a basic level, the culture within which the patient is living influences their experience and understanding of the disease and the healing process (Lupton 1994: 13). At the same time the doctors' knowledge and perceptions of treatment are also influenced by local knowledge (Commelles 1997: 43-4). Yet, these studies and understandings of medicine in culture are fairly recent. Kleinman argued in 1980 that he wished to advance the notion that cultural categories are intrinsic to all cultures and that their analysis and cross-cultural comparisons are essential for understanding medical systems (1980: xii). It seems that it has only been in the last two decades that such ideas have been incorporated in medical anthropology, and the awarness of this begs archaeologists of Roman medicine to consider the possibilies that there might have been different beliefs about health care across the empire.

When units of non-Roman soldiers, with medical backgrounds and understandings different to that of the Romans, were approached with different ideas of illnesses and their treatment a reaction either for or against its acceptance would most likely have been raised. A more recent example of peoples' reactions to new medical practice is demonstrated in a study of medical treatment made in Grenada and Trinidad in the 1950s. The study showed people were more willing to approach a local curer rather than a doctor trained in western medicine, unless the curer realised that western medicine would be more beneficial to the patient's treatment (Landy 1977: 472-3). Kleinman discusses the combination of western and traditional medicine in his study on the doctor and patient relationship in Taiwanese medical practices. He describes how infants often suffered from a culturally defined disorder called 'fright' which could be one of a number of problems such as colic or measles. The traditional treatment usually involves a healing ceremony and wearing charms to ward off the disease, this is usually performed on children who might have been inoculated by western medical practitioners only a few hours earlier (1980: 12-13). Here it is seen that western medicine was basically rejected until there was no other hope for a cure by traditionally accepted means, or in some cases the traditional practices were performed in conjunction with foreign ones. More specifically, medical practice is bound up in behaviour that is significant to a culture, and affects beliefs about how treatments are to be executed. The people of Fatiha in rural Egypt use bodily ornaments as medicine, such as tattooing the forehead veins to relieve the pressure from the frequent hauling of loads of goods. They also use ear piercing as a means of curing a fever, which has to be done by the females of the society with pointed earrings, allowing for the fever to escape through the hole in the ear (Morsy 1993: 83-4). These anthropological observations encourage one to question understandings of past societies, because in areas where western medicine has been thought to have influenced traditional medicines in reality it is seen to have been adapted in different ways. With Roman medicine would one not expect to find similar reactions between provincial natives, soldiers from different backgrounds and the Romans who brought medical practices from Italy?

One study more directly related to classical medicine is Nijhuis' philological examination of Roman reactions to Greek doctors. In it she argues how cultural constructions of illness caused problems with the two societies interacting, because Roman doctors would have prescribed chants and Greek doctors had other ideas about curing (1995: 57-60). She borrows her methodology from Kleinman (1980: 259-310), demonstrating that anthropological methods can be used in philological studies of medicine. With this she discusses the reactions, sometimes hostile, that occurred because of the misunderstandings of foreign practice (1995: 60). Nijhuis' paper is a demonstration that an interpretative anthropological approach can lead scholars to distinguish aspects of a problem or question that might not have been visible to them by using less interpretative approaches. Moreover, it is an indication that there were cultural conflicts about medicine in the classical world, and one should not expect that soldiers with different medical traditions would have openly accepted Roman ones.

By looking at the questions raised about Roman medicine from more of an ethnographic angle and the consideration of cultural difference, the complex cultural matrix of the Roman army will be brought to the fore-ground, something which tends to be overlooked in so many studies of the military (e.g. Davies 1974; Drummond and Nelson 1994; Whittaker 1994). All too often the soldiers are described as a homogeneous group of people, whose ethnic background is either only mentioned in passing (e.g. Johnson 1983: 19-20; Watson 1969: 24), or not mentioned at all, and tends to be disregarded in scholarly discussions of daily and social life, architectural construction, design of the frontiers and military organisation. To remedy this lack of consideration of cultural variation, this thesis is designed to re-examine issues about medicine using more of the methodological approaches drawn from the studies of anthropology and historical archaeology. By approaching the subject from this perspective, as opposed to an empirical collection of data, more questions can be asked of the data that allow for greater insights into the subject.

1.5 The question of data analysis

The manner in which data is collected and analysed in Roman archaeology should also be reconsidered because of the limited interpretative focus in relation to material culture. Artefacts are normally described and organised according to typological group, such as pottery, bronze finds and iron finds. Rarely is full contextual information provided with details of material associations for individual artefacts, making it very difficult to understand the full character of particular assemblages (Hingly 1999: 141; Jones 1997: 131). Shanks and Tilley point out that in earlier studies of archaeology, artefacts were sorted in a manner equivalent to biological classifications. Finds were expected to fit a tight category according to date and classification. This practice divorces the object from its context, rarefying it, and limiting the potential of sound interpretation (1987: 79-80). Deetz states that "classifying artefacts in this way is potentially misleading" (1977: 13). The conventional typology does not allow one to take into account all the variables that humans consider, consciously or unconsciously, when they use, make or own an object; nor is it possible for an archaeologist to use the information to see if there are any unusual patterns in the way the artefacts were deposited (Shanks 1996: 39-41). As Small argues in a discussion on the deficiency of material cultural studies in Roman archaeology, the failure to question more about the artefacts "can miss underlying structures and clues to the social strategies of past societies, which are contained in different community contexts" (1999: 123). In the same discussion, Small also notes that classical archaeologists tend to view the material remains as a subordinate means to support the literature and history. However, the artefacts can often demonstrate an opposing point of view from that mentioned in the literature, and in some cases can demonstrate subtle features neglected in the literature. Matthews (1994), for example, discusses how one might possibly find evidence for a gay male sub-culture in Roman society. He notes that there are some Roman writers who mention effeminate men in a derogatory manner, but he is curious to see if it was only the writers who expressed such feelings, or if homosexual men were able to openly display their sexuality. Matthews suggests one way to do this is by examining the material remains found with sexed skeletons. He realises that there are difficulties in determining gender specific artefacts, for example men today wear earrings as they did in the Elizabethan era, but we often associate them with females. Yet, by comparing finds in male graves with those in female graves he points to two possible burials that have 'female' jewellery, possibly suggesting an open demonstration of gay sexuality that may possibly imply a different attitude from that mentioned in the literature (1994: 125-8). Another example for denoting contradictions with the literature comes from Deetz, who uses lists of livestock in Colonial America to show how misinterpretations can occur in what has been written and what was actually happening. In one instance he observed that farm animals in Colonial America were listed in documentary records, and many archaeologists used these records as a means of determining the types and numbers of animals that were owned by specific farmers. Furthermore, they assumed that the animals listed were the only ones owned by the farmers. However, Deetz argues that only those animals listed on documentary records were intended to be used for food because the archaeological remains of animal bones demonstrated that the specific farmers owned other animals. The bones of the animal types not mentioned on the lists did not show signs of butchering, whilst the types on the lists did (1977: 12); thus, warning archaeologists and historians that literary sources of any type must not be taken as the exact truth to a situation.

Another problem with classifying artefacts in strict groups is that certain objects tend to be given higher status over others. Classical painted Greek pots, for example, are referred to as vases and often discussed individually as objects of art, whilst the unpainted and coarse wares are generally perceived as anonymous works, hence of lower culture and status (Shanks 1996: 31-9). It is the archaeologist and the art historian who are responsible for assigning the significance and importance to the objects, as we understand them to be today. This modern identification of the pots as objects of art can create abstract ideas about how they were understood by those who used and made them, and it is likely that the designations say more about the scholars' perception of the artefact than past value systems. Of particular importance in respect to this thesis is the fact that Roman medical instruments do not escape such categorisation either. Riha (1986) has created a classification for medical artefacts: strictly surgical, strictly toilet and those instruments that could have been used for both purposes. In general, the categorisation is useful as a means of defining the possible intended function of an instrument, as described by classical writers of medical treatment. However, it soon becomes clear that the majority of instruments could be used for a variety of purposes: medical, pharmaceutical and even non-medically related functions. The most common types of instruments are surgical/toilet instruments, which can be used for a variety of purposes. Yet, a certain hierarchy seems to have been ascribed to strictly surgical instruments because they do not have the intended dual functions as the surgical/toilet instruments and are not as common in the archaeological record. As a consequence, the dual-purpose instruments tend to be played down in their importance. For example, more articles are written on individual types of surgical instruments such as specula (Longfield-Jones 1986), uvula forceps (Jackson 1994a) and syringes (Bliquez 1984, 1994) than are on the more common instruments such as spatula and spoon probes. It is interesting that the more uncommon instruments are discussed more than the surgical/toilet instruments, which hardly ever seem to be examined in separate articles. Multi-functional instruments could have been used for surgical purposes just as often, if not more so, than the less common strictly surgical instruments. An analogy to this is that the same pattern appears in the collection of art and antiques. Rarity is equated with value, though modern values might be a distortion, or an inversion of past ideals. By looking at 17th century London delftware, some of the most valuable pieces on the market are plain white wares, though these pieces were the ones that were produced in more abundance, and as a consequence these were the ones that were looked after with less care and were used and discarded with greater frequency. On the other hand, the blue and white delftware was more expensive in the 17th century, so these were looked after with greater care, causing them to be more abundant and, therefore, cheaper in today's antiques market (Britton 1987: 116-19).

Returning to medical instruments, the prevalence of surgical/toilet instruments may be able to tell us much more about how people viewed health care and the body. Since they could have been used more for personal use perhaps this says something about individual hygiene practices, and from there more can be drawn out about attitudes towards bodily treatment (Hill 1995; Hill and Jundi 1998). Although, at the moment, the assigned category and the commonality of an instrument helps to define how it is regarded in typological discussions, more interpretation needs to be developed about the social meanings of the instruments.

1.6 Deposition of finds

The deposition of finds is also an important area in material cultural studies and one that should be examined with more care in Roman military studies. Deposition is evidently a complex process that can range from accidental to deliberate disposal regimes and even votive offerings. What recent work on the anthropology and archaeology of deposition suggests is that all modes of deposition (excluding accidental loss) were worked through culturally specific understandings of the world. How artefacts were discarded can say much about the people one is observing. In an anthropological study Moore (1982) notes that the Marakwet, an east African tribe, regards different types of dirt to be gender and age related, and the ascribed associations determined where the dirt was to be discarded. Her study demonstrates that there are intrinsic beliefs ingrained in the way this specific society observes certain aspects of their world, and these beliefs contribute to how the Marakwet understand their surroundings and social rules, for example, and this leads to how they behave within their understandings of their world. Even though she studied a contemporary group similar methods of observation can be applied to archaeological evidence as well (e.g. Hill 1995). Deetz demonstrates that in early 18th century America the colonists threw their trash outside their houses, and often just outside the door. This practice appears to change in both rural and urban areas in the mid-18th century with garbage being thrown and buried in pits, which Deetz argues to be the result of a change in mind set to more 'Georganised' practices - concurrent with new architectural and culinary orders. Deetz notes that some archaeologists argued that the reason for the change was purely functional, relating to an increase in population penetrating urban spaces and, therefore, the need to clear rubbish away from the streets. However, Deetz notes that even before this period the more highly populated areas practised discarding trash in the streets

(1977: 125-6), which seems unhygenic to modern western thought, but rational thought, or common sense, is also culturally defined (Deetz 1977: 23; Geertz 1984).

In Roman military studies deposition tends to be described in very functional terms, or often there is no consideration given to it at all. For example, articles and reports on ceramics and metalwork tend to discuss objects alone with little, or no examination of what was found with them. Recycling of metals is often used as an argument for a lower number of metal finds than one might expect, and overall this offers a sound interpretation. Nonetheless, not every bit of metal work was recycled and it is the status of those objects that were not recycled which needs to be questioned. The fort at Newstead in Scotland, for example, has a large number of pits that are argued by Bishop and Coulston (1993: 34) to be related to deliberate clearance of surplus items. Yet, there is an odd collection of items such as bits of metal, human skulls and unusual collections of animal bones, that, as pointed out by Clarke and Jones (1994: 119), are not likely to have been considered rubbish. Moreover, they note that helmets were also placed in the pits (Clarke and Jones 1994:119). Helmets have also been found in pits at Nijmegen, in the Netherlands, and are now being interpreted in the context of ritual deposition in spite the fact that they were not all in perfect condition (van Enckevort and Willems 1994: 126-7). Since both of these deposits are unusual one can probably not argue for recycling or rubbish clearance. By studying the deposition of finds it is possible to interpret more about how the soldiers viewed the world in which they lived. In the context of this study, given that medical instruments are intrinsically associated with the body, disease and wounds it is entirely feasible that they may have been discarded in different manners depending upon the beliefs of the people using the instruments.

1.7 Limitations of the study

With any historical research there are always limits to the answers to the questions that are raised because of a dependence upon the sources available. To gain material for this thesis, museums were visited that housed unpublished medical finds. Given the nature of the questions asked in this study the more traditional typological and descriptive study was not undertaken. The only descriptive elements recorded were instrument type, size and material, and a written description was provided for the more unusual tools, though this was rare, as the majority were easily recognised. As there were limited financial resources (being a foreign student without grant funding), a six-week trip to 14 museums on the Rhine and Danube was all that could be managed. Thus it was not the recording of specific typological detail of the instruments that was of utmost importance to the study, but rather gaining information about the context of the artefacts that was needed for the nature of the questions being raised. It became a noticeable problem, on account of poor archaeological recording, that the contextual information was not as readily available as had been hoped. At the same time, there was still enough information gathered to begin to answer the questions that have been raised in this thesis and not considered in previous scholarship. Despite these limitations, it is hoped that the material has been employed in this thesis in a way that generates the possibility of broadening the scope of Roman military medicine.

Having given some ideas of new approaches that can be applied, one aim of this thesis is to make a break from the more traditional typological finds catalogue and demonstrate how, by using interpretative methods, we can enhance our understanding of the Roman army and its medical care.

CHAPTER TWO

A review of classical medical literature and modern scholarship on Roman medicine

2.1 Introduction

This chapter is devoted to providing a framework for understanding what scholars have said about Roman military medicine, and to suggest possible ways in which medical care was understood by the Romans. It can probably be said, perhaps with some certainty, that many Romans were suspicious of doctors and medical treatments. One reason for this suspicion might have been the fact that there was no formalised training of doctors, allowing anyone to set him or herself up as a healer. This could mean that remedies and treatments ranged from the ineffectual and dangerous to care that was fairly safe and effective. Another cause might have been painful surgery, there being no truly effective anaesthetics. There was also the potential for far more deaths due to higher risks of infection after surgery, since there was no proper understanding of how infections were caused. The fear of medical treatment was voiced frequently by Martial, who in one case remarked that doctors were even incapable of curing a common fever: "Nothing naughtier, Maximus, was ever done by Carus than his dying of a fever. The fever too did a very bad thing. Cruel noxious fever you might at least have been a quartan. He ought to have been kept alive by his doctor" "*Nequius a Caro nihil umquam, Maxime, factum est quam quod febre perit: fecit et illa nefas. Saeva nocens febris saltem quartana fuisses. Servari medico debuit ille suo*" (Mart. 10. 77, Trans. Bailey). Martial mentions other anxieties towards medicine by complaining about doctors' practices and habits for butchering people. Twice he mentions Diaulus, a doctor who had changed his profession to an undertaker. Diaulus is described as doing the same thing as a doctor as he does as an undertaker: "*Chirurgus fuerat, nunc est vispillo Diaulus. Coepit quo poterat clinicus esse* *modo* (Mart. 1. 30). *Nuper erat medicus, nunc est vispillo Diaulus: quod vispillo facit, fecerat et medicus"* (Mart. 1. 47). Other authors of the Roman era write about their fear and mistrust of doctors. Pliny mentions that there was a general distrust in foreign doctors. When he wrote about the first foreign physician to come to Rome he explains that the physician was Archagathus, son of Lysanias, a wound specialist nicknamed the 'executioner', and the profession along with those who practised it was seen with much loathing: ..."*mox a saevitiae secandi urendique transisse nomen in carnificem et in taedium artem omnesque medicos"* (*HN* 29. 6. 12). A quote in Lucian can probably best be used to show a mixed attitude towards doctors. He says that doctors should not all be trusted, because, "unaware that you are doing the same as the most ignorant physicians, who get themselves ivory pill-boxes, and silver cupping vessels and gold inlayed scalpels when the time comes to use them, however, they do not know how to handle them, but someone who has studied his profession comes upon the scene with a knife that is thoroughly sharp, though covered with rust, and frees the patient from his pain" (Harmon trans):

> *"Οὐκ εἰδὼς ὅτι καὶ οἱ αμαθέστατοι τῶν ἰατρῶν τὸ αὖτο σοὶ ποιοῦσιν, ἐλεφαντίνους νάρθηκας καὶ σικύας ἀργυρᾶς ποιούμενοι καὶ σμίλας χρυσοκολλήτους, ὁπόταν δὲ καὶ χρήσασθαι τούτοις δέῃ οἱ μὲν οὐδε ὅπως χρὴ μεταχείρισασθαι αὐτὰ ἴσασιν παρελθὼν δὲ τις εἰς τὸ μέσον τῶν μεμαθηκότων φλεβότομον εὖ μάλα ἠκονημένον ἔχων ἰοῦ τἄλλα μεστὸν ἀπήλλαξε τῆς ὀδύνης τὸν νοσοῦντα"* (*Ignorant book collector*. 29).

In spite of the more disagreeable comments there were obviously mixed feelings in Rome about the quality of medics since Augustus gave preferential treatment to doctors because his personal physician, Antonius Musa, saved his life. To honour Musa, Augustus had a statue constructed of him: "*Medico Antonio Musae, cuius opera ex ancipiti morbo convaluerat, statuam aere conlato iuxta signum Aesculapi statuerunt*" (Suet. *Aug.* 59). According to Dio, Musa, along with the entire population of doctors were granted exemption from taxes:

"*τήν τε ἀτέλειαν καὶ ἑαυτῷ καὶ τοῖς ὁμοτέχνοις, οὐχ ὅτι τοῖς τότε οὖσιν ἀλλὰ καὶ τοῖς ἔπειτα ἐσομένοις ἔλαβεν*" (Dio Cassius 53, 50).

This exemption is mentioned in the *Theodosian Code.* It states "the reasons of equity demand that the privileges granted to you by former emperors shall be confirmed spend the rest of your lives secure from molestation of all compulsory public services" (13. 3. 10 Trans. Pharr). Further on the code mentions that there was an exemption of taxes for spouses and children of physicians and teachers (13. 3. 10). Another law says that not only were the children of doctors exempt from taxes, but that they were also excused from work (13. 3, 1-3, 8, 10). If one were to look at these sources alone it would seem as if the position of doctors was highly respected, and trusted. However, the attitudes of the satirists and other Roman writers demonstrate that there were mixed feelings in Rome about the use of traditional and 'rational' medicine, and an accurate assessment of how the majority of Romans felt about doctors is difficult to assess. If such opposition existed in Rome itself, than it is likely that there would have been disagreement about classical medical practices in provincial and military areas of the empire, where there were different cultural groups, each having their own traditions towards the treatment of the body. In spite of these feelings, Roman doctors still treated patients, treatises were written about many areas of medicine and debates continued between different schools of thought, indicating that there was more to ancient medicine than Martial and Pliny would have us believe.

Today scholars of many backgrounds have examined various aspects of Greek and Roman medicine including classical philology, philosophy, history and archaeology. From the philological and philosophical studies we have learned that there was not one school of thought on the subject, but that there were many different philosophical ideas about how diseases were thought to have originated and to have been treated. Attitudes towards dissection and vivisection were common subjects of debate as well. Archaeologists have added to the subject by identifying, in conjunction with literary sources, artefactual evidence of many surgical instruments and their functions. The descriptions of the intended use of the instruments also show evidence of a possible understanding of anatomy by those who might have used the instruments. The literary and archaeological evidence hint, and in some cases the literature makes it clear, that there was quite a lot of concern about how the body should be treated when sick, how the body functioned, and how it was to be cared for on a daily basis. Although these studies have taught us much they have also generated more questions about the subject.

It must also be pointed out before progressing further that ancient medicine was not approached and learned by the doctors of the classical era in a purely scientific, or rational manner, as one would understand it from a modern western point of view. A recent issue in the fields of anthropology, sociology and certain areas of archaeology is an examination of the way that Cartesian thought has structured modern writers' scientific practice into defining the world around a series of binary oppositions, such as male:female, nature:culture, wild:civilised and sacred:profane (e.g. Lévi-Strauss 1963, 1969). There is a growing recognition that such dualistic thinking does not have a universal validity (e.g. Johnson 1999: 101-8; Moore 1999a: 19; Moore 1999b). The reason for bringing this issue to the fore is that in some cases classical archaeologists tend to look at the classical world as being structured in such a way that religion and daily life, or the sacred and the profane, are treated as opposites. Yet, it must be questioned whether most people of that time understood their world in such polar oppositions. From what is understood about perceptions of the classical world, the sacred was incorporated into almost everything, rivers and streams for example, were thought not only to have had an associated deity, but in some respect these bodies of water were actually thought to be the deity (e.g. Burkert 1979; Morford and Lenardon 1985: 12-15). There is an important reason for pointing this out, and that is to show that some scholars of ancient medicine attempt to make divisions between what was written from a rational point of view, that is without religious overtones, folk remedies or magic, as opposed to medical practices that included these elements (e.g. Longrigg 1993; 1998). Many medical texts from the classical era seem to be written without the influences of folk treatments, causing scholars to make this division between the so-called rational and irrational; yet, even if the medical writers did not refer to divine aspects, their world was still surrounded and imbedded within the sacred (e.g. Gladigow 1995; Gordon 1995; Lloyd 1983). It is clear in the epigraphic and archaeological evidence that some Roman doctors were practicing practical medicine, a term used in this thesis to mean the basic technical areas of medicine such as bandaging or surgery, alongside practices with more religious overtones, as some altars were dedicated by doctors asking for the help of healing deities (Appendix 2, numbers 7, 8, 10, 24, 25, 29, 31, 34, 37, 38). Certain religious sanctuaries were also dedicated to healing, such as Epidauros on the Peloponnese. Amulets, charms and votive offerings of body parts also occur in the archaeological record, indicating an embedded belief that medicine and religion were intertwined. Recently a set of surgical instruments from Stanway near Colchester was found with a possible set of divining rods (Jackson 1997). These rods may imply that even the most practical surgical procedures had embedded magical practices, that might have been seen as purely 'rational', from the doctor and patient's perspective, and necessary for the treatment to be effective. Medical anthropology has demonstrated that people's perception of the healing process is embedded in their beliefs: therefore, if they believe that some form of magic or ritual was intrinsic to healing then the action becomes a necessary part of the procedure (Kleinman 1980; Landy 1977: 472-3; Morley 1978: 6; Morsy 1993: 83-4). To understand medicine in the classical world, one must attempt to erase the structural world with which we are so familiar and understand that even the 'rational', or perhaps practical, aspects of medicine were thought about and used by a culture whose belief system embodied the sacred and the profane on the same level. Even though this thesis concentrates on the 'practical' elements, such the surgical instruments that have been identified in the archaeological record, there is the potential that it is only presenting half of the picture, as only the instruments commonly recognised as having a 'practical' function tend to be discussed in the archaeological literature on medicine. However, the possible divining rods from Colchester indicate that perhaps the full range of instruments employed in the medical practice could include objects such as amulets, divination rods, curse tablets or charms.

2.2 Modern perceptions of Greek influences on Roman medicine

It is understood here that there was not a single school of thought in the classical world about how medicine should be approached. Had there been one then it would be easy to say that Roman medicine evolved from that which came before it (i.e. Greek). General introductions to Roman medicine often present it as somehow evolving from the Greek (e.g. Majno 1974: 341-2). All too often, as mentioned in Chapter 1, Roman culture is seen as a homogeneous entity, but such an idea is far from realistic because Roman culture developed from contact and interaction with many groups (Woolf 1998: 6). Interactions with many different societies would have enabled the Romans to come into contact with various philosophies on the body and its treatment, some of which might have influenced their medical skills, and others of which might have been rejected.

When discussing the history of Roman medicine it is commonplace for most scholars to begin their discussions on the history of the development of classical medicine from the Egyptians, because their practices might have had an influence on early Greek medical thought (e.g. Jackson 1988: 14-16; Longrigg 1993 and 1998; Majno 1975: 140). Although Egyptian medicine might have had an influence on Greek medicine, it is difficult to say how much of an influence it had on Roman medicine. As it is Roman medicine that is the major concern of this thesis only a brief account of the possible Greek and Etruscan influences is presented.

One cannot deny the fact that some Roman doctors' techniques and ideas about the body were influenced by certain Greek philosophical and medical texts. Two examples of the various ideas about the body come from the pre-Socratic philosophical texts by Empedocles and Diogenes of Apollonia. Empedocles believed that all things in the universe consisted of four elements: earth, air, fire and water, and these corresponded to dry, cold, hot and wet. When these were not in balance in the body then illness would develop. Galen, a medical writer of the 2nd century AD, appears to have borrowed some of his ideas of Empedocles through the works of Aristotle. As a demonstration of how beliefs differed amongst the pre-Socratics, Diogenes of Apollonia developed the concept of pneuma, something related to or equivalent to air that he felt was the source of all things (Jackson 1988: 17-18). These variations demonstrate, as Edelstein points out "Greek and

Roman doctors were not 'scientists' who applied theoretical knowledge to the case at hand on the level of common (modern) medical practice, as biological and physiological inquiries were neither presupposed, nor were they actually made" (1952: 301); indicating that there was an entirely different approach to understanding the body than we have today and that different philosophers, such as Diogenes and Empedocles, would create different theories about how the body worked. Since there was not one common means of understanding the mechanisms of the body, it means that the Romans could have been treated by doctors with different beliefs within their own society, let alone doctors from other cultures, and this would most likely apply to military personnel as well.

One Greek source that did have an influence on medical writers on the Roman era was the *Hippocratic* Corpus. It is fairly certain that the texts were not written by a single person named Hippocrates, who is thought to have lived and written at the end of the 5th century BC, because it contains a number of contributions on a variety of topics that were written in different styles, and has contradictory statements about philosophy and the approaches to medicine (Jackson 1988: 20-1). This corpus does seem to have influenced some Roman medical writers, such as Celsus for example, but how much it affected doctors who did not write about medicine in Roman times is not clear.

One debate that was significant in both Greek and Roman medical texts was the issue of human and even animal dissection and vivisection. It is not clear when dissection and vivisection were first practiced on humans, but it is certain, however, that both were being carried out in the 3rd century BC at Alexandria. The two most notable anatomists from that time were Herophilus and Erasistratus. Herophilus is best known for his dissections and vivisections (Longrigg 1998: 93; for a translation of Herophilus see von Staden 1989), while Erasistratus came very close to discovering the circulation of blood and made important advances in understanding the nervous system (Jackson 1988: 27-8; Longrigg 1998: 93). These anatomical studies made on humans were not permitted to be practised in the Roman period. However, arguments did continue for the importance of dissection and, in some cases, vivisection. Celsus argued that there was not a need for vivisection, believing it to be cruel; yet, he did believe that there was an educational value in dissecting corpses: "*Incidere autem vivorum corpora et crudele et supervacuum est, mortuorum discentibus necessarium: nam positum et ordinem nosse debent, quae cadaver melius quam vivus et vulneratus homo repraesentat. Sed et cetera, quae modo in vivis cognosci possunt, in ipsis curationibus vulneratorum paulo tardius sed aliquanto mitius usus ipse monstrabit*" (Cels. Proem 74-75). Since the Romans did not practise dissection or vivisection on humans, at least according to the literary evidence, it is again made clear that not all aspects of Greek medicine influenced the Romans.

The most specific demonstration of the ambiguous relationship the Romans had with Greek medical practice was made in 295 BC when Rome was struck with a plague. Their medicine not being effective, assistance was called in from outside, employing the help of Greek medics. It was not, however, the Greek physicians, or their practices whom the Romans trusted, rather they adopted the worship of Aesculapius. More faith was obviously placed in the Aesculapius' capability by the Romans because they built a temple to him on an island in the Tiber (Jackson 1988: 10-12). It is noted from this adoption that some of the Greek physicians were using religion in their medical practices, thus demonstrating Greek medical practice was not as rational as the philosophical texts seem to present. Contact made with the Greek physicians may have influenced some aspects of practical Roman medicine, but it is apparent from Cato that Greek medicine was not trusted by him and possibly many others. As Pliny states, Cato was suspicious of Greek doctors and believed that the introduction of Greek doctors into Rome was a conspiracy to kill all Romans, and even worse they would treat people for a fee: "*Vincam nequissimum et indocile genus illorum, et hoc puta vatem dixisse: quandoque ista gens suas litteras dabit, omnia conrumpet, tum etiam magis, si medicos suos hoc mittet. Iurant inter se barbaros necare omnes medicina, sed hoc ipsum mercede faciunt, ut fides is sit et facile disperdant*" (Pliny *HN* 29, 7, 14). Cato insisted on worshipping ancient fertility and agricultural deities as well as using folk remedies instead of trusting the Greek approach to medicine. This situation and attitude towards medical practices of other cultures were, however, quite varied. Later, Julius Caesar confered citizenship to physicians who practised medicine in Rome along with other professions to make Rome a more desirable place to live: "*Omnisque medicinam Romae professos et liberalium artium doctores, quo libentius et ipsi urbem incolerent et ceteri adpeterent, civitate donavit*" (Suet. *Caes.* 42). Caesar does not specify where these physicians were to come from, implying that it was possibly not only Greek doctors with whom the Romans came into contact.

Although practical works on medicine were written in the 1st and 2nd centuries AD, there were still people practising folk medicine, something that is evident from Pliny's *Natural History*. For example, it has descriptions of treatments that were used to prevent and ward off diseases. Although some treatments were more practical in nature, others involved the use of what we would call superstition, such as spitting to scare away evil spirits: "*despuimus comitiales morbos, hoc est contagia regerimus*" (Pliny *HN* 28, 7, 35; Jackson 1988: 1). Despite the more 'rational' Greek medical texts, it is clear that not all Roman medicine was entirely influenced by it, or evolved directly from it.

2.3. Cultural influences as opposed to evolution

As seen in the previous section there was some Greek influence on Roman medicine; however, it seems more likely that Roman medicine in the 1st and 2nd centuries AD developed from earlier Roman and Italian practices along with influences from a number of different societies. Since the Greek influence has been mentioned, the discussion shall first turn to the Etruscans. The Etruscans were a separate cultural group from the Romans, having their own language, religion (although some of their religion seems similar to the Romans), burial practices and most likely medical care (Barker and Rasmussen 1998; Bonfante 1986). The Etruscans and Romans are known to have fought, so some aspects of Etruscan society might have appeared antithetical to their own by the Romans. In the context of medicine, however, the Romans may have adapted some Etruscan practices. From archaeological evidence it seems that most of Etruscan medicine was ritualistic, using the practice of augury and divination as a way of foreseeing an outbreak of disease and possibly aiding treatment (Jackson 1988: 11). It is known that the Etruscans had contact with the Greeks, but how much of their medicine was influenced by the Greeks is uncertain. Remains of false teeth from Etruria demonstrate that the Etruscans did practise dentistry, and it is often assumed that this form of dentistry is 'rational' or practical, unlike traditionally assumed Etruscan medical practices, so it is therefore considered to have been a Greek influence on Etruscan medicine (Jackson 1988: 11). However, a recent study by a dental anthropologist has noted that the majority of the Etruscan false teeth appear to have been made for females, most are made of gold and they are usually only for the replacement of the incisors. Incisors generally do not decay until later in life, generally when someone reaches their seventies, and the tombs from which these gold teeth were found suggest their use on younger women (Becker: 1999). This evidence suggests that the gold incisors were intended for some form of bodily adornment, rather than purely medical purposes. Moreover they fade from the archaeological record at a similar point in time as the Etruscan language (Becker 1999: 110). Becker also notes that a similar practice was undertaken on Phoenician men (1999: 103), and they had contact with the Etruscans as well. It can therefore be questioned whether such treatment was a Greek influence, a Phoenician influence, or if it was an Etruscan innovation. What this new study does demonstrate is that the practical dentistry would have taken to make the teeth and extract the incisors need not have evolved from Greek practices, or if it had the practice was adapted to fit Etruscan beliefs. Becker points out that there are no archaeological examples of these in the Roman record, yet there are descriptions of them in the Roman medical literature. A possible reason for this is that such practices might not have been borrowed by Roman women because it might have identified them as Etruscans. This study also shows the use of dental prosthetics varies according to different cultural understandings. How much of an influence the Etruscans had on Roman medicine is difficult to say; however, one thing that is indicated by the negative archaeological evidence is that the Romans were obviously rejecting some Etruscan practices of which they were aware.

Iron Age cultures in northern and western Europe might also be examined for medical influences on the Roman world. Künzl asks this question when looking at the early Roman conquest of the Rhine, by examining the name of plants that were thought to have medicinal properties, surgical instruments, and buildings identified as hospitals. For the medicinal herbs, he notes that an ointment marker found at Haltern might be an indication that there was contact between the Frisians and the Romans for medicinal remedies because the name of the product was Frisian instead of Latin (1988: 187). The names of some plants used for medicinal purposes that appear in Roman records had Gallic names (Künzl 1991: 189). The names of these herbs might be an indication of contact, but whether both sets of people used them for the same purpose is not understood. To look at this aspect more closely medical tools were examined from the early Roman military sites in Germany (Künzl 1991: 189-96). No clear typologies of instruments exist for the classical world until the 1st through 3rd centuries AD. Before this time there is not much documentation of instrument types, and the archaeological record is slim. By looking at the tools from the sites of Augsburg (although, a fortress has never been found), Haltern and Dangstetten, Künzl notes that the instruments are different from those that are known to date before the military occupation, and he argues that the military instruments were either reshaped on existing designs, or that they were new designs (1991: 196). It is possible the military units were the cause of these changes in design because they do not resemble local Iron Age instruments found in the area. The military at this time would have included many more Italian units, so they could have been bringing Roman styles of tools with them, whilst local instruments could have been of different designs.

Iron Age instruments from Germany and Hungary are rarely found in the archaeological record, but those that are recorded are not similar to Roman designs. For example, Navarro (1955) mentions two graves of the Middle La Tène period (2nd century BC), that contained medical tools. Both graves are fairly typical of the time since they are found with military items, the only exception is that they were also found with medical tools. One was a cremation grave found in Munich-Obermenzing. Found with the three instruments were a knife, which might be medical, a razor, arm ring, shield-boss, spearhead and a sword with a scabbard (Navarro 1955: 231-40). The three medical instruments are all made of iron, unlike the copper-alloys used by the Romans. One instrument has been identified as a cautery and probe, but it has not survived in the best of conditions. The other two survive in much better condition. One is recognised as a double instrument. It has on one of its ends a flat surface with a small hook, identified as a wound retractor. The opposite end is unlike any classical instrument, having a loop made of double wire that runs through two collars. The wire could be tightened and is thought to have been used to snare bodily growths and aid in their removal. The third instrument is identified as a trepanning saw, but it is not circular like the classical varieties (Navarro 1955: 243). The second set of La Tène finds comes from Baranya in Hungary. It, like the grave from Munich, was found with a spearhead. There are eight instruments in the set, but they are different in their design from those in Munich. They are also unlike classical instruments because they have hooks and loops on their ends. Navarro points out that it is argued in the earlier literature relating to these finds that they were imported from the Greek world, but there are no parallels used to demonstrate this assumption. It is known that these Iron Age cultures did have contact with the Greeks (Collis 1984; Navarro 1955: 244); however, there is no evidence to say that the instruments are Greek. One thing that might be indicated is that these two Iron Age groups might have had different surgical practices, implied by the variation in instrument design. Perhaps the people who used these tools had different specialities. It is possible that these instruments indicate different cultural medical practices, and hence that there was not just one tradition of medicine in the Iron Age. Furthermore, such practices could have been carried down and used by these people during the Roman period and could have been practised by different groups of soldiers. Yet, more evidence is needed from the Roman period to state anything with certainty.

The only set of instruments from the Roman imperial period with a possible Iron Age design is from Colchester, Essex (Jackson 1997). The instruments, with the exception of one Roman style spoon probe, have different designs from the typical Roman sets of instruments. Like the instruments from Germany and Hungary seven of the Stanway instruments are made of iron, whilst the others are similar to Roman instruments, as two are a composite iron and copper alloy and four are made of bronze (Jackson 1997: 1471). These instruments are not entirely similar to those Iron Age types discussed above. The archaeological evidence for cultural variation in Iron Age medicine may well be more plausible by the variation seen between the Hungarian, Bavarian and Colchester instruments. It is difficult to say with certainty from where the influence for the instruments derived; they might be seen as an amalgam of different Iron Age, Greek and Roman traditions. Even though the spoon probe from Colchester indicates some Roman influence, it cannot be said whether it was used for the same purposes by both groups. When the army came into contact with different groups of people, and Roman settlements were established in new areas, then it is quite possible that both groups would have introduced new ideas to one another.

Thus far, it has been demonstrated that Roman medicine was far more than an evolutionary development from Greek medicine. First of all, there could have been influencing practices on the Romans from groups who lived in Italy before the Romans. There would also have been contact with different groups other than the Greeks whose traditional remedies were likely to have influenced Roman doctors, who could have drawn upon various understandings and practices of medicine.

2.4 An overview of some medical texts dating to the Roman era

The Roman medical writers who are described in the following discussion are those who explain a more practical approach to medical treatment and tend to leave out discussions of folk remedies, magic and religion. Their works are useful in the context of an archaeological approach because they often explain the intended medical function of the instruments and how they were to be used in certain procedures; consequently their works have been examined by scholars concerned with identifying the function of medical tools (e.g. Bliquez 1984, 1994; Jackson 1993, 1994a, 1994b, 1995; Künzl 1983, 1996; Meyer-Steineg 1912: Milne 1907; Tabanelli 1958). Such sources also provide useful insights into Roman ideas about how the body should be treated. It is possible that the books were available for any student of medicine living in the Roman era, especially if she/he had visited one of the large medical libraries at Alexandria or Kos. However, simply because such opinions were written does not imply that they were required reading for anyone interested in becoming a doctor.

One of the main texts used in this thesis is the treatise on medicine by Cornelius Celsus. He wrote eight books on the subject of medicine, and it is the seventh book of his corpus that mentions the function of a number of instruments. In addition, book eight describes bone operations and the tools required for it. Although Celsus was probably not a doctor, his work does provide some ideas about the main issues in medical discussions of the time, especially that of dissection and vivisection.

Rufus of Ephesus, who wrote during the reign of Trajan, and Aretaeus of Cappadocia, a contemporary of Galen, also describe instruments in their treatises on medicine. Rufus mentions known instruments, but Aretaeus discusses instruments not mentioned by any other author (Milne 1907: 3).

During the reign of Trajan, Soranus of Ephesus wrote a treatise entitled *Gynaecology*. In it he describes medical instruments made specifically for examining females and for delivering infants (Milne 1907: 3-4; for a translation see Temkin 1956). His work is important to military medical care because the presence of gynaecological instruments might be used as an indication that men were not the only people being treated on the frontiers by military doctors.

Galen wrote many books on medicine that cover a variety of topics such as prognosis, anatomy, respiration and surgical procedures. He also borrowed and discussed ideas from many philosophers who discussed the functions of the body. For archaeological identification, some of his texts have descriptions of which surgical instruments were to be used in certain treatments (Majno 1975: 395-416; Milne 1907: 3).

Oribasius, who lived in the 4th century wrote an Encyclopaedia of Medicine entitled *Συναγωγαὶ Ἰατρικαί* or *Collectiones Medicae* of which a third survives. He also wrote a book on first aid, Εὐπόριστα. His works have recently started to be regarded with greater interest because he included information of writers whose work does not survive today, some of which describes instruments not mentioned in easily available sources (Bliquez 1984: 120-21; Milne 1907: 4).

In the 5th century AD Caelius Aurelianus, a Numidian, wrote on acute and chronic diseases. He also translated some of the works of Soranus. Included in his translation are a number of observations that do not survive in the original Greek and are known about only through his translations (Milne 1907: 4).

In the later Roman period, both Aetius and Paul of Aegina compiled the compositions of earlier writers. Aetius wrote a treatise on medicine in sixteen books of extracts that are the only surviving examples of some other writers' examinations. Paul wrote seven books on the subject. It is the sixth book of his compilation that is most essential to the study of surgery and instruments (Milne 1907: 4, 6).

For further information concerning Greco-Roman medical care one can consult Arab writers who preserved earlier works from the classical medical texts. The extracts of Albucasis of Cordova, who lived in the 12th century, are mainly from Roman sources and describe instruments that were to be used in certain procedures (Milne 1907: 8; for a translation see Spink and Lewis 1973). There is always the possibility that Albucasis may have mis-read or copied information incorrectly, so as it is a later source, caution is advised when using the text.

Milne mentions three Renaissance writers who also wrote about surgical instruments (1907: 8-9): Ambroise Pare (1509-90), Scultelus (1650) and Heister (1739). Their works introduce new instruments for their time, but some are direct copies of classical ones. Although these later descriptions are sometimes useful, caution must always be taken when looking for a description of an implement, as their design and/or use might have altered.

The medical texts mentioned above provide information about medicine in general, and the uses of surgical tools in particular. In order to gain a better understanding of the more specific issue of military health care sources that consider daily life in the army should also be consulted. Vegetius' *Epitoma rei militaris* is useful in regard to explaining expectations of health standards for recruitment and hygienic conditions in fortifications. Since Vegetius wrote during the 4th century it is possible that his work might have been influenced by the military practices of his time; nevertheless he did borrow many ideas from the time of the emperors of Augustus, Trajan and Hadrian, so, with caution, his works can shed some light onto the subject at hand. The tablets from Vindolanda, on Hadrian's Wall, and papyri fragments from Egypt also present some small clues about how medical treatment might have been provided. Since there are no ancient sources that specifically cover the medical system in the Roman military, by using what is available in combination with more general treatises on medicine, and archaeological information, one can make more informed judgements about how medical care was offered to the Roman soldiers.

2.5 Modern scholarship on Roman military medicine

There has been much interest generated in the subject of Roman military medicine over the last 250 years or so. J. Y. Simpson (1856) conducted one of the earliest studies on the subject in the 19th century. He wrote a response to an English translation of an anonymous 18th century French writer's views on the subject (1750: 287, mentioned in Simpson 1856: 5). The anonymous writer believed the Roman army was not equipped with doctors, or any form of medical aid (Anonymous 1750: 287, mentioned in Simpson 1856: 5). Simpson redirected this course of thinking by questioning the French writer's premise, pointing to both literary and epigraphic sources that proved the army was prepared to handle medical treatment. One of the most convincing quotations Simpson used to support his thesis is from the *Scriptores Historiae Augustae*, (Aurelian 7. 8) that advocates "each soldier should be able to be cured for free by physicians": *a medicis gratis curentur*, implying that a medical service, or at least doctors, were made available in the army. Furthermore, Simpson found confirmation in the *Corpus Iuris Civilis* of Justinian that states that the doctors from the legions were exempt from civil duties when they were absent in the public service: "*cum te medicum legionis secundae adiutricis esse dicas, munera civilia quandiu rei publicae causa abfueris, suspicere non cogeris. Cum autem abesse desieris post finitam eo iure vacationem, si in eorum numero es, qui ad beneficia medicis concessa pertinent, ea immunitate uteris*" (10 Tit 52 p. 855, as quoted in Simpson 1856: 7 note 3). In the case of legionary units, this law demonstrates that doctors did exist (Simpson 1856: 6-7). An inscription from Housesteads of a *medicus ordinarius* (Appendix 2, number 39) demonstrates that treatment was also available to auxiliary units (Simpson 1857: 17-8). These two sources, along with other primary historical literature and inscriptions, helped Simpson to confirm his thesis that there was some form of medical assistance provided to soldiers in the Roman army.

Subsequent studies were made in the earlier decades of the 20th century that expanded upon Simpson's work, examining other aspects of Roman medical care. Some of the studies mentioned medical care for the army amongst general reviews of Roman medicine, whilst others concentrated specifically on the particular aspect of the military. In an overview of how soldiers were ranked, Domaszewski included inscriptions of doctors in his study to determine their position in the army and came to the conclusion that all legionary units were equipped with a *medicus* (1908: 45-7, 50-1). Haberling described what he believed to be the differences between the care offered to the soldiers living during the republican period compared to those living in the imperial period. Overall, he thought medical organisation was arranged more systematically in the imperial period, and that more doctors were employed to help the soldiers (1910: 4-12). In a broader study, Meyer-Steineg started his discussion with a history of early Roman medical practice and treatment, which was based on folk remedies, before the introduction of Greek medicine to Rome (1921: 99-103). It is interesting to note that even this early on scholars were insisting that Roman medicine had somehow directly evolved from the Greek. Following the historical introduction, he continued to discuss Roman medical writers and places for the treatment of the sick (1921: 114-4). Writing on doctors, Gummerus (1932) collected information on all the inscriptions available at the time, both military and civilian, to show the prevalence of medics in the Roman empire. These studies added to and complemented Simpson's argument, but they still left a number of unanswered questions about treatment in the army that archaeologists attempted to solve.

Although archaeological studies have added information to the study of military medicine, one must apply discretion, as with the literature, when using some of the earlier archaeological examinations because many of the archaeologists who wrote about certain aspects, especially the hospitals, served as soldiers in the two World Wars. They offered their experiences in the military to explain how the daily lives of Roman soldiers functioned. Although it is helpful to make analogies, these can be anachronistic, as the soldiers of the 20th century would most likely have had an entirely different experience to that of the Roman army. Frequent battles in the two World Wars led to the need for a well-organised system of medical care. Some Roman soldiers, on the other hand, might not have participated in much, if any, military action during their twenty-five years of service, which could have had effects on the way treatment was provided. Furthermore, many of the early archaeologists assumed that it was only rational that the systems should be the same, and what may have seemed rational to the archaeologists might not have been to the

Romans. Far too often these anachronistic ideas are accepted without question and they seriously affect the critical study of medical history.

Such acceptance can be seen in the scholarship of the 1950s and early 1960s. During this time some general works were written about the subject, but again they did not offer much in the way of new interpretation (Richmond 1952: 2-6; Penn 1964: 253-8). Richmond mentioned how he believed the doctors might have been ranked and organised. According to him, Roman inscriptions provide information about two kinds of doctors, *medici ordinarii,* who he thought were ranked orderlies, and *capsarii*, who were wound wrappers. Both types, Richmond stated, were exempt from daily fatigue duties (1952: 2); yet he does not provide more information about how he came to this conclusion. Penn, on the other hand, looked at the literary evidence to certify the existence of military health care and to see how it may have been organised. He argued that each legion had a doctor, but was concerned with their rank in comparison with the military today (1964: 255). His paper makes many assumptions about the system and his un-critical reading of the evidence led him to determine that there was a "highly efficient medical service that was greatly in advance of anything that succeeding civilisations produced until quite modern times" (1964: 257). These two papers exemplify how assumptions were created based on very little evidence, but have been carried over into more recent scholarship.

In the late 1960s greater interest arose in the topic, and an argument developed between Scarborough (1968 repeated in 1976) and Nutton (1969) about the organisation of medical care in the army. The arguments presented by both were more specific than the assumptions previously made by scholars. Scarborough asserted that only the upper ranks of soldiers received treatment, whilst the majority of those in the lower ranks were forced to depend upon help from their fellow soldiers. He also maintained that when medical care was provided it was given so the soldiers could heal quickly and return to battle in a very short period of time (1968: 255; 1976: 67). Nutton disagreed with Scarborough for three reasons. Whilst Scarborough argues that medical care was only provided to the upper ranks, Nutton argues that the doctors were arranged in corps of medical surgeons who were distributed throughout the army (Scarborough 1968: 257). Moreover, Nutton believes that there was an organised system made available to all the soldiers (1969: 261-2). Secondly he criticises the evidence used by Scarborough for the republican period, as it is too scattered and there is not enough to make any firm statements about whether or not the Hellenistic system had been adopted (1969: 261, 267). Finally, he sees the lack of detailed discussion over the epigraphic evidence as a problem (1968: 270). In the end, whilst Nutton demonstrates where Scarborough has made some invalid points, he mainly points to the fact that doctors were available to the lower ranking soldiers in both legionary and auxiliary units, and he suggests ways to advance the knowledge of military medical care by looking at the evidence of inscriptions in closer detail.

Callies (1968) looked at the names of the doctors found on inscriptions to attempt to understand their ethnic identity. During the same time Davies examined more specific aspects of the subject. He is generally in agreement with Nutton in that there was some form of health care organisation, and he used the primary literary and epigraphic evidence to expand upon the area to determine details about the rank and order of military medical staff (1969b; 1972; 1974; 1989). Davies concentrates on the principate, as he expressed the opinion that the system was not organised properly until Augustus was emperor and sent a large number of troops on campaign (1969a: 83). He also examined the sanitation, diet, recruitment, *valetudinaria* and some information about surgical instruments to attempt to interpret more about the military's approach to health care. Although Davies' papers on the medical service are extensive, he does not look closely at the archaeological evidence, particularly that of the instruments, to determine the calibre of the doctors' skill and the care they were able to provide.

The information from Davies is often discussed by scholars who have looked at Roman medicine from a broader perspective (e.g. Jackson 1988; Conrad et al 1995; Dolmans 1992), yet it was not until Wilmanns (1995a & b) that the work of Davies was expanded upon, questioning his interpretations. (More specific aspects of her work will be mentioned throughout the thesis, but especially in chapter 4.) In *Der Sanitätsdienst im Römischen Reich,* Wilmanns closely examined the organisation of medical treatment in the army through epigraphic material relating to medical personnel. Like Davies, she used the inscriptions to question the rank of the doctors and made comparisons between auxiliary and legionary units. However, to help with this comparison she also examined the size of buildings identified as hospitals to see if there was a need for the same arrangement of medical care between the unit types. She concluded that there were more medical and administrative personnel in the legions, whilst the auxiliary units were most likely provided with a single doctor, or minor health care workers, such as *capsarii* and *marsi* (1995b: 116). Unlike other scholars, Wilmanns also looks at the idea of Romanisation; however, she only examines interaction from the Roman perspective. Although she admits that folk remedies would be present, she argues that Roman medicine would have become the main means of treatment in the Roman army in the 2nd and 3rd centuries. In summary she states that the legions were better equipped for the provision of health care than the auxiliary units.

Overall studies of the Roman army tend to agree that the legionary units were provided with a well-organised medical service, whilst the auxiliary units had medical care that was not on the same scale as that of the legions (e.g. Bidwell 1997: 71; Johnson 1983: 159; Webster 1969: 248-54; Wilmanns 1995a, 1995b). In spite of scholars being aware of the provision of doctors for the soldiers, it was the studies of Davies (1969; 1970; 1972) and Nutton (1969) that seem to have initiated the idea that the organisation of medical care was done on a similar, if not the same manner, for every unit throughout the frontiers. Such ideas are continued and reinforced in Wilmanns; although she points out that there would have been varying degrees in the size of the medical staff in accordance with the size of the unit. On a general level there would have been some uniformity throughout the units, such as the arrangement of the soldiers' ranks and the unit types (e.g. the cavalry and infantry) being homogenised. This said, certain aspects of each unit might have been organised and functioned differently, which is evident in the fact that many auxiliaries were allowed to retain their own ways of fighting (Saddington 1997: 493). With other aspects of the army, such as medical care, rigidly institutionalised organisation is expected by scholars, but this underlying supposition is open to question.

2.6 Conclusion

From the preceding discussion it is evident that certain expectations about medical care in the Roman imperial period are open to question. The topics of the distinction between the sacred and the profane and the evolutionary idea of Roman medicine demonstrate that there were, at that time, many ways that medicine could have been influenced by different cultural values and ideas. Since there were various means by which doctors could have learned their skills, this could have affected the way that practices were applied in the army. However, scholars assume that the Roman army was a homogeneous group of people, and that soldiers would have experienced the same treatment, regardless of whether they were legionary, or auxiliary soldiers in any unit throughout the empire. This assumption is the foundation on which most of the previous scholarship about military medical care is based. In the following chapters the entrenched understanding that the Roman army had a uniformly organised system of medical treatment will be critically assessed. By questioning the established preconception, one can note whether there is enough evidence to support the belief of an overall system of military provision, or whether there is evidence for a localised system of organisation, which might then show variations in the way medical treatment was arranged.

CHAPTER THREE
Discussing the area of study

3.1 Why the western frontiers?

Before inquiries are made into the questions asked in the previous two chapters about medical care in the Roman army, reference is given to the particular area being studied. Ideally it would be best to look at all of the Roman fortifications located throughout the empire that have artefactual remains relating to medicine, but such an undertaking lies beyond the time, finances and scope of this thesis. Therefore, the most pragmatic approach is to analyse a selection of fortifications from specific frontiers to make a comparison of medical care between unit types and areas. The areas selected for the study were the frontiers of Germania Inferior and Superior, Raetia, Noricum, Pannonia Superior and Inferior and Britannia, modern-day Netherlands, Germany, Switzerland, Austria, Hungary and Britain. They were chosen over the provinces of Africa, Egypt, Asia Minor and the lower Danube because they seem to appear to have similarities in military organisation, as seen in the arrangement of their frontiers, the construction of their military buildings, as well as in the organisation of supply system (Drummond and Nelson 1994: 43). For example, the arrangement of the frontiers in the north-western provinces has a continuous line of auxiliary forts interspersed with watchtowers, unlike the African frontier which has large gaps of a couple hundred kilometres between sections of fortifications (Whittaker 1994: 78-81). The lower Danube was not examined because of difficulty in gaining access to some of the sites, and because the Dacian frontier is also dissimilar to those on the upper Danube and Rhine, consisting of a row of watchtowers with very few fortifications. Since it is generally assumed that units stationed in areas sharing similar physical arrangements of structures had military systems functioning in the same manner, such as medical care and food supply, the possibility of variations in the organisation of such aspects is never challenged. Similarities in the system are believed to have been a necessary component for controlling a large army spread across thousands of miles of frontiers (e.g. Drummond and Nelson 1994: 33). In spite of this assumption, each of these apparently similar areas has obvious differences in the way the frontier was demarcated. For example, Britain had Hadrian's Wall with fortifications attached to it and parts of Germania Superior had its frontier marked with ditches and wooden palisades. Since there are obvious differences in the construction of each frontier, it begs one to consider the possibility that if certain aspects of similar frontiers were not exactly the same then perhaps this variability spreads to other sectors of the military as well.

The main reason why Egypt, Africa and Asia Minor were not chosen is because variations in military organisation are noted and expected more frequently than in the northwestern provinces. For example, the gaps in the African frontier are argued to have been made to allow for transhumant tribes to continue with their traditional lifestyle of herding animals (Raven 1993: 13, 77). This could be contrasted with Hadrian's Wall, which did not have gaps to allow for people to cross between Roman and non-Roman territory with as much ease as in Africa, rather it had gates within mile-castles that allowed for even more controlled traffic over the borders. This distinction is based on modern understandings that the relationships between the Roman army and the native populations might have been different within each of the major regions within the empire (e.g. northwestern Europe, Africa, Egypt and Asia Minor). Climatic variations could also be a reason for the organisation of the army to be modified according to a specific area. In medical care, for example, it is understood that there were medical specialists called *marsi* (CIL VIII 2618 + 18096; CIL VIII 2564 + 18052 = ILS 470; AE 1917/8, 29) who cared for snakebites and scorpion stings. These specialists are only known to have been recorded on inscriptions from Africa most likely because afflictions related to scorpion stings and most snakebites are not expected in the northwestern province (with the exception of some snakes, these creatures do not generally survive in colder climates). Such a medical specialist would not have been needed in the northwestern provinces, making the organisation of medical care different from that in Africa. Military events also show distinctions between the provinces in the northwest and those in the south and east. Generally events that occurred in Africa and Asia Minor rarely had direct effects on the arrangement of the frontiers in the northwest; although sometimes troops were removed to help with wars in the East, physically the northwestern frontier was not affected. On the other hand, military events that took place in one province of the northwestern frontier often had repercussions on a neighbouring province, which can be seen in the arrangement of continuous lines of auxiliary forts along the Rhine and Danube. By looking at provinces with similar military activity, climates and relationships with indigenous populations one is better prepared to ask how the medical care system was made available to the soldiers, whether it was done on an empire wide basis, or provincial basis. The aim of this thesis is, therefore, not to delineate variations in medical provision between regions where marked environmental differences would dictate different kinds of care and treatment (e.g. Africa versus Britannia). Rather by studying environmentally similar regions, it is hoped to show how organisational and cultural factors played their part in contributing to regional variations in medical provision.

The location of the fortifications was also an important consideration in choosing the area of study. Only fortifications located on the front lines of the provincial frontiers are to be discussed. Some reasons for this were financial and the availability of published material.

The frontier fortifications were also chosen because they would have been used for similar purposes, such as watching over the borders of the empire, or being active in defence. In contrast to this, military sites located in the interior of the provinces, such as Siscia in Pannonia Superior, would have served different functions, such as policing the interior of the province. The provisions of many things, including medical treatment, might have been offered in a different manner in comparison to the fortifications on the outer edge of the frontier. The only place where interior legionary fortresses were considered was in Britannia because the fortress of York was the closest to Hadrian's Wall, and Chester and Caerleon were built near auxiliary forts in what is now Wales. Though the fortresses in Britannia seem to be interior fortifications they are still fairly similar to those on the Rhine and Danube, which were generally placed slightly behind or directly on the frontier line.

The argument here is that there were differences in the provision of health care in the northwestern provinces. However, it is necessary to ask what is it in these areas that could have contributed to the variations. It might be affected by the specific historical events of the province, the relationship between the soldiers and the natives, or even the differences in the cultural backgrounds of the soldiers' units.

3.2 Defining the word frontier

So far the term frontier has been used rather loosely. In this thesis it is used to designate the fortifications on the fringes of the Roman empire. In spite of this simple explanation of the location of the frontiers, there is a considerable amount of debate about the actual meaning of the terminology. The definition of what constitutes 'a frontier' is not the main concern of this study, yet, it does require some discussion since it can reveal ways the

Romans might have viewed the frontiers, which would have dictated their behaviour towards interaction with people living near, on, or beyond the lines of fortification. Another issue that needs to be pointed out is that different units of soldiers might have had different views of the frontiers and the indigenous population living near them than the Romans since the soldiers came from other areas of, or beyond, the empire. Since soldiers in individual auxiliary units tended to come from similar cultural backgrounds (though there would have been changes through time) their cultural beliefs and understandings of other societies would have an impact on their relationships with those whom they interacted. The interaction could have affected the manner in which ideas, including medical treatment, were passed between groups.

On one level, the frontiers can be understood as a physical marker such as the border of the Roman empire, or maybe a division between Romans and non-Romans. On a more complex level though, it is often forgotten by those who study the Roman frontiers that they were not simply lines of fortifications, but a complex matrix of people interacting and influencing one another. Since the human element to this study is frequently not considered, or if it is considered it is done so in a rather simplistic manner such as in terms of the 'Romans' and 'others', it leads to an oversimplification of the understanding of what the Roman frontiers were.

One reason why certain aspects are not studied or questioned is because scholars in the 19th century set a general precedence for the way the subject is examined and understood. In general, the study was introduced by scholars attempting to define the meaning of other frontiers such as the American West, or the Imperial British frontier in India. Often these scholars' understandings of their frontiers were directly related to their perception of the

Roman frontiers (Whittaker 1994: 1-10). Basically, all of the frontiers were described as being a division between the civilised and the barbarian (Whittaker 1994: 2). The American frontier was not described entirely as a division between the two peoples, but rather 'the meeting place between savagery and civilisation' (Turner 1893; Whittaker 1994: 5). The British did not see their frontiers as a meeting place, but as a division between the civilised and the barbarian (Whittaker 1994: 5). French scholars defining the Roman frontiers saw them not only as natural division such as mountain ranges or rivers, but as Gautier stated in the context of the southern mountains in Algeria, as being used by the Romans to demarcate their territory with what lay beyond as '*un autre monde*' (1952: 211-12; Whittaker 1994: 4). This other world was made up of people who were described by Gautier to have been uneconomical and uncontrollable. These examples demonstrate two important points. The first is the assumption that the Romans were somehow of the same mind set as those who were fighting on the 19th century frontiers. The second is an ethnocentric view that places the Romans in a completely opposite, and in the 19th century scholars' definition, more civilised position, than that of the indigenous population located on or near the frontiers. Their descriptions of the frontiers are also structural in nature, in that they point the Romans as viewing the people living beyond the frontiers as completely 'other'. In some respects it is likely that the Romans did view other cultures as radically different, as Hadrian's biographer states his wall in Britain was built to divide the Romans from the barbarians: "*qui barbaros Romanosque divideret*" (SHA. *Hadr.* 11. 2); but in other respects the archaeology, as shall be described in the following chapters, demonstrates the possibility that such oppositions were not that strong. Therefore, the 19th century descriptions may be anachronistic in this definition, as the term is defined in an embedded view of binary opposition that has developed out of more recent frontier expansions.

Nineteenth century imperial views are still an inspiration for many frontier scholars. One would expect such attitudes and ideas to be implicit in earlier studies of the subject, and indeed such ideas are demonstrated in the earlier frontier's conference lecture series of the 1950s and even 1960s. Unfortunately, however, new methodology rarely seems to be introduced into Roman frontier studies (evident in the latest publication of the 1995 *Limes* conference: Groenman-van Waateringe *et al.* 1997). One representative case is a paper on the site of Sewing Shields, a turret, located on Hadrian's Wall. This site has been interpreted as being abandoned by Roman soldiers in the 3rd century, though there is evidence that after its military abandonment it was still being used as a place for metalworking. It is argued that the metal workers were from the indigenous population living in the area, rather than the soldiers because "the general atmosphere of the site was one of industrial squalor, rather than military neatness" (Allason-Jones and Dungworth 1997: 318). This strongly implies an ethnocentric attitude about the Romans being more advanced than the locals who were somehow incapable of doing things in the ordered manner of the military. This assumption automatically rules out other means of interpretation. For example, the metalworking may well have been carried out by a military unit who found the abandoned site an ideal area to work; why it had to be done in an area of "military neatness" shows assumptions made about the soldiers in comparison to the locals. On the other hand the term "industrial squalor" seems to imply that if it were natives using the site, then they were somehow less organised than the military, again pointing to some rigidly held ideas about the indigenous population compared to the Romans. There is an idea that the native population in the north of Britain was somehow even less 'sophisticated' than the native population in the south of Britain (Webster 1969) and this has had a direct effect on the way scholars have divided the archaeology of the

Romans and the natives. Even Whittaker, who points out this ethnocentric attitude in frontier studies, does not escape viewing them in the same manner. He says that the empire stopped where it did because those who lived beyond might not have been capable of supporting an army, pointing out that they were almost too poor to fend for themselves, let alone the Romans. Since these people are regarded as being poor, Whittaker argues that they were beyond the scope of the Romans to civilise (1994: 97; 113-4; 123-4). Such perceptions stultify many efforts to understand the more complex situation of how the Romans interacted with other groups of people and understood their frontier zones.

3.3 Roman views of the frontiers

In an attempt to move away from these more traditional studies, it is necessary to try to understand how the Romans perceived the frontiers and those societies that lived on them. For the Roman view, Dyson argues that during the republican period "Rome was a society of frontiers" (1986: 7), meaning that the Romans did not understand their empire to have permanent boundaries. The fortifications where the soldiers stopped were only temporary and would be used as starting points for the next campaign to expand their territory. Whittaker (1994: 11) disputes this arguing that even though the Romans probably did perceive their empire as never-ending, paradoxically they were also committed to having visual limits in their society. Statues of Janus, a god with a face on both sides of his head, were used to guard exits and entrances concurrently, and to define territory. Laws also existed for demarcating and protecting land. The intangible contradiction of expansion and borders is expressed in their mythology, manifested in the symbolism of the two gods, Iuventas and Terminus, who were associated with Jupiter and personified expansion and boundaries of law and order respectively. To simplify a complex situation, Iuventas is symbolic of expansion into areas that have not been affected by Romans, whilst Terminus represents Roman order and control on an area that has been added to the empire. Thus it is not physical boundaries, but boundaries created in areas that are practising Roman law that are important. The dichotomy, according to Whittaker, demonstrates how expansion cannot be approached without providing some form of administration through laws (Whittaker 1994: 10-11). Yet, this description does not consider the attitudes of the native people living in the frontier territory, as Whittaker assumes that the Roman laws were adopted by all groups and were understood in a Roman manner. Even in areas that were technically under Roman control, it is clear that some native populations in Britain did not always adopt a Roman lifestyle, as seen with their continued use of Iron Age-style round houses (Clarke 1999; Hingly 1999). Perhaps Roman laws did not prohibit people, in some cases, from living in the lifestyle to which they were accustomed. Thus, the attitudes of the indigenous population should be considered.

It is obvious in contemporary Roman literature that there was a belief in Roman society that they controlled the known world. Before and during Augustus' reign, one of the main objectives of Rome was to attempt to conquer the known world. This idea is supported in Augustus' *Res Gestae,* where he states that he conquered more territory and brought it under Roman control stating "I extended the territory of all those provinces of the Roman people, on whose borders lay people not subject to our government": *"omnium provinciarum populi Romani quibus finitimae fuerunt gentes quae non parerent imperio nostro fines auxi"*(*RG* 26). The idea of *imperium* without limits is even seen in Roman poetry. In the *Aeneid*, Virgil mentions "*imperium sine fine"*, or an empire without an end (1. 278). The poetry of Tibullus, a late 1st century BC elegiac poet, proclaimed the glory of a never ending Rome in his fifth poem, where he mentions Romulus not yet forming an eternal walled city, "*Romulus aeternae nondum formaverat urbis moenia*" (5. 23), but this tends to imply temporal longevity rather than spatial expansion. Livy, too, mentioned this belief in his history, as he asks, "who could question a city founded on eternal growth": "*Quis dubitat quin in aeternum urbe condita*" (4. 4. 4). All of these statements demonstrate that most Romans, at least in the late republic and 1st century AD, could not imagine a boundary to their empire, or a limit to the time in which their empire was to survive (Whittaker 1994: 11). However, these sources were most likely written with a political bias, so whether these sentiments were honestly felt by the majority of people is open to question. Whittaker argues that the Romans basically understood everyone to be a Roman citizen, rather than being entirely separate. Regions outside the Roman world were viewed to hold people living in an area that was awaiting Roman law and order, but at the same time believed the area and the people to be somehow part of the Roman empire (Whittaker 1994: 20). If this is a fair statement of the Roman perception of the frontiers, then it shows that perhaps things were not visualised in a strict oppositional manner - civilised:uncivilised, familiar:other.

3.4 Why were boundaries created?

Having established that the Romans, at least in the 1st century, perceived their empire to have no boundaries, one can then ask why there were boundaries and more importantly why they stopped where they did? Mann argues that the army did begin to slow their attempts to expand their territory and areas of control in the 2nd century, and the lines of military advance became smaller and even complacent lines of fortification, unlike the situation in the 1st century (1974: 512). One explanation for the instigation of this change in attitude might have come very early on when Varus lost three legions in the Teutoburg forest in AD 9 to a German attack. This disaster was a demonstration that the Romans were not invincible. After the event Augustus warned Tiberius not to continue his expansion across the Rhine, by saying that the empire should be left within its boundary stones, "*addideratque consilium coercendi intra terminos imperii*" (Tac. *Ann.* 1. 11). It is more likely that Augustus had not intended for Tiberius to stop his campaigns entirely; rather, it is possible that he wished for him to wait a short time to allow for the situation to calm down, and then proceed with the expansion. In spite of the warning of Augustus, Tiberius sent Germanicus into Germany, and later Gaius, Claudius and the Flavians led campaigns near, or across the Rhine. The expansion that continued during and after the reign of the Flavian emperors was more permanent in nature, as demonstrated by the construction of fortifications in stone. In the Flavian period fortifications were constructed on the eastern side of the Rhine, but the expansion was not as ambitious as it had been during the reign of Augustus. Moreover, the fortifications were constructed in more substantial materials of stone and concrete, rather than wood and turf, indicating a greater permanency to their frontiers. In spite of this, the borders of some of the frontiers were moved even farther to the north, in the case of Britain and Raetia, and to the east in Germania Superior in the 2nd and 3rd centuries. This movement shows that even though the change might have been slower than in the 1st century there was still movement on the outer edge of the frontiers. Mann argues that the soldiers were forced into becoming settled because they were not continually encouraged to go on campaign. Nonetheless, there were battles being fought in other areas of the empire, so it is more likely that the emperor concentrated on specific regions, allowing for others to remain peaceful. It also seems likely that as the Romans gained a better awareness of the size of the continents of Asia and Africa, they began to see the improbability of their aim, causing the frontier lines to acquire increasing definition (Mann 1974: 512; Whittaker 1994: 85-97).

Economic and social changes are argued to have contributed to the frontier becoming permanent (Whittaker 1994: 85-97). Whittaker believes that many of the frontiers correspond to the limits of cultivation. Clearly the supply of food is very important to any army. Even though there were supplies delivered to the soldiers from throughout the empire, it can be expected in an age when travel was unpredictable that the army would have needed to be in an area where food and supplies were easily available in case of an emergency. Whittaker points to the Antonine Wall in Britain where he feels that the natives within the region were not able to produce enough supplies for the soldiers, causing the army to return to Hadrian's Wall. (1994: 97). Yet, as mentioned earlier, this is somewhat of an ethnocentric point because, Whittaker implies that the cultures beyond were too poor to support the Romans. In fact, there is plenty of evidence for extensive cereal cultivation during the Iron Age in northern Britain and southern Scotland (Topping 1988; van der Veen 1992). Whittaker also states that travel was difficult, but contrary to this statement the Romans imported goods to all areas of the empire. It is true that travel could be unpredictable, but with a fairly good system of roads and shipping, the importation of items was not impossible. Furthermore, when the army originally moved into unknown territories that were to become part of the empire, not all populations they encountered were agrarian societies, as some relied more on hunting. The army could not have relied on these societies for food, so they would be dependent upon their own importation of items, along with hunting and gathering until their settlements became more established (Wells 1995: 173). This intimates that the army had to be adaptable and in some ways independent from the supply system of the empire to survive. For example, one of the main staples of the Roman world, grain, was grown not only in Egypt, but in Germany and Britain. Thus, could one not question whether it was possible for the Roman soldiers to have imported grain from their northern provinces to a new frontier line in the same, or a nearby province? With this consideration in mind, simple supply and demand economics become questionable as a main factor in the slowing down of the frontier expansion. Obviously food supply could have been a factor, but not the single factor for why there was a development of the frontiers.

Watson argues that another reason for the military slowing down may be that the soldiers themselves were not moving far from their homes when they joined the army. Initially both the auxiliary and legionary soldiers were expected to serve for 25 years moving with their units to wherever their presence was required (Watson 1969: 134-5). This movement was known to have been a cause of problems within the auxiliary units, who did not wish to move from their home areas (Saddington 1997: 493). The legionary soldiers were originally recruited from Italy. Later, however, they were selected from veteran colonies and other areas in the empire, possibly making the soldiers' movement, in some cases, only a short distance from their birthplace. Following their service, the legionaries were encouraged to settle in veteran colonies. Instead, it seems that many were likely to inhabit areas near their fortresses because they had acquired wives and families (Watson 1969: 134-5). Their sons might then have been recruited into the same units, and it is possible that in some cases they would not travel far from their families in order to serve in the army.

The immobility of the army appears more obvious in the case of the auxiliary troops. The names of auxiliary units were primarily taken from the area where the unit originated, but as the soldiers retired they too, like the legionaries, often settled and married women from the regions of their fortresses. If they had sons who joined the army it is believed that they would have served in the same unit as their fathers. In spite of this, troops did move, as is evident with the Batavians moving into the fort of Carrawburgh on Hadrian's Wall in the 3rd century. Mann argues that the names of the units stayed the same, but the ethnic background of the troops differed from that of the original unit (1974: 515-6). Yet, it is possible that the children of the auxiliary soldiers were taught to maintain some of their parents' original cultural traditions, so the ethnic background might have changed, but many of the practices and customs could have been maintained and passed on through the generations. In a recent study, Roxan looked at military diplomas to see what happened to soldiers after they retired and noted that some soldiers returned to their homes and others stayed near their troops (1997: 483-6). What is interesting about this is that if those who returned home had sons who joined the auxiliary troops, then they may have been placed in the same units as their fathers, and the ethnic background of the units might have stayed moderately the same, rather than the unit slowly undergoing a process of 'Romanisation'. Further evidence for soldiers keeping their own identity is in the style of uniforms worn in the third century, that were of 'foreign' dress and this might have helped to denote their nationality (James 1999: 19, 21-23).

Often the identity of the soldiers is not considered in scholarship (James 1999: 14-15), with the exception of derisive comments about the probable impoverished conditions of the auxiliary soldiers, making it clear that the study of Roman frontiers was originally, and is still, mainly concerned with the army as a single homogeneous unit with little interest for other groups of people who inhabited the military area and the different cultural backgrounds of the soldiers (Elton 1996: 2-4). There is the possibility that the cultural background of the units changed through time as new soldiers joined the original unit, but it does not mean that the soldiers would have adopted a Roman lifestyle. Though some scholars admit that the soldiers did find it necessary to interact with non-military and non-Roman peoples in the area, this tends only to be viewed for its economic possibilities (Okun 1989: 2; Hanson 1989: 58). Soldiers did marry women from the area where they were stationed, who were often from a different cultural group and this clearly indicates that the frontiers were not simply areas of military life. Elton (1996: 3), rather than arguing for a definition of the term frontier, points out that the frontier are abstract because there were a number of overlapping zones within the line of fortifications constituting four groups of people: Roman soldiers, Roman civilians, local natives and barbarians. Within each group described by Elton other boundaries could be found that defined different aspects of the culture. The boundaries he mentions are religious, political, social, ethnic, linguistic, economic and military (1996: 3). These could, but did not have to, coincide. Perhaps rather than asking why the soldiers slowed down in their movements, the main question should be, what interaction was taking place on the frontiers that might have dictated the soldiers' lifestyle, which will be examined in Chapters 4, 5, and 6.

3.5 How did native populations view the Romans?

Another way to examine perceptions of the frontiers is to look at the archaeology of the native settlements, to see how much interaction was occurring and to see how the natives understood the Romans. By understanding the native acceptance, or rejection of Roman aspects, one can possibly learn if there was a Roman tolerance for people to live in their own ways. It is only recently that examinations have started to be undertaken looking into the views of the native cultures towards the Romans; before this any interaction was generally looked at in the one-sided terms of Romanisation. Woolf argues that Romanisation boils down to ranking, as it rates one culture against another and this is generally preceded by placing the Romans in a higher position than that of native groups (1998: 6). However, any form of colonial interaction is not a simple process of diffusion between an active donor and a passive receptor; cultural influence is an active, motivated and creative process. Moreover, colonial interaction must be looked at from the standpoint of the social and cultural logic of the indigenous cultures with their proper institutions and their complex histories (Dietler 1995: 90). When examining both parties, natives and colonists, it is important to try and understand how they were linked in networks of interaction. Any interaction between different groups of people is driven by different logics of social action and interest that produce continual transformations in the regional structures of power (Dietler 1995: 91). This means that different groups will interpret actions differently and if one aspect of a culture is adopted it tends to be adapted to fit a different set of understandings (c.f. Sahlins 1985). For the Roman military, Barrett and Fitzpatrick (1989) point out that it is all too easily assumed that Roman authority was the dominant force; and therefore, it is generally only the Roman point of view that is studied, since it is believed to have been forced onto native cultures. The problem is further enforced by the distinct division between Romanists who will not always consider the archaeology of contemporary Iron Age societies, because it often falls under the field of prehistory, and is therefore perceived to lie outside the field of Roman studies (Barrett and Fitzpatrick 1989: 9).

Besides Romanisation, another term used by Romanists is 'acculturation', which means the total acceptance of one culture's influence and ideas by another. This idea is employed as a method of demonstrating how native cultures would have gladly accepted a Roman way of life because it was more 'civilised'. Unlike the term Romanisation, the approach of the term acculturation looks at the other culture, but in a very limited view. The problem is that it assumes that one aspect of a society will be adopted with complete understanding; however, any society, if it chooses to adopt a specific aspect of another's determines the end product of the specific aspect by adapting it to fit their beliefs (Woolf 1998: 14-15). It also assumes a development of the less civilised society into something more civilised (Webster 2000). There are likely to be different patterns of change with regard to different spheres of activity. Some aspects such as means of subsistence might be accepted more rapidly in societies, but cultural values might only be accepted and adapted in a much slower manner (Shennan 1996: 290). To change the understanding of Roman interaction, Barrett and Fitzpatrick suggest the abandonment of cultural blocks such as Roman and Native, along with the concept of acculturation and its evolutionary assumptions, and to try and understand the ways in which varied cultural values penetrated the routine existence of all people (1989: 9).

Archaeological case studies do not always show an immediate acceptance of the Roman way of life. For example, communities living in the area around the fort of Newstead in Scotland retained their native lifestyle, perhaps because they did not perceive the Roman way of life to be as orderly or superior as theirs (Clarke 1999). Another instance, already mentioned, is seen on the Roman frontiers of Africa, where it is argued that gaps were left in the lines of fortifications to allow for transhumant groups to pass through the frontiers without problems (Raven 1993: 13, 77). This African lifestyle was not disrupted, but at the same time the large gaps in the lines of fortifications did give the Romans some control over where the transhumant groups moved. However, it might be questioned who actually dictated the gaps; was it the Romans attempting to maintain some control, or were they left where it was common for the groups to move? Either way, it seems as if there was no disruption to their way of life. Furthermore, there are examples from Roman Spain that show that some of the indigenous groups were maintaining aspects of their traditional culture and not incorporating Roman aspects when they came into contact. The areas of Lusitania, Galicia and Cantabria have archaeological evidence that supports the fact that people were continuing to worship their own gods, speak their own language and build structures in their own styles (Curchin 1991: 181-6). Ideas of Romanisation or acculturation seem inappropriate in these instances. If the indigenous cultures were choosing to continue to live in their own manner, can it imply that they rejected other aspects of Roman life, such as medicine? Taken further, could such processes have affected the way certain units of auxiliary soldiers from these areas might have accepted or rejected Roman-style medicine?

3.6 Soldiers and culture on the frontiers

To understand cultural variation within the army auxiliary units can be examined and compared because they consisted of groups of non-Roman citizens, who were placed in units according to their homes, such as a cohort of Gauls. Overall it seems that most modern scholarship defines the auxiliary soldiers as less 'civilised' than those of the legions. The legions are seen as having soldiers more versed in the Roman way of life because they came from Italy and the "more civilised provinces of Gaul and Spain" (Scullard 1979: 71). This opinion is consistent with Cunliffe's thoughts on the auxiliary soldiers. He states that the auxiliary soldiers were made up of bands of rampaging Celts who were in need of Romanisation; a process that would raise their status when they returned home to their own societies (1989: 126-7). According to Drummond and Nelson the use of auxiliary soldiers cost the empire nothing because the soldiers had the acceptable job of learning to act like Roman citizens (1994: 189; Johnston 1983: 20; Watson 1969:

15). Saddington argues that in order for these soldiers to be controllable they had to be Romanised to stop any problems that might occur (1997: 496). At the same time, he points out that many were allowed to maintain their ways of fighting (1997: 493). There is also the possibility that some problems were avoided by allowing auxiliary groups to keep their command structures, as is suggested by Tacitus, who implies that the Batavians went to Britain without trouble (Tac. *Hist*. 4. 12). This statement provides some evidence that the Romans were probably not, as a matter of course, turning their auxiliary soldiers into homogeneous units.

3.7 How does military medicine and culture relate?

As it has been pointed out there were many types of interaction occurring on the frontiers, and these occurrences could have had an effect on the way medical treatment was provided to the soldiers. Understanding a specific culture is a complex matter. Sometimes in archaeological studies cultural variation is only used to denote differences in material goods such as types of ceramics, or architectural styles based on who made or used them. Of course there is a danger in giving a particular artefact, burial and building type a specific ethnic identity because one group might have borrowed certain aspects from another (Jones 1997: 132-4) – pots do not equate with people. It is important to try and learn more about how the cultures being studied worked and understood themselves, and the relationship with their material remains. Since one is attempting to learn how a specific culture worked, anthropologists (and archaeologists are placed in this category, since archaeology is a discipline clearly related to anthropology) break up aspects of the culture into symbolic systems, folk models, mental structures and language to gain some understanding of how a specific society functioned (Woolf 1998: 12; Shennan 1996: 284).

Cultural beliefs and aspects would have been learned and carried over in the military zone, as a result of the overlapping of the many boundaries mentioned by Elton. For medical treatment there is no direct evidence of civilians influencing military doctors, though medical specialists were aware of non-Greek and Roman health care. Soranus, as mentioned earlier, provides information about how newborn infants were treated in Germanic and Scythian cultures:

> "*Μετὰ δὲ τὴν ὀμφαλοτομίαν οἱ πολλοὶ τῶν βαρβάρων, ὡς οἱ Γερμανοὶ καὶ Σκύθαι, τινὲς δὲ καὶ τῶν Ἑλλήνων εἰς ψυχρὸν ὕδωρ καθιᾶσι τὸ βρέφος στερεοποιήσεως χάριν καὶ <τοῦ> τὸ μὴ φέρον τὴν ψύξιν, ἀλλὰ πελιούμενον ἢ σπώμενον ὡς οὐκ ἄξιον ἐκτροφῆς ὂν ἀπολέσθαι*" (Sor. *Gyn.* 2. 12. 81).

This indicates that the military boundaries did not eliminate medical information from passing into Roman scholarship. Varied beliefs could have been introduced to, or at least been familiar to, military doctors. It is possible that some doctors could have adopted or adapted the medical practices they might have learned by being stationed in different regions of the empire. This could allow for the possibility of different treatments and sympathetic medicine to move between fort and frontier. As already mentioned, the latest find from Stanway, dating to the era of the Roman conquest, has possible divining rods, that could have been used in medical practice. Not known to occur in 'Roman' medical kits from later dates, it is these rods and the shape of the medical tools that provide us with more information about the culturally specific nature of later Iron Age medical treatment in the southern part of Britain. Again the instruments from Colchester show a possible merging of ideas. The surgical instruments found with the burial are similar to Roman designs of medical instruments, but they also have characteristics similar to Iron Age instruments from other areas. The surgical knives have blades shaped similar to those found on Roman scalpels, but the knife handles are unusual and may be based on local designs (Jackson 1997: 1,473). This combination is another indication of the possibility of Roman and native interaction concerning medical practice. It is plausible that civilian help might have been employed, especially if doctors or hospitals were not available in fortifications. Although we are not aware of military doctors making use of civilian medical treatments, we do know that civilians did care for wounded or ill patients, as described by Julius Caesar during the Civil War. He mentions how on campaign some sick and wounded soldiers were left behind in friendly villages to be cared for by the local inhabitants: "*Caesari ad saucios deponendos, stipendium exercitui dandum, socios confirmandos, praesidium urbibus relinquendum necesse erat adire Apolloniam*" (*BC.* 3, 78. 2). Caesar also reported one of his commanding officers, Labienus, doing the same thing during his African campaign: "*Labienus saucios suos, quorum maximus numerus fuit iubet in plostris obligatos Hadrumentum deportari*" (*BA.* 21).

To go beyond the structural matrix that is often used to understand interaction, cultural anthropologists are concerned with how aspects of a society are handed down and transmitted from one group to another. Social theory is now being considered more in both anthropology and archaeology to understand what the causes and consequences of a particular social aspect might have been on a group of people and how the transmission of ideas might have occurred (Shennan 1996: 284). Giddens, a social theorist, points out that human understanding of their culture can only be articulated in some cases, but much of what we do is at a practical level of consciousness and we know how to take part in our way of living without thinking about it (1984). To simplify this, one can use a specific case in western culture by looking at why it is common to shake hands when people meet.

The obvious and immediate answer would be politeness, but this does not completely answer the question, why shake hands? These practices are learned, but are never totally explained. By observing how we shake hands it is possible to learn about the cultural proxemics (the study of personal space) and what is acceptable and not. Even though this is an example for anthropologists studying living groups, one can use the same theories when studying the material remains of a culture through archaeological remains. Attitudes towards the ill and medicine can be shown (Chapter 5) by comparing the archaeological remains in their context, by making such observations social practice can be observed by the archaeologist interested in ancient medicine.

3.8 A review of the military events

The history of the frontiers might also have been a contributing factor, along with cultural influences, in the way in which medical treatment was provided to the soldiers on the frontiers. Although the evidence for the history of frontiers is readily available, a brief account of the major events for each area in this study is presented here to acquaint the reader with a working background of the important developments in each frontier, from the reign of Augustus to the mid-3rd century AD. The mid-3rd century seems the most beneficial time to end this examination because at this time there was upheaval in the running of the empire that was disturbed by insurrections in the government that caused chaos in military control and organisation. The frontiers on the Rhine and Danube frontiers were also plagued with incursions from groups of people who lived beyond the rivers. Britain remained fairly peaceful at this time, but overall the mid-3rd century was chaotic. The problems were finally resolved in the 4th century with a rearrangement in the military and government. Not only were the frontiers administered differently, mainly from an offensive to a defensive point of view, but the system of supply changed (e.g. Baker 1995), and it is likely that this affected how medical treatment was offered.

Since this is intended to be a very brief introduction to the history of the frontiers, specific details about the development and history of separate fortifications will not be presented. However, information about the units and dates of occupation is provided in Appendix One A for fortifications that have evidence concerning medical care. This more specific information will also be useful in making comparisons with the frontiers and units in the proceeding chapters.

3.8.1 Germania (Appendix 1 and Figs. 1, 2, 3)

Combined, both German provinces have a greater number of fortifications than any of the other frontiers being examined. The historical development of Germania is complex and riddled with conflict. It was originally a single province, but at the end of the 1st century it was divided into two provinces. Germania Inferior ran from the North Sea at the mouth of the old Rhine to the fort at Sinzig in modern Germany. Germania Superior, at its farthest expansion eastwards, ran from the fort at Andernach to the Raetian border near Lorch (Schönberger 1969: Fig. 1).

During the campaigns of Drusus there was some construction of fortifications beyond the line of the Rhine on the Lippe river. The fortifications of Haltern, Oberaden, Beckinghausen, Rodgen, Holsterhausen and Anreppen were built to help with the movement towards the Elbe (Wells 1972: 165-221). Haltern is important to the study because a building has been identified as a hospital within the fortification. Following the

Varian disaster in AD 9 the forts on the Lippe were abandoned and the troops settled on the west bank of the Rhine.

Tiberius was warned by Augustus not to extend the boundaries of the Rhine (Tac. *Ann.* 1. 11). Clearly though, this advice was not strictly followed because Germanicus led a campaign in AD 15 and 16. The legionary fortress at Strasbourg (Argentorate) was constructed and one was built at Windisch (Vindonissa). To support these fortresses a number of auxiliary forts were also built along the Rhine (Maxfield 1987: 147; Schönberger 1969: 151). In total Tiberius had eight legions stationed along the Rhine, four in what would become Germania Inferior and four in the future Germania Superior.

Germany became more volatile when the Batavians revolted on the lower Rhine in AD 69. Vespasian defeated them in the same year and following the attack he reorganised the frontier. Four legions were stationed on the lower Rhine. The auxiliary forts were reconstructed in stone, making them permanent and stronger to attack (Haalebos 1995: 5). Upper Germany had not escaped incursions either, as the Mattiaci attacked Mainz. To combat further invasions auxiliary forts were constructed on the Taunus beyond the Rhine on the Main (Maxfield 1987: 148). Furthermore, Vespasian shortened the distance of travel and communications between the Rhine and the Danube. To do this he constructed a road that ran from Strasbourg through the Black Forest to the banks of the Danube near Tutlingen (Drinkwater 1983: 57; Maxfield 1987: 148; Millar 1967: 112).

Domitian inherited a number of problems on the Rhine when he became emperor. During his first visit to Germany he was made aware of a possible uprising by the Chatti, who were preparing to cross the river. The emperor launched a successful campaign in either

AD 82 or 83 to help quash any possible movement towards the frontiers. His achievements were ridiculed by Tacitus and Pliny, yet his successful campaign was of vital importance because it enabled him to strengthen the Roman presence beyond the upper Rhine, by constructing a string of auxiliary fortifications on the Taunus and Wetterau between the Main and Lahn rivers some 30 miles east of the Rhine (Jones 1973: 79-80). Included in his construction, Domitian reinforced the forts with a line of wooden watchtowers and stone forts, creating a more visible frontier (Maxfield 1987: 153; Millar 1967: 112). In order to gain greater control over the area he divided Germany into two provinces (Figs. 2 & 3), which could, therefore, be governed separately. Domitian's victory was soon overshadowed by a revolt in AD 89 by L. Antonius Saturninus, the commander of both legions at Mainz. After this, Domitian abolished the use of double legionary fortresses (Schönberger 1969: 158).

Trajan created the Odenwald Limes in the upper Rhine, which was a military road guarded by observation towers on the river Main. Ten small forts were constructed on this line starting at Worth and running southwards to the Raetian border at Lorch. (Maxfield 1987: 155-6; Fig. 3). Eventually, except for Friedburg in the Wetterau, all of the auxiliary forts behind Trajan's line were abandoned and the military control, except for the legions, was limited to a long narrow strip on the outer edge of the frontier (Maxfield 1987: 156-7).

Antoninus Pius was the last emperor to advance farther into Germania Superior. He set up 12 forts beyond the Neckar river that ran in a line south to the Raetian Limes after defeating the Germans in battle (Fig. 3). The fortifications were constructed of stone, demonstrating the intention that they should be permanent (Schönberger 1969: 167-8).

In AD 213 the Alamanni invaded for the first time, and in 233, during the reign of Severus Alexander a major Alamannic invasion was directed at Upper Germany and Raetia. The frontier was restored by Maximinus Thrax, but in AD 260 lands east of the Rhine and north of the Danube were abandoned for the original Julio-Claudian frontier (Maxfield 1987: 165-6).

3.8.2 Raetia (Appendix 1 and Fig. 1, 4)

Raetia was an alpine province that was in what is now the Austrian Tirol, southern Bavaria and the northeastern corner of Switzerland. In 16 BC Drusus and Tiberius conquered the Raeti and the Vindelici, two tribes that occupied this region: "*At. Ti. Caesar quam certam Hispanis parendi confessionem extorserat parens, Illyriis Delmatisque extorsit. Raetiam autem et Vindelicos ac Noricos Pannoniamque et Scordiscos novas imperio nostro subiunxit provincias*" (*Vell.* 2. 39.3). It is thought that during the campaigns of Drusus in this region two legions were stationed at Augsburg-Oberhausen; however, a fortification has never been found, only a large number of finds of military accoutrements were excavated in the river Inn, indicating a military presence (Schönberger 1969: 145). Very little was done to the province until the time of Claudius, who was responsible for changing the government from one of native alliance to provincial rule. He realised its importance as a link between the Rhine and the Danube rivers and sought to place the area under Roman control (Whittaker 1994: 348). In order to organise a communication system, Claudius moved all of the auxiliary troops that had been previously scattered throughout the province to a road along the southern bank of the Danube (Cook et al. 1979: 784; Maxfield 1987: 147).

During the reign of the Flavians military movement beyond the Danube increased the size of the province. Auxiliary forts were constructed by Vespasian on the road that ran from Strasbourg to the Danube (Whittaker 1994: 46). Domitian created a larger province by moving the troops north of the road into the Swabian Alb, where he built a number of auxiliary forts along a military road (Maxfield 1987: 154, 159; Whittaker 1994: 46). Hadrian reinforced the Domitian's defences by building a stone wall with watchtowers attached to it, the *Teufelsmauer*, north of the military road (Maxfield 1987: 159-60).

The final change to Raetia was made during the Marcomannic Wars, under the rule of Marcus Aurelius. The security risk created by the groups of people living north of the Danube caused Marcus Aurelius to have the first and only legionary fortress constructed at Regensburg (Maxfield 1987: 164; Millar 1967: 115; von Elbe 1974: 322). After the province of Raetia gained a legionary fortress the commander of the unit was given the duty of governor as well. The province held the Antonine boundaries until the mid-third century when attacks by the Alamanni forced the soldiers to return to the southern bank of the Danube (Maxfield 1987: 190-2). Overall Raetia was a fairly peaceful province that played an important role in the communication link between the Rhine and Danube.

3.8.3 Noricum (Appendix 1 and Fig. 5)

To the east of Raetia was the province of Noricum created by the emperor Augustus (*Vell.* 3. 39.3; Cook et al 1979: 211) that was located in what is now Austria with its northern border on the Danube. Noricum was overrun by the Pannonians and Noricans in 12 BC. Rather than making it part of the Roman empire, when P. Silius Nerva conquered the Noricans he allowed them to live as a dependency of Rome:

"*καὶ οἱ Παννόνιοι τήν τε Ἰστρίαν μετὰ Νωρίκων κατὲδραμον, καὶ αὐτοί τε πρός τε τοῦ Σιλίου καὶ τῶν ὑποστρατήγων αὐτοῦ κακωθέντες αὖθις ὡμολόγησαν, καὶ τοῖς Νωρίκοις αἴτιοι τῆς αὐτῆς δουλειάς ἐγενόντο*" (Dio Cassius, 54, 20. 2; Cook et al. 1979: 348).

Little else is known about the province until the time of Claudius. During his reign it was changed, like Raetia, from a native alliance to provincial rule, governed by an equestrian *praefect* (Whittaker 1994: 44). Few forts were built on its frontiers because not many incursions were made over the Danube since its geography helped to protect it in certain areas. In the section of the frontier between Passau and the Wachau much of the Danube flows in a narrow steep-sided valley that would have made crossing difficult on both sides (Maxfield 1987: 175). In the eastern section of Noricum between the Wachau and the Wienerwald the frontier faced the Tullnerfeld, a heavily populated area that was home to the Marcomanni, north of the river. Because the Marcomanni were a possible threat, and the river was easier to ford in this area, five auxiliary forts were constructed in a 31 mile (50 km) stretch (Maxfield 1987: 174-6). In order to fill these new forts, troops from the interior of Noricum were moved to the outer line on the Danube (Alföldy 1974: 66, 147).

During the reign of Vespasian the Norican army was reorganised (Alföldy 1974: 143-4). There were most likely to have been nine auxiliary forts occupied during the reign of Hadrian (Alföldy 1974: 144). The province remained peaceful and there are no recorded invasions during the 1st or early 2nd centuries. It only held the strength, in auxiliary troops, of roughly one legionary unit. These auxiliary troops were probably used to police the area and protected the transportation of supplies.

The first threat came to the area during the Marcomannic war when both the Marcomanni and Quadi crossed the Danube into Pannonia and proceeded into Noricum. Marcus Aurelius had to protect Noricum as it was particularly close to the Italian border. In 171 he constructed a legionary fortress at Albing to house the first legion to occupy Noricum, *II Italica*. Albing, however, was built in a low lying area near the confluence of the river Enns and the Danube and flooded frequently. The legion was transferred to slightly higher ground at Lauriacum before the end of Commodus' reign (Alföldy 1974: 165-6). The commander of the legion then became the *legatus Augusti pro praetore* or governor of the province. The next invasion into the province was not made until the mid-3rd century (Alföldy 1974: 159; Alföldy 1974: 202).

3.8.4 Pannonia (Appendix 1 and Fig. 6)

Like Noricum, Pannonia was also overrun in 12 BC, and Tiberius was forced to fight for four years before he was able to gain some control of the area. In AD 9 Pannonia was separated from Illyricum and made into a new province (Maxfield 1987: 174). In the later reign of Tiberius or under Claudius a legionary fortress was constructed at Petronell (Carnuntum) which was established as the capital of the area, and the first unit to be stationed at the site was the *Legio XX Apollinaris* (Móscy 1974: 40). At the same time, auxiliary forts were built at Brigetio (Szóny) and Aquincum (Budapest) (Maxfield 1987: 175). Pannonia occupied what is now eastern Austrian near Vienna, to the south of Hungary on the Danube.

Little else was done in this province until the reign of the Flavians. At this time more auxiliary forts were added to the Danube frontier to strengthen it, especially since the Dacians were beginning to become a threat to the middle and lower Danubian provinces. It seems that watchtowers were also constructed towards the end of the 1st century (Maxfield 1987: 178).

Trajan fought two Dacian wars and when he had secured Dacia as a province he found that the Iazyges, a tribe that lived on the Hungarian plain in the non-Roman territory between Dacia and Pannonia was a threat to the province of Pannonia. In order to maintain security in Pannonia he divided it into two provinces: Pannonia Superior and Inferior, enabling the governor of Pannonia Inferior to keep a closer watch on the Iazyges. The new province of Pannonia Inferior, starting at the Danube bend in Hungary and running southwards to the border of Hungary, was governed by a praetorian legate, and Superior, which occupied the western section of the original Pannonian province, was governed by a consular legate. For better protection Trajan added more legions to the front line in Pannonia Superior at the fortresses of Brigetio and Vindobona (Maxfield 1987: 178). Only one legion was stationed in Pannonia Inferior at the fortress of Aquincum (Maxfield 1987:182; Zsidi 1995: 14-5).

In the mid-2nd century, during the reign of Marcus Aurelius, a string of watchtowers was also built on the frontier of Pannonia Inferior because of the Marcommanic wars. The province remained fairly uneventful until the mid-3rd century when Gothic tribes began to invade on the lower Danube, followed by incursions during the later part of the century on the middle Danube by the Marcomanni, Quadi and Sarmatae (Maxfield 1987: 187; Millar 1967: 115-6).

3.8.5 Britannia (Appendix 1 and Figs. 7 & 8)

In this thesis, the main area of discussion relating to Britannia will concern Hadrian's Wall, although there were other frontier lines of military forts in the province of Britannia such as those in Wales and the Antonine Wall in Scotland. The Welsh frontier ran from Chester to Caerleon close to the present day border between England and Wales. It also had a line of auxiliary forts running east to west across the centre of Wales, and a row of forts on the north and south coasts of Wales (Jarrett 1969).

There was much disruption after the Claudian invasion of Britain in AD 43. However, it was not until the Flavians that more visible lines of fortifications began to appear in the province. In c. AD 84 Domitian sent Agricola north into Scotland, and construction began on small military posts and the legionary fortress at Inchtuthil. He defeated the Caledonii in a decisive battle at Mons Graupius (Scullard 1979: 45-6). The campaign in Scotland, however, was cut short by an unexpected Dacian attack on the Danube. At the time Domitian found it necessary to leave three legions in Britain and give up the newly gained territory in Scotland. Thus, Domitian sent troops from Britain to defend the Roman territory on the Danube (Breeze 1987: 201). When the Dacian campaign ended, the legions returned to Britain and were stationed at Caerleon, Chester and York (Scullard 1979: 46; Breeze 1987: 201-5). These three fortresses remained the permanent legionary posts in Britain.

When Trajan came to power there was an increasing threat from the Dacians that caused him to abandon Roman auxiliary fortifications in southern Scotland in order to keep

Britain secure. He fortified the Stanegate road that ran from Corbridge to Carlisle, with watchtowers and auxiliary forts. He strengthened the legionary fortresses and had them rebuilt in stone in the early 2nd century (Breeze and Dobson 1991: 16-26).

Hadrian consolidated the British frontier and built a wall across northern Britain. Roughly 9,500 men would have served on the Wall. Initially it seems that Hadrian's Wall was intended to be similar to his fortification in Raetia where forts were left behind the wall, in this case on the Stanegate road. However, forts were constructed on the Wall soon after its construction was started. The plan was to have a tight network of forts set about a half day's march apart from one another that would be used to control the key strategic points along the Wall (Webster 1981: 122). The Wall frontier also had a number of outpost forts, located to its north.

The remainder of the 3rd century continued to stay fairly peaceful in Britain. At the beginning of the 4th century the province was faced with threats from Saxon attacks. Hadrian's Wall, however, remained the northern frontier until Roman rule ended in Britain in the beginning of the 5th century (Scullard 1979: 65-6).

3.9 Conclusion

This chapter should first demonstrate the complex nature of the frontiers, and the variable means of cultural interaction that occurred on them between the natives and the military, and also within the different military units. Secondly this chapter discussed the development of each of the provincial frontiers involved in this study. The reason for this is in order to understand the medical system of the army, one must be aware of both issues because they can play an important role in how medical care might have been affected and organised. By choosing areas that are believed to have operated on a similar, if not the same, basis, rather than comparing ones thought to be vastly different, one can better consider the possibility of variations in medical treatment by taking into account the issues of historical influence and cultural interaction.

CHAPTER FOUR
Observations on the classical literary and epigraphical sources relating to Roman medicine

4.1 Introduction

The preceding three chapters were intended to demonstrate why and where there is a need to approach Roman archaeology, especially that of medicine and the frontiers, with an increased use of anthropological and interpretative methods familiar to other fields of archaeology, such as historical, colonial and prehistoric. These methods shall be used in this and the following chapters, not only as a means of demonstrating the complexities of Roman military medicine, but, more importantly, to ask specific questions about the different influences, such as military events and cultural backgrounds, that might have contributed to the distribution of medical care in the Roman army. Since inscriptions mentioning doctors are the main source of information used by scholars when attempting to make sense of military medicine, they shall be examined in this chapter before discussions are made about the relationship of artefacts (specifically medical tools) to military medicine. The main concern of most scholars who have examined the extant epigraphical remains is to discern how a system of medical care might have been structured in the army (Davies 1969; 1972; 1989; Domaszawski 1908: 45-7; Haberling 1910: 4-10; Nutton 1969; Penn 1964; Richmond 1952; Scarborough 1968; Wilmanns 1995a & b). The system, as described by modern scholars, is not perfectly understood (Jackson 1993: 83). Nonetheless, definitions are still provided for the different types of doctors mentioned on Roman inscriptions, and these modern definitions have been used as a foundation on which scholars have determined the doctors' rank and the organisation of the medical care system. These basic interpretations are then used as a framework on which understandings about the organisation of military medicine have been based, and this structure is then applied to the army as a whole (Davies 1969, 1972, 1989; Jackson 1993: 83; Richmond 1952; Wilmanns 1995a & b). Except for some differences between the legionary and auxiliary troops, there is an overall opinion that the military comprised a homogeneous group of soldiers who were organised in the same manner and shared comparably organised systems (Cunliffe 1987; Drummond and Nelson 1994; Watson 1969; Whittaker 1994). These beliefs have led to the assumption that there was, first of all, a system of medical care in the army, and that the system was fairly uniform throughout the empire (Davies 1969b; Wilmanns 1995a & b; Nutton 1969; and in some cases Scarborough 1968). As mentioned in Chapter 3, such understandings lead academics to preconceptions about the army that assist in their consistent overlooking of the possibility that there might have been variations within the organisation of the medical care system. In order to test whether Roman military medicine was standardised it is necessary to reconsider the foundation on which this assumption is based.

This chapter begins with a discussion of previous scholarship on the literary and epigraphic material concerning health expectations of the soldiers, the prescribed ranks of the doctors, and the organisation of the medical care system. This discussion provides a basis on which the reader can familiarise themselves with past interpretations and to see where questions still remain in the area of study. Following this, comparisons of the literary remains between frontiers, unit types and auxiliary groups with the name of their unit's home will be made to see if the evidence supports previous arguments, or if it challenges our current understandings of the organisation of medical care in the army.

4.2 Recruitment: a possible first encounter of 'Roman' military medicine

Since recruitment would have been a person's first contact with the Roman army and possibly its medicine it is the best place to begin a discussion on what has been mentioned in the extant literature about the health requirements for a prospective soldier. Davies (1969a: 202-22), Webster (1969: 39) and Wilmanns (1995b: 44-6) are the main secondary discussions that can be consulted for military recruitment. There is little written about the topic in the classical sources. With the exception of Vegetius, one is forced to rely upon small excerpts from other sources that mention the system of recruitment in passing in order to gain some understanding of how the system worked.

Before describing the recruitment procedures, Vegetius first presents a detailed description of the type of person he felt made a desirable candidate for the army. Men from temperate climates were considered to be the ideal candidates to become soldiers, because they possessed the best qualities of men from both the warmer and colder climatic regions of the Roman empire. People from warmer areas were thought to be of greater intelligence, but had less blood and, therefore, lacked the steadiness and confidence to fight. Whilst those who were living in the coldest climates were considered to be less intelligent, but had the abundance of blood and readiness for war. Consequently, the finest soldiers were expected to have the mental ability to be disciplined during training and battles, along with a capacity for fighting: "*Omnes nationes, quae uicinae sunt soli...amplius quidem sapere, sed minus habere sanguinis dicunt ac propterae constantiam ac fiduciam comminus non habere pugnandi ,...Contra septentrionales populi, remoti a solis ardoribus, inconsultiores quidem, sed tamen largo sanguine redundantes, sunt ad bella promptissimi. Tirones igitur de temperatioribus legendi sunt plagis*" (*Mil.* 1. 2-3; Davies 1969b: 209). Cato believed the best recruits were raised on farms: "*At ex agricolis et viri fortissimi et milites strenuissimi gignuntur*" (*De Agri Cultura.* proem. 4), and it is possible that Vegetius borrowed this idea from him since he also states that individuals from the country were better suited for training than persons from urban areas: "*De qua parte numquam credo potuisse dubitari aptiorem armis rusticam plebem...*" (*Mil.* 1. 3; Davies 1969b: 209). Both writers were convinced men more familiar with hard work and the outdoors would find it easier to assimilate to the harsh training of military life, whilst those who were not accustomed to strenuous outdoor living would find the experience difficult. The possibility exists that these ideas may have been passed down throughout the centuries, and Vegetius may have simply recorded a general conception held in Roman times. It is also possible, given the late period in which Vegetius was writing, that he simply borrowed an idea from an earlier source that had nothing to do with the thoughts of the time he was living. On the other hand, recruiting officers from different regions might have had their own ideas about who would make a strong soldier.

One factor that might indicate that these ideas were not followed completely is that ultimately soldiers were enlisted from many regions in and around the empire. It seems more likely that those who wished to join the army were chosen on the results of an entrance examination known as the *probatio*. However, our understandings of the requirements to pass the *probatio*, are insufficient at best (Watson 1969: 39). According to Herodian there were three points of physique a recruiting officer should examine most closely during the *probatio*: age, height and suitability of health, as he notes the emperor Antoninus Pius mustering young men into their ranks on certain occasions so he could examine these three aspects (4. 9. 5; Davies 1969a: 212; Watson 1969: 39). While discussing the life of the emperor Maximius, Herodian states that Maximius was recruited into the army because of his size and strength (6. 8. 1-7; 1. 2). Herodian's work provides a general idea of what the *probatio* might have consisted of, but he does not explain how these aspects were examined and what the exact specifications were, as no indication is presented about what constituted his idea of appropriate size and strength. Therefore, we must turn to other sources to try and piece together the possible specifications for enlistment, if there were any.

Height is the only part of the *probatio* that has exact standards mentioned in the classical sources of Vegetius and the *Theodosian Code.* The minimum height set for entrance into the Roman army was originally five feet ten Roman inches, with six Roman feet or over being the ideal height of a recruit: "*Proceritatem tironum ad incommam scio semper exactam, ita ut VI pedum vel certe V et X unciarum inter alares equites vel in primis legionum cohortibus probarentur*" (Vegetius, *Mil.* 1. 5; Watson 1969: 39; *Codex Theodosianus* 7. 13. 3; Wilmanns 1995b: 44). The standard height was lowered during the reign of Valentinian in the late 4th century to a minimum of five feet seven Roman inches because the number of recruits was receding and there was a need to maintain high numbers of soldiers in the army (*Codex Theodosianus*, 7. 13. 3). Since the exact specifications are presented it seems that this aspect of the *probatio* might have been more standardised than the other two parts of the examination.

Age is more difficult to determine because there are no exact figures given in any extant source. Inscriptions can be used to show the ages of soldiers during their recruitment, as Wilmanns mentions a study by Scheidel (1995b: 46 note 105) who says that 75% of the inscriptions mentioning ages of recruitment range between the ages of 17 and 20. This suggests that age was probably not standardised on the same scale as height. It seems though to fall within the late adolescence. According to Vegetius, who quotes Sallust, adolescents were considered to be the ideal age for army selection because their bodies were nimble and they were at an age when they were willing to learn more than those who were slightly older and had more set ways of thinking: "*Adulescentes legendi sunt, sicut ait Sallustius Iam simul ac iuventus belli patiens erat, in castris per laborem usum militiae discebat*" (*Mil.* 1. 4). Since there does not appear to have been a minimum or maximum age it is conceivable that a person could choose the time when he may have felt that he was physically and/or mentally prepared to join the army.

The physical examination is the most problematic component of the *probatio* to understand because no exact specifications are presented in the literature about how the examination was executed, what the expectations of a healthy body were, or even how thorough an examination might have been. From the evidence of an Egyptian papyrus it might be suggested that soldiers were examined, at least in some cases, for distinguishing features, marks or scars on their body, that could be used for identification in case the soldiers fell in battle (*POxy* 1022=CPL III; in Davies 1969a: 222):

> C. Minicius Italus to Celanus, Greetings
> Give orders that six recruits who have been approved by me in the cohort
> under your command be included in the ranks from Feb. 19. I append this to the letter their names and descriptions.
> Farwell dearest brother

C. Veturius Gemellus	21	no distinguishing features
C. Longius Priscus	22	scar on left eyebrow
C. Julius Maximus	25	no distinguishing feature
[.] Julius Secundus	20	no distinguishing feature
C. Julius Saturninus	23	scar on left hand
M. Antoninus Valens	22	scar on right side of forehead

> [C.] Minicius Italu[s C]elsiano suo sal[u]tem

Tirones sexs probatos ame in coh(orte) cui praees in numeros referri iube ex xi kalendas martias: nomina eorum et icon[i]smos huic epistulae subieci.
Vale frater karissim[e.

C. Veturium Gemellum, Annor(um) xxi, sine i(conismo),
C. Longium Priscum, Annor(um) xxii, i(conismus) supercil(io) sinistr(o)
C. Iulium Maximum, Annor(um) xxv, sine i(conismo)
[.] Lucium Secundum, Annor(um) xx, sine i(conismo)
C. Iulium Saturninum, Annor(um) xxiii, i(conismus) manu sinistr(a)
M. Antonium Valentem, Annor(um) xxii, i(conismus) frontis parte dextr(a)

Since this letter records marks on the body it may be suggested that, in this unit at least, there was some interest in certain physical aspects of the solders' or prospective soldiers' bodies as a means of identification. In order to make a note of the marks, there might have been a superficial assessment of the soldier's body, and during this time it is plausible that the recruiting officer could have made a mental note of the person's physique. One must also consider the possibilty that the recruit might have been asked if he had any noticeable marks, and no examination was given.

Another papyrus fragment from Egypt (*POxy* 39; Davies 1969a: 211; Watson 1969: 41) signifies the possibility that a vision test might also have been part of the physical examination:

Copy of a release dated and signed in the 12th year of Tiberius Claudius Caesar Augustus Germanicus Imperator, Pharmouthi
Discharged by Gnaeus Valerius Capito, praefect of upper and lower Egypt to
Tryphon, son of Dionysus, weaver, with weak sight owing to a cataract
Of the metropolis of Oxyrhynchus.
The examination was conducted in Alexandria
The examination was conducted in Alexandria
The examination was conducted in Alexandria

Ἀντίγραφον ἀπολύσεως ἔτους ιβ Τιβερίου Κλαυδίου Καίσαρος
Σεβαστοῦ Γερμανικοῦ Αὐτοκράτος, Φαρμοῦθ(ι), σεσημ(ευωμένης).
ἀπελύθηι [ὑ]πὸ Γναίου Οὐεργιλίου Καπίτων[ο]ς τοῦ ἡγεμονος
ἀμφοτέρων
Τρύφων Διονυσίου γέρδιος, ὑπο <κε> χυμένος ὀλίγον βλέπων,
τῶν ἀπ' Ὀξυρύγχων τῆς μητροπόλ(εως).
Ἐπεκρίθ(η) ἐν Ἀλεξανδ(ρείᾳ)
Ἐπεκρίθ(η) ἐν Ἀλεξανδ(ρείᾳ)
Ἐπικέκριται ἐν Ἀλεξανδ(ρείᾳ)

There is a debate about whether the person being discharged was military or civilian: Davies believes that it was a military discharge (1969a: 211); Jackson states that it is military as he feels it is evidence of an eye examination being given during recruitment (1996: 2229); Watson suggests that it is civil (1969: 41). No matter if the situation is military or civil, the letter indicates that people were examined for problems concerning vision. Nevertheless, there is nothing specific about whether eye-tests were a routine procedure, or only available when a problem was noticed. One would expect that eyesight was an especially important issue for recruitment into the military, and examinations were made throughout the soldier's military career. Yet, this is the only fragment that mentions the possibility, and it seems most likely that Tryphon was a civilian, since he is on a list of the men from the city of Oxyrhynchus rather than being associated with a military unit. Even though this fragment is mentioned frequently in literature concerning military medicine, one cannot say more than the fact that it hints at the possibility of eye examinations in the army.

Vegetius puts forward more possible suggestions about what the recruiting-officer should concentrate on when making the physical examination. The officer was advised to "look hard at the face, eyes and entire confirmation of the limbs, to choose an able soldier. The person chosen should have alert eyes, a straight neck, broad chest, muscular shoulders, strong arms, long fingers, small stomach, slender buttocks and calves and feet that are not swollen by surplus fat, but firm with hard muscle": "*Sit ergo adulescens Martio operi deputandus vigilantibus oculis, erecta cervice, lato pectore, umeris musculosis, ualentibus brachiis, digitis longioribus, ventre modicus, exilior clunibus, suris et pedibus non superflua carne distentis sed nervorum duritia collectis*" (Veg. *Mil.* 1. 6; Milner Trans). The translator of Vegetius, Milner, thinks the suggestions Vegetius provides are contrived and believes the criteria for the selection of soldiers was based on the selection of cattle for stock breading because no other source provides such precise details. Other sources tend to simply mention the words *statura* and *robur* rather than offering a precise description of what was meant by these words (Veg. *Mil.* note for 1, 6 page 7 number 3). A statement made by Frontinus reports that Pyrrhus remarked to his recruiting officers that it was up to them to choose the big men, but Pyrrhus would make them brave: "*tu grandes elige, ego eos fortes reddam*" (*Strat.* 4. 1. 3; Davies 1969a: 213), again demonstrating the physical selection incorporated an examination of stature. It is difficult to determine whether Vegetius' statement is correct, but it seems likely, depending on the recruiting officer, that some would have considered these aspects when choosing the men for the military. On the other hand, even if Vegetius' ideas of how a soldier was chosen do not correspond with the criteria of the recruiting officer, his statements along with the other sources mentioned imply that there was more to the selection of a recruit than height and age.

The description of the ideal body provided by Vegetius seems to conform to the classical model of how an ideal body should look, if compared with the Greek sculptures of Polykleitos' Doryphorus, which is symmetrically balanced (Pollitt 1972: 107-8). This body type is not only represented in Greek depictions, but also in many imperial Roman sculptures from the first two and a half centuries AD. It is especially seen in sculptures of Roman emperors depicted wearing armour, such as the statue of Augustus from Livia's villa at Prima Porta (Lawrence 1972: 256-7). The soldiers depicted on Trajan's column are also idealised and illustrated with toned muscular bodies (Lawrence 1972: 273). Since the artistic depictions of soldiers' bodies fit the description provided by Vegetius it is possible that the writer's ideas originated from what he saw in the artwork surrounding him. Even though 4th century artwork differed in style from that of the 1st and 2nd centuries, many of the earlier monuments would have been visible. It is likely that active members of the military would have had the body type described by Vegetius, if they carried on with their daily exercises, so he may have discussed what he saw in the military rather than with the recruits. Although, it is more likely that the potential for men to gain this body type was what most recruiting officers were looking for in potential soldiers. One must not forget that all of the officers would not have originated from the same areas of the empire, and they might have brought different ideas or understandings from their cultural background about what made an ideal recruit. For example, some might have been looking for maturity, or the mental preparedness to fight, whilst others might have concentrated on the physical aspects of the men being examined. This idea is simply a suggestion because there is no literature that mentions this, and it is difficult to assess what the ideal body of people from the provincial areas would have been. Much of the artwork of the provinces and of the soldiers is somewhat 'block-like' or more abstract in form. The art is not always intended to be strictly representative as it is schematized, which makes a reading of its meaning more difficult. However, this difference in style may reflect variations in attitudes about the body throughout the empire. This may be used to support the possibility that different recruiting officers might have had different understandings of the body. A modern example of cultural variation in ideal bodies is seen in the female body. In western societies the ideal female body is depicted on fashion models who are tall and thin, but in reality few women fit this expectation. In contrast oriental women, for example, ideally should be petite. These ideals are not only culturally different, but historically constituted as well. Seventeenth century European art frequently depicts women as being voluptuous, far from the image of today. Furthermore, women in the European middle ages starved themselves for religious purity and girls living in the Victorian era saw an emaciated body as being associated with social superiority (Counihan 1999: 102). Thus, as one can see the perceptions of an ideal body can change not only from place to place, but from era to era and can conform to the social ideologies of the time, so the same can most likely be expected in Roman times. Therefore, recruiting officers could have carried with them influences drawn from their cultural backgrounds and have different ideas about bodies than the Roman.

According to Vegetius, those who passed the initial selection were then expected to take a second examination that tested their stamina in physical activities. This second test was suggested to have taken place because some recruits may have appeared stronger than they were, or those who might have appeared somewhat weaker may have been more suitable than originally expected: *"Sed non statim punctis signorum scribendus est tiro dilectus, verum ante exercitio pertemptandus, ut, utrum vere tanto operi aptus sit, possit agnosci"* (Veg. *Mil.* 1. 8). This second exam, unlike certain aspects of the *probatio*, is only attested in Vegetius, so Milner is unsure if it ever really existed (1. 8, page 9 note 2). It seems as if it should have been part of the exam as soldiers had to be physically capable of performing daily duties and training.

In spite of all the information provided to us by Vegetius, there is still very little that can actually be said about the process of recruitment. The only certainty is that there was some form of entry requirement in the Roman army, height being the one aspect that appears to have been uniform. Age and physical stature, on the other hand, cannot, at this point be understood.

4.3 Is there evidence for soldiers' health being maintained?

According to Vegetius, after a person had been recruited into the army he was then expected to have his health care maintained by the unit. In order to impede illness Vegetius suggests that preventative measures should be taken by the army to maintain soldiers' health (Davies 1989: 209-12). Health care in the army began with the location of the fortification. An adequate location was not only for its strategic position, but also for its salubriousness, as environmental factors were believed to have affected the health of the soldiers: *"loci salubritas eligatur"* (Veg. *Mil.* 1. 22; Jackson 1988: 37). Weather was another factor that concerned Vegetius because he believed heat and cold contributed to health and suggests precautions for the construction of fortifications. For areas with ample sunlight and heat he recommends tree cover, although in some areas of the frontiers, such as Africa, there may have been a problem complying with this instruction. For cold and damp places a good reserve of firewood is recommended: "*Locis, ne in pestilenti regione iuxta morbosas paludes, ne aridis et sine opacitate arborum campis aut collibus, ne sine tentoriis aestate milites commorentur*" (Veg. *Mil.* 3.2). More importantly, Vegetius stresses that an adequate supply of untainted water was one of the most desirable means of maintaining health, believing that pestilent water was the major cause of disease. Marshes were to be avoided, as the tainted waters were comparable to poison that could infect an entire unit: "*Nec perniciosis vel palustribus aquis utatur exercitus; nam malae aquae potus, veneno similis, pestilentiam bibentibus generat*" (*Mil.* 3. 2; Johnson 1983: 36). In support of this, and possibly where Vegetius gained the idea, is a statement by Onasander, who wrote during the reign of Claudius. In discussing the building of a palisaded camp Onosander argues that it must be in a location that is not too marshy, nor damp as rising vapours and rank smell could bring disease:

> "*τὰ γὰρ τοιαῦτα ταῖς ἀναφοραῖς καὶ ταῖς ἀπὸ τῶν τόπων δυσωδίαις νόσους καὶ λοιμοὺς ἐμβάλλει στρατεύμασι, καὶ πολλῶν μὲν ἐκάκωσε τὰς εὐεξίας, πολλοὺς δὲ ἀπώλεσεν, ὥστε μὴ μόνον ὀλίγον, ἀλλὰ καὶ ἀσθενὲς ἀπολείπεσθαι στρατεύμα*" (The General 8.2).

Considering Onasander wrote much earlier than Vegetius it seems that environmental factors had been a concern for a long period of time. Even in civilian life ecological conditions were important to Roman constructions. Vitruvius mentions placing rooms in houses according to the season that they were to be used so people could receive the best air, shade or sun, depending on what was necessary for their health (6. 4. 1-2). These suggestions were a consideration for the Greeks, as well. One of the Hippocratic writers (Decorum XV) states that the location of the bed of a sick person should be placed in an area according to the season and type of illness. Some illnesses required breezy conditions in which to be cured, whilst others required covered areas. The Hippocratic writer, as does Onosander, also suggests avoiding malodorous areas because smells can encourage, or aggravate an illness. It is attested in the archaeological evidence that attempts were made by Roman soldiers to avoid water becoming tainted. Cisterns, wells and aqueducts were constructed in and around fortifications (Johnson 1983: 202-6, 208-10). A number of cisterns were found throughout the fort of Housesteads, for example, as a means of providing a fresh water supply. Plumbing has also been found by archaeologists to have been an important feature in the construction of many fortifications (Johnson 1983: 209). Latrines were constructed with a drainage system that flushed bodily waste outside the fortification. In general the latrines were constructed against the defensive wall of the fortification, allowing for the drainage to be close to the exterior of the structure, rather than waste to be flushed through the entire site (Johnson 1983: 211-14). Bathing facilities were also common in, or nearby, fortifications and fresh water was brought into these structures, by aqueducts, springs or rivers (Johnson 1983: 204-6, 209, 210-11).

It is with the issue of health and the environment that one can compare the modern western understanding of health care with that of the Romans. As westerners we are aware that a clean environment is conducive to good health; however, the treatment of an illness in accordance to certain weather conditions and situating architectural structures to the season is something not considered in most modern western medical thought. Although this aspect is mentioned frequently in Roman and Greek literary sources, archaeologists have generally not compared buildings, rooms in buildings or even the layout of fortifications to see if there is any evidence of the Romans and soldiers applying rules relating to the positioning of buildings and rooms for reasons of health. Such a study would involve not only comparing the layout and aspect of a structure, but it would involve understanding the purpose of a specific room or building. This might sound a simple task, but there are some problems with the identification of structures in fortifications and of rooms in buildings (Chapter 6). Only when there have been more thorough studies of room function can this task be undertaken by archaeologists, who could then make comparisons of fortifications in different areas of the empire to see if all units used the same rules when constructing fortifications and buildings. Such a study would further scholars' understandings of how health care was incorporated into the daily lives of those living in the Roman empire, but at this point cannot be studied further in this thesis.

Besides the prophylactic measures suggested for construction, exercise was recommended not only for training, but also as a means of maintaining health. Exercise in armour was thought to be better for soldiers' health than a visit to the doctors, so the infantry and cavalry were advised to train on a daily basis, and they were even expected to do so during inclement weather; although, they might have performed indoors or under some form of covering, perhaps in a bathing basilica such as that at Caerleon (Zienkiewicz 1986). Their exercises also involved plenty of manual labour, which would have contributed to their physical fitness. Overall, soldiers were advised to be frequently involved in the felling of trees, carrying burdens, jumping ditches, swimming in the sea or rivers, marching at full step or even running in their armour and with their packs (Veg. *Mil.* 1. 9, 1. 10, 1. 19). In his manual, Vegetius states that Augustus and Hadrian expected the infantry and cavalry to proceed with a march three times a month. The infantry was commanded to advance ten Roman miles at the military step, armed and equipped with all their weapons and then retire to camp with parts of the march being completed at a brisker running pace: *"Praeterea et vetus consuetudo permansit et divi Augusti atque Hadriani constitutionibus praecavetur, ut ter in mense tam equites quam pedites educantur ambulatum; hoc enim verbo hoc exercitii genus nominant. Decem milia passuum armati instructique omnibus telis pedites militari gradu ire ac redire iubebantur in castra, ita ut aliquam intineris partem cursu alacriore conficerent"* (*Mil.* 1. 27).

Another form of preventative measure was to provide discharges to those soldiers whose suffering prevented them from continuing with their military career. Doctors granted these discharges, and there is a specific military example of a group of soldiers from Vindobona (Vienna) who were dismissed because of ill health (P. Rainer 165). Another example is provided through a military diploma, a plaque, usually made of bronze, given to a soldier upon his discharge from the army. A diploma from Bulgaria was given to a group as an honourable discharge because they had sustained injuries in a battle (CIL XVI 10 of 70 mart 7). The *Codex Iustinianus* states that men released from the army on grounds of ill health after serving twenty years were entitled to the official privileges granted to veteran soldiers (5. 65.1 AD 213 in Campbell 1994: 204). The seriousness of the discharge is demonstrated in the *Codex* by the fact that those who had been dismissed would not be given the opportunity to return to the army once a doctor had judged them seriously ill (12. 35 (36) 6 in Campbell 1994: 204). That doctors were able to discharge soldiers on grounds of ill health is a demonstration that precautions were taken in the army to keep the seriously ill or wounded from becoming a burden to the army, and it would allow for soldiers to recover properly. In spite of all the possible suggestions for preventative measures, soldiers still fell ill, or became wounded, so the question is what is known about how these soldiers were cared for?

4.4 Who might have provided medical care to the soldiers?

If a soldier became ill medical treatment was supposed to have been provided to him for free (*S.H.A.* Aurelian 7.8). The question raised by this statement is who were the people providing the medical treatment? There has been much academic discussion on this topic, as shall be mentioned below, in order to try and learn how the medical personnel were organised and ranked in the medical system of the army. Scholars have mainly used inscriptions and some excerpts of literary sources to determine the answers to these questions. Thus it is necessary to discuss what is understood about the types of medical personnel there were in the army. From here it will be questioned whether there is enough evidence from the inscriptions to say if there was an organised system of medical care in the army, or if it was flexible and varied according to place and/or unit.

One of the most common views of Roman military doctors that needs reconsideration is that the majority of them were Greek (e.g. Boon 1987: 54; Johnson 1983: 159 and to some extent Salazar 2000: 79). Since some of the first doctors to practise medicine without folk remedies were Greek, there is an opinion that the majority of doctors in Rome had to be Greek. This is also expected to be the case in the Roman army (Callies 1968). When looking at the names on inscriptions, using Wilmanns' prospopography (1995b: 141-252) mentioning military doctors, it is clear that many do not have Greek names, although some do, some have Latin names, and others have a combination of both Greek and Latin names. From the comparison it does not seem that there are any dates that specifically apply to when doctors with Greek or Roman names were more common in the military. The doctors with specific types of names do not seem to have been associated with a specific area within the empire either. It seems from the 93 inscriptions mentioned by Wilmanns that there is no doctor with particular cultural background that was particularly favoured over another in the Roman army. On an even more specific level, it does not seem that the legionary or auxiliary units favoured a doctor with a specific cultural background. For example, units stationed in the city of Rome, where one might expect more doctors with Greek names, had doctors with Latin names (e.g. CIL VI 37194=ILS 9071, CIL VI 2532=ILS 2093, CIL VI 2594, CIL VI 179, CIL 31145+p.3069). It is also advisable not to judge the ethnicity of the doctors by their names because they may have had a Greek name and culturally envisioned themselves to be Roman, as they might have lived in Rome or in a Roman style. Only two inscriptions from the frontiers in question have the home of the doctor inscribed on them, and their homes are not representative of their names. There is one with a Greek name, Zosimus, but his home was Ostia (Appendix 2, number 10). Whether he considered himself Greek or Roman is not certain, nor is the form of his medical practice. It seems that since he took the Roman name *medicus* he might have operated in a more Roman style of healing, but one must be careful when saying this because the doctors may have spoken Latin, but possessed non-Roman understandings of medical treatment. Another doctor named Aemilius Deciminus worked in Adium near Brigetio in Pannonia Superior, but came from Germania Inferior (Appendix 2, number 22). He has a Latin name, but one can question whether his home area dictated his medical thinking. Since most inscriptions do not have the home of the doctors inscribed on them, one cannot determine their place of origin. Thus, it can be said that not all doctors were Greek, and that one cannot judge the sort of medical traditions they followed because of their names. Furthermore, the assumption that all doctors were Greek is shown here to be somewhat of a dubious understanding in the context of Roman military medical treatment.

It has already been shown in Chapter 2 that medical care was provided to Roman soldiers, and more evidence has come to light in the form of an ink tablet from Vindolanda (Bowman and Thomas 1991: 93-4). The tablet is a daily strength report for the first cohort of Tungrians that lists soldiers who were available for their daily duties and those who were absent. The report (Inv. No. 88/841 period I dital) was found in the pre-Hadrianic area of Vindolanda, located in a ditch in the west defences of the earliest phase of the fort. The ditch appears to have been filled by AD 90/92 and would probably reflect the situation at Vindolanda a few years after the departure of Agricola (Bowman and Thomas 1991: 62, 66; Bowman and Thomas 1994: 93-4, 98). The heading of the report contains the date, the unit's name, the commanding officer's name and the total strength of the unit. Following this, it displays a list of the numbers of soldiers absent from the fort, followed by a total of those who remained in the camp. Of the remaining soldiers there is a roster of those who were unfit for duty listed in categories according to the reason for their absence. Fifteen men were recorded as sick (*aegri*), six were listed as wounded (*vulnerati*) and ten as having eye problems (*lippientes*), leaving 265 men to perform routine duties in the camp (Bowman and Thomas 1991: 66-9; 1994: 93-4). It might be implied from the tablet that there was some form of separation of soldiers in accordance with their illness, since it is curious why those unfit for duty were divided into three groups. One possibility for this division is that there were different doctors available to treat people placed in these three groups. In support of specialists, Galen does mention an eye doctor having been associated with a naval unit (Appendix 2, number 40), so it is possible that a specialist might have worked at Vindolanda. Another suggestion may be that the division corresponded to places where the different groups were being treated, and rather than having different doctors the patients were excluded from certain areas on account of their problem. Another possibility is that the divisions meant both the doctor and places for treatment were different for each group of patients. It must also be considered that this division might have been the means by which the Tungrians categorised illness in accordance with their been particular beliefs and understandings of illness and its treatment, and such a division was not applied in all of the units across the frontiers.

With the exception of knowing that ill soldiers were taken off of their daily duties and they were catagorised according to their specific problem, no additional information can be ascertained from the tablet about how health care might have been organised in the army. Thus, to try and gain a better undertanding of the system one must look to the inscriptions mentioning doctors to see if other information can be gained. It is clear from the medical inscriptions that there were several types of medical personnel in the Roman world, and Davies and Wilmanns have attempted to discern some form of structure to the rank and organisation of the doctors (Davies 1969b; 1972; 1974: 306-7; Wilmanns 1995 a & b). From the information surviving it seems that medical care in each fortification was the responsibility of the tribune or the *praefectus castrorum,* an official, junior in rank to the commanding officer and responsible for the logistics of the legion (Davies 1969b: 84; Davies 1974: 306; Davies 1989: 212; Wilmanns 1995a: 75-7). According to Vegetius the position of *praefectus castrorum* carried the responsibility of providing care for the sick and being in command of the *medici* (*Mil.* 2. 10). The *Digest of Justinian* also mentioned that one of the jobs of the *praefectus* was to inspect the sick (49. 16. 12. 2 Trans. Watson). However, it is the medical personnel below the *praefectus* whose positions remain to be understood with much certainty, as their rank and status are not described clearly in the ancient sources, or on the inscriptions. It seems that the camp commander was simply in charge of the doctors and making sure that medical care was provided to the soldiers. The most commonly mentioned doctors are those who were placed on the list of *immunes* quoted in the *Digest of Justinian* under the laws on military matters by Tarrutienus Paternus (L 6, 7; Watson Trans; Davies 1969b: 84; Davies 1974: 306-7; Davies 1989: 212). The *immunes* were soldiers designated with special tasks that allowed them to be dismissed from regular duties, yet they did not benefit from a higher rate of pay, receiving the same rate as the *munifex*. The medical personnel listed as *immunes* were the *optiones valetudinarii, medici, capsarii* and *qui aegris praesto sunt* (those who were responsible for the sick). Some other personnel included on this list were architects, veterinarians, arrow makers, carpenters, stone masons and librarians. This list shows that some of the medical staff fell into a large category of specialists who were paid the same rate, and perhaps were not considered to be of a privileged rank. This ranking of the different types of doctors by modern scholars makes the system in the Roman army appear similar to the modern military where ranks are inflexible. Wilmanns points out that rank in the Roman army was more flexible and complex compared with modern military groups (1995b: 53).

The persons holding the title *optiones valetudinarii* have been interpreted to have been in charge of the administration of the hospital and those who worked within it (Davies 1969a: 84). Wilmanns points out that inscriptions mentioning this position have only been found in legionary fortresses (1995a: 117-19). It is not even certain if this person did anything medical, except for possibly running the hospital, perhaps being someone more like an administrator or secretary. In the frontiers covered by this thesis, inscriptions mentioning *optio valetudinarii* have been found in the legionary fortresses of Bonn and Aquincum (Appendix 2, numbers 1, 25, 26). Outside the area of study, one inscription was found in Rome (CIL VI 175) and two in the legionary fortress at Lambaesis in Africa (CIL VIII 2563; CIL VIII 2553). No inscriptions for this position have been found in auxiliary units, but Wilmanns does mention an inscription for an *optio convalescentum* that was found in Lugdunum for a cohors urbana (1995b: 117; CIL VI 1057). Perhaps this position was similar to the *optio valetudinarii*, but it seems to be the person in charge of the sick, whilst the other seems to be in charge of running the hospital. It may be that the cohors urbana did not have a hospital, and therefore would not have needed an *optio valetudinarii*. Perhaps rather than ordering supplies for the hospital, the *optio convalescentum* ordered supplies for the doctors who used them on the patients in a number of places, such as the barracks or even the doctor's 'office'. Since the only known *optiones valetudinarii* are from legionary inscriptions it might be suggested that the medical organisation in legionary fortresses needed more administrative staff because of the higher numbers of people living within these (Wilmanns 1995b: 117). Hospitals are known to have existed, but whether they existed in all fortifications is not clear. Obviously if units did not have a hospital there would be no need for someone to run it. It is also possible that not every hospital needed a person in charge of it, which could also explain the small numbers of inscriptions for the *optio valetudinarii.*

Also mentioned on the list of *immunes* were the *capsarii*, who are mainly thought to have been responsible for the care of minor injuries and cleaning wounds, as the name refers to a box or *capsus* that was used to hold bandages (Davies 1969b: 83; Wilmanns 1995b: 122). Trajan's column has a depiction of a man in armour helping to bandage a wounded soldier, and the scene has been the source of much debate. It is often argued that it is a representation of a *capsarius* (Davies 1969: 84; Jackson 1988: 132; Wilmanns 1995b: 135). However, Scarborough maintains that it is not a doctor because the person is wearing armour, and this he feels is proof that there was no systematic medical care available to the soldiers, except the help of other soldiers (1968: 254). One could probably expect that anyone helping soldiers while in the midst of battle would be wearing armour to avoid being injured. Wilmanns, on the other hand, says that *capsarii* were so commonly known that anyone would have recognised one on the column (1995b: 135), yet, they might have also recognised the figure as a soldier helping the wounded. There is some evidence that soldiers knew first aid. Dionysius of Halicarnassus mentions that soldiers knew how to bandage themselves because sometimes they did it to avoid active duty (IX. 50. 5, mentioned in Scarborough 1968: 254), and this is proof to Scarborough that the depiction is of a soldier (1968: 254). Whatever the depiction on Trajan's column might be, there are still inscriptions surviving from auxiliary, legionary and *numerus* units that mention the *capsarii*. Overall the *capsarii* were probably minor doctors, but their work is deemed important enough to allow them to be excluded from the regular duties of a soldier. Wilmanns argues that they were part of the medical corp (*Sanitätsdienst*) (1995b: 74; 1995a: 173), that consisted of minor doctors who were more likely to have worked with the auxiliary units. Wilmanns believes that the auxiliary groups would probably not have needed as many *medici* because there were fewer people stationed in the forts (1995a: 174). In spite of her argument they do appear in all types of units, including a *collegium* from the legionary fortress at Lambaesis (CIL VIII 2553). Since some units seem to have numbers of them, rather than one, it may be that their jobs were somewhat like modern nurses. King argues that in the Greek medical tradition, nursing would have been the job of the doctor as a means of controlling his or her patient, or rather the control of the care (1991: 19). However, in the army where there were more people it is possible that a nursing position, if that is what it was, might also have been useful in units with large numbers of soldiers where extra help would have been necessary.

The duties of the persons designated as those who care for the sick, mentioned on the list of *immunes*, may have been as simple as feeding and comforting the sick. This could suggest that their medical knowledge was minimal (Davies 1969b: 84; Davies 1974: 306-7; Wilmanns 1995b: 55). There is no supporting evidence for this position, but there is a papyrus fragment of a letter from a soldier named Terentianus apologising to his father for not having been in touch because he along with the entire unit had suffered from an outbreak of food poisoning, due to the consumption of rancid fish (P. Mich 478 in Davies 1971: 130). In an earlier letter to this one, commented on by Davies, Terentianus apparently told his father that he had to be fed by others (1971: 130). This could have been performed by the person mentioned on the list of *immunes,* who may have been employed only to help when the need arose. It is also possible that the person mentioned in the letter was simply another soldier who was not ill and helping the doctors.

The *medici* are the most common type of doctor from the list of *immunes* mentioned on inscriptions; yet the duties of the *medici* are difficult to describe because there are a number of discussions by medical writers such as Galen and Celsus who tell of different expectations of doctors. To complicate the situation further, some doctors have titles added that differentiate them from the standard *medicus* such as *ordinarius, miles* and *duplicarius*. These doctors will be discussed below. The standard *medici* inscriptions are found throughout the empire in both military and civilian contexts, indicating that the occurrence of these medical personnel was wide spread. As for their careers in the military, Davies and Wilmanns believe that they could vary in length, and there does not seem to have been a set number of years a person was expected to remain in the military as a doctor as there was for soldiers (Davies 1969b: 83-6; 1989: 214; Wilmanns 1995b: 85). The length of time spent in the army would allow for more training and possibly for more security regarding payment, as, unlike civilian doctors, army doctors were guaranteed a salary (Wilmanns 1995b: 101).

The *medicus ordinarius* is denoted on inscriptions throughout the frontiers and according to both Davies and Wilmanns may have the same rank as a centurion as they believe the word *ordinarius* is synonymous with the title centurion (Davies 1969b: 89; Wilmanns 1995a: 175-6; 1995b: 80-8). Davies also states that in a general context an *ordinarius* had a higher status than the average medical orderly (Davies 1969b: 89). It is possible that these soldiers had a permanent position in the army and made it a lifetime career, giving them the title (Davies 1989: 214), which might be indicated on one inscription of an *ordinarius* from Lambaesis who was an octogenarian (CIL VIII 18314). Nonetheless, Nutton points out that there is no indication as to what the rank actually meant (1969: 268). The four known *ordinarii* on the western Roman frontiers are from legionary an auxiliary units as well as a *numerus* unit (Appendix 2, numbers 7; 18; 22; 39). This particular rank of doctor may have existed in other regions of the empire, but there is no evidence to suggest that it did, which might indicate that perhaps this was a position particular to the military on the frontiers. Since the *ordinarius* is attested from a variety of units it seems that the calibre of medical care did not differ between units, but at the same time it need not indicate that there was a standard organisation of care across the frontiers.

The *miles medicus* is another doctor whose rank and role is not entirely understood. Only two are known from the area (Appendix 2; numbers 2, 32), and there is another possible example from Poetovio (Appendix 2, number 23), an interior military colony in Pannonia Superior. According to Nutton there is the possibility that the soldier was proud of being both a soldier and a doctor so he had both titles placed on his tomb, or that he was a soldier who had gained medical training whilst in the army (1972: 267-8). Since the general term *medicus* was on the list of *immunes* there might be the possibility that a *miles medicus* was made exempt from regular duties because he was a doctor who gained his training as a soldier. Davies suggests it was a medical orderly who possessed basic knowledge and skill with the art of healing (1989: 214). Perhaps the person holding this position performed the daily duties of a soldier, but was only employed as a doctor when there were high numbers of casualties. At Iversheim, a legionary kiln works near Bonn, a *miles medicus* is known to have worked (Appendix 2, number 2; Wilmanns 1995b: 77). It might be that he was mainly a soldier who had medical training and was sent out to do the same work as the others at the kiln, but in case of an emergency he could then take on the role of a doctor and be made exempt from his regular duties until the situation had passed.

There are other types of military doctors not attested on inscriptions in the frontier areas concerned, but found in other military sites, providing an even stronger suggestion that there were variations in medical care between unit types and areas of the empire. Domaszewski argues that urban units and units stationed in Rome had *medici* with higher positions, as they were placed along with officers and senior commanders on inscriptions (1908: 15, 26). This may be comparable to the Praetorian Guard being the highest order of soldiers because of their close proximity to the centre of the empire. If Domaszewski is correct, urban military doctors might have been of higher rank, and he suggests that they were probably of a higher standard because of this. Domaszewski's argument is typical of a core-periphery understanding that the centre of the empire was somehow more sophisticated, with aspects of life of a higher quality than those on the frontier (Webster 1999: 24-5). However, the location of the doctors does not imply quality, nor does it imply rank, as those doctors stationed on the frontiers might have been equal to or better than their conterparts in Rome.

Rather than understanding the doctors in the urban units as being of higher rank and quality, it seems more plausible that they were simply different depending upon the needs of the unit. A specific type of *medici* mentioned for urban units is the *medicus castrensis*. The title is mentioned in two cases of urban units, one was a *medicus* in a unit of *equites singulares* from Rome (CIL VI 31,172), and the other was based in a cohort from Lugdunum (CIL XIII 1833). The title translates literally to camp doctor. The rank is not clear, but if the physician was a camp doctor perhaps it means that he was in charge of all the other medical care in the troop. There are two other types of medics only found in urban units. A *medicus clinicus* belonged to the Praetorian Cohort in Rome (CIL VI 2532). This position was thought by Davies to have been a doctor who specialised in internal ailments (1969b: 87; 1989: 214). Rome was a large city and could probably support a specialist, so it may be that the *clinicus* was living and working with civilians in Rome, but also worked for the army. Another specialist associated with the Italian troops was the *medicus chirurgicus* (*AE* 1945 62), probably a doctor who specifically performed surgical operations, or at least that is what seems likely to have been his or her main concern.

The idea of flexibility in the medical organisation might also be supported in the positions of specialised doctors. Few of these have been found in the epigraphic and literary evidence of the western frontiers and some of the positions might not have been entirely medical. Moreover, it is difficult to satisfactorily ascertain their regularity in the medical staff of the entire army. An eye-doctor is mentioned in Galen as being attached to the *Classis Britannica* (Appendix 2, number 40). A possible secretarial position was the *seplasiarius*, who was responsible for ordering ointments. Wilmanns does not believe that they were medical (1995b: 123), but the term is rather ambiguous and there is the possibility that the *seplasiarius* did order ointments used in medical treatments (R. Tomlin pers. comm.), so the existence of the position shall not be ruled out entirely. One inscription was found at the legionary fortress in Mainz, and perhaps, similar to the role taken by the *optio valetudinarii*, the *seplasiarius* was acting as extra secretarial help in a unit of many people and ordered ointments for both medical and non-medical needs. Another secretarial position was the *librarius*. The person holding this title looked after the paperwork for the entire unit rather than for a single part of the fortification, such as the hospital (Davies 1989: 212). It is probable that a smaller unit might have depended upon the *librarius* for ordering medical supplies, rather than an *optio valetudinarii,* or perhaps a *seplasiarius.*

There also seems to have been veterinary specialists in the army. Since veterinarians are not concerned with the health of the people stationed in the unit, it is pointless to mention them in detail here. However, a horse doctor, not known in any other unit, is mentioned on an inscription of a cavalry unit stationed in Egypt (IGRR I 1373). This may be a further indication that army units were provided with the choice of deciding which type of medical care they desired.

The descriptions of the types of doctors presented above are mainly those given by Wilmanns and Davies. However, their descriptions and understandings of the positions are tenuous, as there is very little available evidence, besides the pay scale, to understand the rank of the doctors, if there was one. Moreover, there is much ambiguity about whether some of the positions were medical, such as with the *seplasiarius.* Even though the scholars present interesting interpretations about what the titles might have stood for, their interpretations do not bring us closer to supporting the belief that there was a single system of medical care throughout the army. Here it seems that there is actually more evidence to support differences within the medical care system.

4.5 The comparison of medical inscriptions from the northwestern frontiers

Comparisons will now be made of the inscriptions of doctors from the western frontiers to see if there is more specific evidence of certain units or areas receiving more, or different, care in contrast to others. Although the sample is small, it provides a point on which to start such an investigation. There are only about 93 military inscriptions in total (this number is from Wilmanns' interpretations), but there is much that can still be said about the topic. The inscriptions are mainly from altars, tombs and unknown fragments that were found in a number of areas both within and around the fortifications. The inscriptions that are known may not be representative of the original number or original distribution. There are a number of possible reasons why the numbers of inscriptions in the archaeological record are low: many might have been re-used; inscriptions might only have been set up by people or units that had more money; certain units might have had more of a tradition for erecting inscriptions than others. Wood was sometimes used instead of stone for inscriptions, which does not survive well in the archaeological record. Sometimes the legions are thought to have had more inscriptions, but in the case of medical ones a number of legionary units in the area of study -Vienna, Nijmegen, York, Caerleon and Xanten - do not have medical inscriptions and many of the other fortresses only have one or two. Perhaps there was not a great tradition for medical inscriptions, or perhaps it was simply the preference of the unit or the doctor as to whether these were set up. Whatever the reason for the small number, this should not be a deterrent in attempting to ask new questions. It is possible that patterns can begin to appear even with a limited amount of evidence.

Overall there are 42 medical inscriptions from the area of study (Appendix 2); however only 32 of these are definitely military. The remaining inscriptions mentioned might be military: one of these (Appendix 2, number 42) will be discussed in chapter 6; three are not in the area of study, but have some bearing on the arguments (Appendix 2, numbers 4, 23, 41); and the others (Appendix Two, numbers 14, 15, 16, 17, 40, 41) might have a relationship with the military and will be discussed when necessary. There are variations in the number of inscriptions between the frontiers. Of those relating to identifiable military doctors and medical staff, three were found in Germania Inferior (Appendix 2, Table 1), Germania Superior has nine (Appendix 2, Table 2), Raetia one (Appendix 2, Table 3), Noricum one (Appendix 2, Table 4), Pannonia Superior two (Appendix 2, Table 5), Pannonia Inferior 12 (Appendix 2, Table 6), and Britannia has four (Appendix 2, Table 7).

There is an obvious difference between the numbers of inscriptions per frontier, and to attempt to understand why this might be a few comparisons must be made. The first is to see if there were specific types of doctors or medical staff only found in specific areas or units. Of the medical personnel the *medici* are the most commonly mentioned on the inscriptions. Thirteen are mentioned for the legions (Appendix 2, numbers 6, 11, 12, 19, 21, 24, 27, 28, 29, 30, 33, 36, 37), and five are definitely known from auxiliary units in the area of study (Appendix 2, numbers 3, 8, 9, 10, 38). There is one inscription that might have been associated with an auxiliary unit in Germania Superior (Appendix 2, number 14), but it was found in Italy, and the doctor is mentioned as having worked in two units. It has been placed under Germania Superior on account of Wilmanns' interpretation (1995b: 194-6), but without knowing the exact location of the units given on the inscription, or an exact date of when this doctor worked for the units, it is impossible to say exactly where the unit was located. A tentative 2nd century AD date is given for this inscription. The inscription does, however, indicate that doctors were able to move to different units whilst they served in the army. Overall, from this comparison the evidence shows that the *medici* worked in a range of units on the frontiers of Pannonia Inferior, Noricum, Germania Superior and Inferior and Britannia. Pannonia Superior is the only province that does not have an inscription of a *medicus*.

The *medicus ordinarius,* which has been argued to have the status of a centurion and ranked higher than the standard *medicus,* might be expected to only appear in the legionary units. In spite of this initial supposition it appears in all types of units. For the legions, one was found near Brigettio in Pannonia Superior (Appendix 2, number 15) and in Regensburg (Appendix 2, number 22). Wilmanns argues that another was found in Regensburg (Appendix 2, number 17), but there is so little of the inscription surviving that one cannot be too sure if it referred to a *medicus ordinarius*. As for other units, one was found in the auxiliary fort at Housesteads (Appendix 2, number 39) and another at the *numerus* fort of Niederbieber (Appendix 2 number 7). As the number of inscriptions for this type of doctor is less than the common *medicus* perhaps it was, as has been suggested, of higher rank, or simply not common in the army. Since inscriptions for the *medicus ordinarius* appear in a couple of provinces, it does not seem to be specific to one area. As for this position of doctor, more appear in the legions, but it is not specific to it, indicating that whatever the rank of the doctor might have been it was not exclusive to the legions.

Two inscriptions relating to the *miles medicus* are known from the area of study. One was from Aquincum and the other was found at the kiln works at Iversheim near Bonn (Appendix 2, numbers 2, 32). There is potentially one from Poetovio, a veteran's colony, that mentions a *medicus miles* (Appendix 2, number 23). This person had also worked for a legionary unit, so perhaps he too was a soldier who only helped to cure people when there was a need for extra help. Thus far, inscriptions mentioning the *miles medicus* are only known from legionary groups and this might easily be explained by the fact that there were more personnel in the legions and, therefore, more people of such rank. Perhaps they simply served as extra help when there was a need for more medical care. On the other hand, if the auxiliary units did not have a high number of medical personnel it would seem likely that they would have a person who could act as both a soldier and a doctor.

The *capsarii* are found on legionary inscriptions (Appendix 2, numbers 13, 20, 31), auxiliary inscriptions (Appendix 2, numbers 34, 35), and on one from the *numerus* unit of Niederbieber (Appendix 2, number 7). Again inscriptions of this type of medic are found in a number of different units. Wilmanns states that this is the one that would be more prevalent in the smaller units (1995a: 173; 1995b: 73), though this does not account for the presence of *capsarii* inscriptions from three of the legions. These epigraphic remains are only known from Germania Superior, Pannonia Inferior and Superior and Africa, possibly suggesting that *capsarii* were restricted to specific areas, or units that considered them a necessary component of their medical staff.

The *optiones valetudinarii* are only known from legionary inscriptions (Appendix 2, numbers 1, 25, 26). Since they are not found in the auxiliary units it might mean that the position was only needed because of the larger number of people living in the fortresses. Inscriptions relating to these are only known from Pannonia Inferior and Germania Inferior.

The information provided by the comparison of the inscriptions suggests that there were no differences over which type of units received health care. The auxiliary, legionary and *numerus* groups, from the limited inscriptions, appear to have had a fairly equal calibre of doctors offered to them. The legions have evidence for a wider variety of medical staff than the other two types of units. With the exception of the numbers of inscriptions from Aquincum, the numbers of inscriptions per legionary fortress is fairly equal to that of the auxiliary units, usually only being represented with one or two inscriptions.

As mentioned above, the numbers of medically related inscriptions vary between the frontiers. In the case of Raetia and Noricum inscriptions only appear for the legionary fortresses that were constructed after the Marcommanic Wars and none appear in the auxiliary units from the two provinces. The other province that does not have inscriptions associated with the auxiliary units is Pannonia Superior. In these three provinces it is possible that there were medical personnel stationed at the auxiliary units, but no inscriptions remain or were erected. It is also possible that the limited evidence of medical inscriptions from this area suggests that medical care was not provided in the units, or if it was it were, it was not the Roman-style medicine scholars expect to be found in all fortifications, but something based on the cultural background of the unit. In Raetia and Noricum it may be that the military event of the Marcomannic war prompted the introduction of medical inscriptions, or Roman medical treatment into the two provinces.

Germania Superior has the highest number of inscriptions and the greatest number of fortifications with inscriptions. This might be because overall it has the largest number of military installations in the area of study, and since it was one of the more active military areas, units might have had found it necessary to employ doctors. Britannia and Germania Inferior are fairly equal in their numbers of epigraphic material. Overall, from this general observation one can say that the arguments provided by Wilmanns and Davies about how the system of medical care was organised do not apply to the military as a whole. There are differences in the numbers of inscriptions between provinces, which might be a result of the number of fortifications per province. Provincial variations also appear in the types of units associated with medical inscriptions. Some provinces only have inscriptions from legionary fortresses, whilst Britannia has more from auxiliary forts and Germania Superior seems fairly equal between unit types. Thus the results of this comparison indicate that there was probably not a standard organised system of medical care. The medical care offered to the units seems to have been fairly equal in the types of doctors working in the different types of fortifications: legionary, auxiliary and *numerus* units, for example *medici ordinarii*, thought to be of higher rank, were found in all three units. Yet, each province varies with respect to one another in the fortification types that had medical personnel and in the numbers of staff.

4.6 Are the dates of the inscriptions indicative of any patterns of standardisation?

There might be the possibility that the dates of the inscriptions can provide more clues about why differences occur between the frontiers and units. Overall, the inscriptions date mainly from the mid-2nd century and 3rd centuries AD. Very few of these have an exact date. For the frontiers, the inscriptions from Pannonia Inferior date to the 2nd and 3rd centuries, Pannonia Superior to the late 1st or early 2nd centuries, the inscriptions of the doctors from Noricum and Raetia date to the late 2nd century after the legionary fortresses were constructed. The inscriptions from Germania Superior range from the 1st to the 3rd centuries, as do those from Germania Inferior. Britannia's inscriptions date to the 2nd and 3rd centuries. In general, the dates span the times when the frontiers were becoming more settled, as Pannonia Superior's line did not advance after the early 1st century and the inscriptions date to that period, whilst the remaining frontiers were either created or became more permanent in the 2nd century.

One can also ask whether a specific time period might be associated with the popularity of a certain type of doctor. The dates of the inscriptions for the *medici, medici ordinarii* and the *optiones valetudinarii* range from the early 1st to the 3rd centuries, so these positions were not distinctive to a specific period in time. Inscriptions of the *capsarii* and the *miles medicus* have a smaller range in date - the early second 2nd to the 3rd centuries. Perhaps they became more common when the military was becoming more settled and they could have been employed as extra help when necessary. In general though, it seems that most doctors were available to all types of units from very early on in the imperial period. Although there are more inscriptions from the legionary fortresses that date to the 1st century, this may be on account of the auxiliary units not being as established in fortifications as early as the legions were (Mann 1974: 510).

Wilmanns argues that the higher numbers of inscriptions with the dates in the 2nd and 3rd centuries is an indication of an acceptance of Romanisation (1995b: 133-4). If there were a vast acceptance of Roman style medical treatment it seems that a wider variety of units would have had doctors referred to on inscriptions, especially if the units were becoming permanently settled in certain areas in the 2nd and 3rd centuries. Those that date to the 1st century are from Germany and Pannonia Superior, regions that were fortified earlier, and the fortresses from which they come - Carnuntum, Mainz, Bonn and Vindonissa -played important roles in the early development of the frontiers. Thus, it is possible that the events of the time would have affected when and where the inscriptions were erected. Nonetheless, even during the 2nd and 3rd centuries, when more inscriptions appear, many units have no literary evidence of medical care, suggesting variations within the units and the provinces.

4.7 Cultural variations amongst auxiliary units

Since there are variations within the numbers of inscriptions per province one should consider other possible reasons for this besides date and events. Here is an opportunity to ascertain whether the number of medical inscriptions is directly correlated with the total number of inscriptions of each province or not. This will help determine whether the variety in the occurrence of medical inscriptions is a product of the overall inscription frequency or survival, or represents real variability in the provision of medical staff. A sample of just under 1,000 inscriptions was taken from a random selection of auxiliary forts to test the commonality of both medical and non-medical inscriptions. Only a selection was chosen and only from auxiliary units because it would have been impossible to locate all the inscriptions for every fort in all the provinces concerned; some inscriptions are not published, others are in obscure publications, or are published two or three times. By restricting the collection of information to the CIL and RIB references a solid and reliable sample of inscriptions could be obtained (Table 1). The sample contains forts that have and do not have inscriptions relating to medical personnel.

Table One: Ratios of medical inscriptions to non-medical inscriptions

Province	Medical Inscriptions	Non-Medical Inscriptions	Ratio of Medical to Non-Medical Inscriptions
Pannonia Inferior	2	59	1:29.5
Pannonia Superior	0	10	0:10
Noricum	0	42	0:42
Raetia	0	62	0:62
Germania Superior	3	345	1:115
Germania Inferior	1	60	1:60
Britannia	2	375	1:187.5
Totals	8	953	1:119.1

A random selection of forts was chosen from: Pannonia Inferior - Ulcisia Castra (CIL III 3638-3444, 10574-10578), Intercisa (CIL III 3326-3339, 10301-10325), Vetus Salina (CIL III 3340-3341, 10326-12332); Pannonia Superior - Schwecht (CIL III 4555-4664); Noricum - Melk (CIL III 5660-5670, 11804-11813), Traismaur (CIL III 5653-5659, 11794-11803), Comagena (CIL III 5650-5652, 11793); Raetia - Heidenheim (CIL III 5929-5932), Eining (CIL III 5935-5941, 11942-11958), Pfünz (CIL III 5918-5918b, 11926-11941), Epfach (CIL 5773-5784, 11887); Germania Superior - Obernburg (CIL XIII 6619-6628, 11772-11773a), Osterburken (CIL XIII 6566-6591, 11766-11769), Groß-Krotzenburg (CIL XIII 7408-7420), From Saalburg (CIL XIII 7444-7492), Heddernheim (CIL XIII 7330-7391), Stockstadt (CIL XIII 6629-6657, 11774-11798), Schlossau (CIL XIII 6503-6511), Neckarburken (CIL XIII 6489-6495), Canstatt (CIL XIII 6437-6447), Lopodunum (CIL XIII 6414-6425, 11739-11741), Rotweil (CIL XIII 6350-6357), Worms (CIL XIII 6212-6260); Germania Inferior - Valkenburg (AE 1975: 634), Roomburg (CIL XIII 8823-8826), Katwijk aan Zee (CIL XIII 8827-8828), Fectio (CIL XIII 8810-8819), Durnomagus (CIL XIII 8520-8528), Rigomagus (CIL XIII 7785-7820); Britannia - Binchester (RIB 1028-1040), Birdoswald (RIB 1872-1929), Carvoran (RIB 1775-1842), Housesteads (RIB 1576-1631), Carrawburgh (RIB 1520-1563), Chesters (RIB 1520-1563), Benwell (RIB 1327-1325), Wallsend (RIB 1299-1311).

First of all the, from the information that could be gathered in the sources, it is noticeable the distribution of fortifications with inscriptions varied greatly. There were higher numbers in Germania Superior and Britannia, whilst Pannonia Superior had a small number. A variety of factors contribute to the overall distribution numbers: the amount of archaeological excavations and publications of the finds that have taken place differ between areas, along with the size of the frontiers and the number of forts. Provincial customs no doubt relate to the production of inscriptions being made.

With this sample three provinces do not have medical inscriptions from auxiliary forts - Pannonia Superior, Noricum and Raetia. The auxiliary units do have other inscriptions, yet the numbers were generally lower in these provinces. Taking an average of one medical inscription per 119 inscriptions, more significant are the high percentages of medical inscriptions from Pannonia Inferior and Germania Inferior. There is a relative scarcity of medical inscriptions from Britannia. Germania Superior fits the expected average. In general what is implied from this study is that there is no easy correlation between the number of medical inscriptions with the total body of epigraphic material. The reason for this could include a differential use of materials - certain kinds of inscriptions being made in wood others in stone across different areas - or different traditions for making medical inscriptions in the military. Other reasons may be that each province, or unit was permitted to dictate how they wished to organise their medical care. Thus, the differences in ratio can suggest possible variations between each province.

Not only do numbers differ, but one can test whether there might have been units from specific areas that were more likely to have erected medical inscriptions in stone than other units. Since the legions do not give a name of origin they cannot be used to make such a study; however, the auxiliary units that had the name of their homes can be examined for such an inquiry. One might argue that the auxiliary units might have become culturally more Roman throughout time (Mann 1974: 515; Watson 1969: 144), but this is based on the assumption that groups would have wished to become increasingly Romanised, gradually shedding all of their original cultural identity (Cunliffe 1989: 126-7). Another question that must be considered is whether there were differences in the types of auxiliary units that might have evidence for medical treatment. There are a number of different varieties of auxiliary units: cohorts of infantry, *alae* or cavalry units, *cohors equitatae* a mixture of infantry and cavalry soldiers and special groups of archers all of which were in groups of either 500 or 1,000 soldiers. Before continuing, it must be made clear that there is no intention in this thesis to assume that each auxiliary unit consisted of a homogeneous group of soldiers from the same area with the exact same cultural practices and understandings. It is clear from inscriptions that there were different cultural groups within a single unit. From Britain the *cohors Tungrorum* has three altars (RIB 2100, 2107 and 2108) dedicated by groups from other areas of the empire. However, since it is difficult to determine cultural composition within a unit from the archaeological material, the unit names represent the securest means by which to gain an understanding of the make up of these groups, and hence explore culturally determined variations in medical practice. Table 2 shows where the units with inscriptions came from originally. There are eight inscriptions in the sample from auxiliary forts, along with one from the numerus fort of Niederbieber that has two types of medical personnel mentioned on it. The tablet from Vindolanda (Bowman and Thomas 1991: 62, 66; Bowman and Thomas 1994: 93-4, 98) discussed above mentions the sick, and it can be inferred from this that there might have been a doctor at the fort. Thus the table below lists the forts with medical inscriptions, the type of doctors, and the name of the unit. One inscription, possibly from Germany, mentions two units' names and is included in the comparison.

Table Two: Inscriptions relating to units from a known place of origin

FORT	PROVINCE	MEDICAL PERSONNEL	UNIT TYPE	UNIT NAME	PROVINCE OF ORIGIN
Ulcisa Castra	Pannonia Inf.	Capsarius	Cohors (1000) Sagittarioum	Syrorum	Syria
Dunaújváros	Pannonia Inf.	Capsarius	Cohors (1000) Sagittarioum	Hemesenorum	Syria
Niederbieber	Germania Sup.	Capsarii	Numerus	Exploratum Germanicorum	Germania
Niederbieber	Germania Sup.	Medicus Ordinarius	Numerus	Exploratum Germanicorum	Germania
Groß-Krotzenburg	Germania Sup.	Medicus	Cohors (500)	Vindelici	Noricum
Obernburg	Germania Sup.	Medicus	Cohors (500)	Aquitanorum Civium Romanorum	Gaul
Osterburken	Germania Sup	Medicus	Cohors (500)	Aquitanorum	Gaul
Valkenburg	Germania Inf	Medicus	Cohors Equitata	Gallorum	Gaul
Housesteads	Britannia	Medicus	Cohors (1000)	Tungrorum	Gaul (Belgica)
Binchester	Britannia	Medicus Ordinarius	Ala	Hispanorum	Spain
Vindolanda	Britannia	?	Cohors (500)	Tungrorurm	Gaul (Belgica)
Unknown	?	Medicus	Ala	Indiana Gallorum	Gaul
Unknown	?	Medicus	Ala	Astorum	Spain

From the table above it is obvious that the majority of different auxiliary types are represented in the inscription record. Two *cohortes milliaria sagittariorum*, or units of archers had *capsarii* in Pannonia Inferior. A *cohors milliaria* from Housesteads had a *medicus ordinarius.* Two *cohortes quingenaria* and two cavalry units were represented with a doctor each. As already mentioned, the *numerus* unit had *capsarii* and a *medicus ordinarius.* Since there does not seem to be any distinction between unit types, this implies that there was probably no discrimination over which units were to receive medical attention; generally supporting the idea of Nuttons's that all types of soldiers had medical care offered to them. Nonetheless, the small numbers of inscriptions could variously imply either that every unit was not receiving treatment, or that they were but did not have a tradition for making inscriptions, or possibly that they had other means of health care that was not classical and they did not call their doctors by Latin or Greek titles. This last probability is also in need of further consideration, and will be examined more thoroughly with the archaeological remains of medical tools in the following chapter.

If one looks at the auxiliary units with inscriptions, the majority of the doctors were in units from areas in Gaul. Of the sample of 12 inscriptions two were for Syrian units, one was for a unit from Germany, two were from Aquitania, two from Gaul, two from Gallia Belgica, two from Spain and one from Noricum. In addition to this sample is an ink tablet from Vindolanda (Bowman and Thomas 1991: 62, 66; Bowman and Thomas 1994: 93-4, 98). Although the number is small, it is curious that the majority of troops with evidence for Roman medical inscriptions come from different areas of Gaul. In comparison, the units in forts from throughout the area of study without medical inscriptions or evidence relating to medical care (Appendix 1 part 2) have auxiliary units from other areas of the empire not mentioned on Table 2. Thus, perhaps one could say that Gallic troops had more of a tradition for making inscriptions, but this would be too simple an argument. The reason is that when one examines the *corpora* of inscriptions it is noticeable that inscribed stones appear throughout the empire regardless of the unit's origin. Perhaps those from Gaul either adopted Roman medicine and incorporated it into their units, or adopted Latin titles for their healers.

4.8 Medical education

Another contributing factor to the divide in attitudes towards doctors, and also in medical thinking, was the education for doctors. There was no standardised medical education in the Roman world, and it seems that anyone could set him or herself up as a practising doctor. Since there was no regulated educational system, information about the different means of the doctors' training is not very accessible and much of what is available is fragmentary. Drabkin states that doctors could gain their training through an apprenticeship (1944: 336-7), which is supported by Martial, who describes students travelling with doctors to observe patients. He found some to be bothersome, as he says that when he was feeling ill, the doctor's visit with his hundred students made him feel worse due to the students touching him with their cold hands, presumably to gain experience: "*Languebam: sed tu comitatus protinus ad me venisti Symmache discipulis centum me tetigere manus Aquilone geltae non habui febrem, Symmache, nunc habeo*" (5. 9). Another possible means for gaining a medical background was for students to visit *auditoria* specifically set up for medical training. According to the author of the *Historia Augusta* on Severus Alexander (44. 4): *auditoria*, perhaps meaning schools, were available for the study of the arts, including medicine, "..*Medicis...salaria instituit et auditoria decrevit*" (44. 4). The location of the *auditoria* was not described in the text, but it might be presumed that the author was referring to places in the larger cities and on certain islands. The island of Kos and the city of Alexandria were known for their medical 'schools'; however, not every person intending to be a doctor would have received their training in these places.

For surgical experience, it was recommended in the Hippocratic work on the *Physician* (9. 219 L) for doctors to join the army because they would have a greater opportunity to observe injuries and to learn how to treat them through surgery:

"*ξυμβαίνε δὲ τὰ τοιαῦτα πλειστάκις καὶ ξυνεχέστατα περὶ τὰς ξενικὰς στρατιὰς γίνεσθαι.*"

In learning about anatomy, there was much debate about the practice of human dissection and vivisection in both Greek and Roman times. During the Roman era dissection of humans was prohibited, a main cause of debate. Celsus believed that dissection of bodies was advantageous; however, he did not agree with vivisection (*de med.* Proem. 40-44). Galen writes of one group of military doctors had the chance to dissect the bodies of a falen German unit:

"*κατὰ γοῦν πολλὴν σχολὴν οἱ ἀνατομικώτατοι τῶν ἰατρῶν ἐπισκοπούμενοι τά μόρια τοῦ σώματος, ἐν πολλοῖς ἐσφαλμένοι φαίνονται*" (2. 385 K,).

Romans did have some knowledge of human anatomy because dissection and vivisection were practised during the Hellenistic period in Alexandria, and some doctors would have had access to these studies. Furthermore, Galen mentions how animals were dissected during the times of the Greeks, and these studies would have contributed to their understanding of how the body functioned:

"*ἱκανῶς γὰρ εσπουδάκασιν οἱ παλαιὸι τὴν ἀνατομὴν, οὐκ ἰατρὸι μόνον, ἀλλὰ καὶ φιλοσόφοι*" (2. 280 K; Drabkin 1944: 338; Majno 1975: 405-9). Scarborough comments that Galen's statement about the dissection of the German is an indication that military doctors were not trained until they entered the army, and their reliance upon a fallen enemies indicates a lack of proper training and knowledge of human anatomy (1976: 74). However, it is possible that Scarborough's statement is too stringent, as doctors may have been trained, but simply wished to gain a better understanding of the physiology of the body.

Another aspect of medical training according to Celsus is that the study of medicine was divided in ancient times into three main areas - dietetics, drugs and surgery: "*Iisdemque temporibus in tres partes medicina diducta est, ut una esset quae victu, altera quae medicamentis, tertia quae manu mederetur*" (Cels. Proem 9.5; Jackson 1995: 192). This is repeated by Galen:

"...τό τε χειρουργικὸν λέγω καὶ φαρμακευτικὸν καὶ διαιτητικὸν καὶ μάλιστά γε το κατὰ χειρουργὶαν ἀμφοτέρων τῶν ἄλλων" (13. 604 K). It may be that these three areas were studied by many people who intended to become doctors; however, according to Baader (1967: 233-4), Galen mentioned a number of specialists who may not have learned all three areas of medicine. Specialists were mentioned for a number of areas: eye diseases, ear disorders, dentistry, throat operations, hernia, anal complaints, fever, dieting and hydrotherapy (On the Parts of Medicine 1.3. 2-1 in Baader 1967: 233 note 64). Celsus, however, only acknowledged specialists in eye care, believing a good physician would encompass the three main branches into which medicine was divided. In the military, as demonstrated above, specialists were known of, but without a large number of inscriptions it is difficult to assess whether they were common. The differences in the statements and opinions of both Celsus and Galen further enhances the argument that there were probably variations within Roman medicine, in this instance relating to differences in training.

Finally, both Celsus and Galen mention the skills a doctor and surgeon was to have. According to Celsus, "surgeons had to be youthful, or at any rate nearer youth than age; with a strong and steady left hand as well as right; with vision sharp and clear, and spirit undaunted; filled with pity, so that he wishes to cure his patient, yet is not moved by the cries to go too fast or less than necessary; but he does everything just as if the cries of pain cause him no emotion" (7 Proem. 4, Trans. Spencer). Galen suggested that "practitioners should merely be equipped with all the necessary drugs, foods, drinks and instruments to meet anything that might happen to the patient, it is their duty to foresee anything that might happen to the patient" (*de opti med. cogn.* 2, 6 Trans. Iskandar). Both explain that doctors had to be intelligent and skilful as well as caring. It is obvious that their ideas were not always considered. For example, an inscription from Lambaesis (CIL VIII 18314) mentions a doctor who was an octogenarian, and it seems fairly certain that he practised medicine until his death. Thus, this one aspect of Celsus' suggestion was not strictly adhered to.

From the medical training and different expectations of doctors it is again clear that there was some ambiguity over how doctors were perceived in Roman literature. Thus, when other groups encountered Roman doctors it is likely that they would have seen different styles of practice, developed through different ways of learning. Such differences, it is conjectured, may have made others wary of Roman medicine, reinforcing their faith in their own medical practices, which can tentatively be implied in the initial names of the units adopting the use of medical inscriptions.

4.9 Contact between military and civilian populations

One avenue that might show movement of medical ideas from military to civilian populations involves looking for evidence of Roman military doctors caring for civilians. There is also the chance that perhaps civilian healers might have been called into Roman fortifications for assistance. For the first part of the question, reference can be made to a burial inscription from Dacia, erected for a legionary doctor (Appendix 2, number 41). This seems to indicate that the doctor might have been given civilian honours by people living in the nearby *municipium*. Perhaps this was done because he had helped the local civilian population when they were in need of medical assistance. Many soldiers had wives and families who would have required medical assistance from time to time. Such contacts could have been a means for maintaining good relations between military and civilian groups. It could also be a method for a military doctor to learn more about the ailments of women and children, a skill that could be used by doctors who wished to practise civilian medicine after their service in the army was completed. There is not much to support the idea of doctors working after their service in the army except for the statement by the Hippocratic writer (On the Physician 9.219 L) saying that doctors should join the army to gain more surgical experience. Whether this advice was followed in Roman times is not known. It is, however, a possibility that some doctors would have wished to practise after working in the army.

Despite the obvious reasons for why a military doctor might have cared for civilians there is little solid evidence to support this. Some does, however, come from three inscriptions of doctors from the civilian areas located around fortifications (Appendix 2, numbers 4, 16, 21). These are from Carnuntum, Bingen and Vetera. The inscriptions were found in close proximity to the fortifications, perhaps indicating that they relate to military doctors who had set up monuments outside the fort, as there is a military inscription of a doctor from Aquincum that was found outside the military zone (Appendix 2, number 31). There is a problem with the location of these: many reports do not state whether the inscriptions were found *in situ,* and it is possible that the inscriptions were originally placed on the inside of the fortifications and could have been moved at some point. Alternatively, the doctors could have been non-military personnel who were available to help the army when necessary. One interesting point is that where there are inscriptions for civilian doctors, or rather inscriptions of doctors that do not mention a military unit found outside fortifications, there are no, or very few, inscriptions for military doctors from within the fortifications. Vetera and Bingen have no other medical inscriptions from the fortifications themselves, but do have them from outside the structures (Appendix 2, numbers 4 and 16 respectively), whilst Carnuntum has one inscription from the settlement outside the fortress

(Appendix 2, number 20) and it has the *spolia* of an inscription mentioning a *capsarius* found built within the wall of the so-called hospital of the fortress (Appendix 2, number 21). Since the doctors on these inscriptions refer to themselves as *medici* it suggests that their style of medicine was Roman, and perhaps those who inhabited the civilian settlements of Carnuntum and Vetera had more of a Roman lifestyle, Vetera being a military settlement and Carnuntum a civilian capital. As for the inscription near Bingen, it may be that the doctor also helped with the nearby legionary fortress at Mainz. Perhaps this doctor was influenced by Roman-style medicine and treated civilians in a Roman manner as he called himself a *medicus,* though it must be remembered that even though a Latin term is used it is also possible that the doctor had other means of practising medicine that might have been learnt through their own society.

For economic reasons it is clear that contact was frequently made between the civilian and military societies (Wells 1999). Simply because they traded with each other does not indicate that local inhabitants would have accepted Roman medical treatment, in fact they may have rejected it. Moreover, certain groups in the military may have had their own doctors and would not have wished to call upon local practices of medical treatment. Although Caesar states that soldiers on campaign were left in friendly areas when they were wounded one does not know what sorts of treatments were offered to the soldiers. Overall there is insufficient evidence to say whether military doctors cared for civilians or vice versa.

4.10 Conclusion

Even though no specific conclusions can be made about medical care in the Roman military from the evidence of inscriptions alone, one thing that is clear is that there is not enough evidence to support the current belief in a standardised system of medical care. The possibility must be entertained that medical traditions varied between military units. Some may willingly have accepted Roman style medical treatment, but others may, as part of a means of retaining aspects of their original cultural identity, have brought various 'indigenous' medical traditions with them. However, from the comparison of auxiliary units with medical inscriptions a pattern does seem to have emerged that units from Gaul might have adopted Roman-style medical care to a greater extent than other units. Since the number of inscriptions is low, archaeological evidence of surgical instruments must be looked at in conjunction with the epigraphic remains in order to explore whether there were either provincial or more specific cultural variations within Roman military medicine.

CHAPTER FIVE

New perspectives on the material culture of medical tools in relation to the Roman army

5.1 Introduction

Examinations of material remains in relation to their context, associated finds, and depositional practices can provide excellent opportunities for expanding our understanding of past societies, both where there is sufficient historical documentation and where there is not. In order to enquire further about the possibility of how military events, provincial and/or cultural variations might have affected the organisation of medical care on the frontiers this chapter comprises a comparison of the medical instruments found at fortifications from the frontiers concerned. The instruments can be studied to ascertain who was being treated - soldiers only, or possibly civilians. Inferences can be made into the deposition of the instruments and might demonstrate attitudes towards items relating to the body and illness; for example, whether they were expendable, something to be carefully curated, or whether through use they might have become 'polluted', thus determining the ways in which instruments were disposed of; and on a more general level this might provide some indication about how doctors and medical care were perceived through the soldiers' eyes. An examination into the aforementioned questions enables Roman medical archaeology to progress in new directions that can broaden our understanding of military medicine.

This chapter will approach the issues raised above by first questioning scholars' identifications of medical instruments. Here it will also be asked whether the modern scholars' categorisation of Roman medical tools into three different groups is necessary for understanding how Romans would have categorised and understood the function of their instruments. A discussion of the manufacture of the instruments is presented to see if regional variations in manufacture might be determined. Following this is a comparison of the assemblages of medical tools from different fortifications, which is provided to see if there are recognisable regional or unit variations within the way medical care was provided to soldiers. The final topic of concern is to enquire who was receiving treatment, as far as the instruments can indicate, and whether Roman style medicine was popular with both soldiers and civilians.

5.2 What is a Roman medical instrument?

Studies of military medical tools have been undertaken through empirical collections and typological comparisons; however, such studies did not question issues pertaining to deposition, contextually related finds, gender and cultural variations within the use of the tools, which has limited archaeological interpretations. Descriptions of the appearance and intended function of Roman medical instruments, as described by the 'rational' writers of Celsus, Soranus and Galen for example, have been the main concern of scholars interested in the archaeological remains of ancient medicine (e.g. Bliquez 1981, 1984, 1994; Braadbaart 1994b; Jackson; 1990; 1994b, 1995; Künzl 1983, 1996; Milne 1907). The instruments discussed in their works are only those that scholars have identified by comparisons with the texts mentioned above, which presents a one-sided understanding of medical tools. Contextual studies of the medical instruments and comparisons of their associated finds have so far not been made to see if the Romans, or people living in the provinces, had any other types of medical instruments that are not mentioned in the so-called rational medical texts.

Künzl (1986a: 30) states that archaeologists concerned with studying Roman medical instruments must continue with typological identifications. One reason for this is because not all of the medical instruments mentioned in the ancient sources have been identified in the archaeological record (Künzl 1986a: 30; Jackson 1990: 7; 1994a: 168). One cannot ignore the fact that these previous studies have supplied us with information about possible ways the tools were intended to be used in certain Roman situations. However, these studies have, unintentionally, hindered the possibility of making other inquisitive examinations into the understanding of Roman medicine by setting prescriptive classifications and forms of analysis on the medical instruments. Although the ascribed classifications help us to organise data, they may only have some approximations to past realities. Thus, the divisions are modern classifications that are then transferred directly onto our understanding of the past. Deetz has argued that "modern artefact typologies allows for controlled comparisons between collections from different sites. But such classifications are entirely formal, and arrived at, by necessity, independently of what the makers of the objects perceived as different types. With the rich documentary materials of historical archaeology, such classifications are not only sterile exercises, but are potentially very mis-leading" (Deetz 1977: 13). Moreover, Miller maintains that archaeologists try to make the artefacts fit very concrete forms, which served one function only, when it is more likely that they have a multiplicity of meanings and purposes (1994: 406). One example of how the single definitions of a medical tool's function has potentially mis-lead scholars into ascribing an incorrect function to a tool is apparent in the identification of some scalpels found in a structure identified as a *fabrica* on the Bonner Berg near Bonn (van Driel-Murray and Gechter 1984: 62). This structure has much evidence of leather working, and it is quite possible that the scalpels found within had been used to work leather, rather than being employed on people. Thus the modern identification of these as surgical tools need not exhaust the range of functions they were employed as. There is the likelihood that such artefacts could have changed their meaning and function throughout their life span, at one point being ascribed a medical function and another time perhaps a non-medical function.

Modern scholars have classified medical instruments into three groups: toilet, surgical and surgical/toilet (e.g. Riha 1986; Braadbaart 1994a & b). Since these categories are modern interpretations, they might not be an indication of how the Romans and others would have perceived them, and it is probable that the Romans did not place the implements in such specific groups. If one looks at the literary texts that describe the use of the implements there are no distinctions made between the different types in accordance to modern categories, as they all seem to be described equally. Archaeologically, they are rarely found in sets of one particular type, with the exception of the artistic representations of boxes of scalpels (Salazar 2000: 239-47). In this instance, however, it is a single type of tool, rather than a particular classification that is depicted. Rather than continuing with this tradition, the data derived from instruments used in this thesis was not divided into these categories, simply because they are too strict. For example, scalpels are placed in the category of surgical instruments, but they might have been used for preparing medicines, or cutting bandages, and as shown above they could also have had functions not related to medicine. The identification of surgical/toilet instruments is also not without problems. They are often relegated to being considered somehow less important by modern scholars for providing evidence of medical treatment, yet they are described by Celsus and Paul of Aegina, for example, to serve functions in a number of surgical procedures.

The one category not considered in this thesis was that of toilet implements. These were not considered because they tend to imply personal use, rather than having been used by a doctor on a patient. Since this thesis is looking at the possible differences in the use of Roman-style doctors and medical practices, personal hygiene, although an integral part of health care, was not considered. Items not considered here include more personal items that generally consist of chatelaines (sets of nail-cleaners, ear probes and tweezers attached on a ring), and tweezers under six centimetres in length. The identification of tweezers for personal hygiene and forceps for surgery are again based on modern definitions of their functions. There is nothing in the Latin or Greek sources that describes their difference, but modern interpretations generally define tweezers for personal use as less than eight centimetres long (Bliquez 1988: 50-1), whilst forceps, instruments that measure 10cm or more, are defined as surgical tools. Usually those found suspended on a loop are defined as having a personal use; however, even these could still be used in the treatment of ophthalmia (Bliquez 1988: 50-1). Though if the tweezers had a round hook for attachment to a chatelaine set they were not considered in this thesis. In general this study only uses instruments of six centimetres or more, but it is possible that even these forceps were used for personal hygiene rather than surgery. Thus, the identifications are still difficult to define, but given the possibility of personal use, rather than doctors' use the instruments were not considered.

Another problem with the use of these categories is that the instruments are regularly taken out of their archaeological context when it comes to recording, and published in separate classes rarely mentioning other objects found with them, artefacts that may shed greater light on our understanding of medical practice. Such frustrations are aired for many aspects of Roman archaeology, as Allison (1997: 78) has discussed with problems in her work on room contents in the houses of Pompeii. She found her study hindered by the lack of information in the finds catalogues because objects had been divided into distinct categories without contextual information. The omission of such information in any study, and specifically with medical instruments, leaves one with less of an understanding of original material associations - that is of what combinations of objects might have been employed in medical treatments, and objects that might have been considered a necessary part of the rituals of medical treatment. (The term ritual is used here in accordance with Victor Turner's work on healing, where healing is interpreted as a ritual, which is described as a process of mediation between different states of being including the healing process (Turner: 1974)). In support of ritual, or 'irrational' aspects in Roman medicine, archaeological evidence of sanctuaries, amulets and altars to medical gods indicate that they were either used in conjunction with rational aspects, or rational medicine was not always trusted or even practised. Thus certain objects occurring with recognised medical tools might have served a function in the ritual of medical practice that has yet to be understood. It also becomes problematic when the context is known, but not considered to be of much importance. This might be the case with a cupping vessel from the Roman fort at Zugmantel that is argued by Künzl to be 16th or 17th century because of its design; however it was found in a Roman context, in celler 77, and it is argued to be a stray find (1984/5: 31). Here the logic of classification overrides the archaeological evidence. If the date of the artefact is correct, we must question how it was placed in a sealed Roman context. But if we consider the fact that is was found in such a context one can ask a number of questions. Did the Romans have other types of cupping vessels of which no other examples survive? Is it possible that the indigenous population of the area, or culture of the soldiers living in the fort developed their own cupping vessels that did not conform to the Roman designs with which we are familiar? Even though it is possible that the identification is correct, the archaeological context should not be relegated to a secondary status.

Objects found in tombs with identified medical tools might begin to shed some more light on the full range of medical beliefs and practices. A tomb from Stanway, Essex (Jackson 1997: 1471), has identifiable surgical instruments along with pottery, a gaming board with gaming pieces and iron rods, which might have been used for divining. The instruments were found on the game board, in close proximity to the rods; perhaps these two objects might have had an important 'ritual' aspect to the medical treatment offered by the doctor. Künzl's study of medical instruments found in tombs mentions other finds buried with medical tools, but he does not consider their possible functions in the ritual of medical practice (1983). Some of these finds are rather unusual, such as three Neolithic stone axes (Künzl 1983: 57), a cuttlefish bone (Künzl 1983: 59) and an iron bell (Künzl 1983: 79). It can be speculated that in certain areas these items might have been used as charms, or tools that were integral to medical treatment. While the medical texts give one perspective on medical treatment, the material culture can be used to establish culturally determined behaviour and to ask what other practices people are expressing through their objects. Therefore, it is possible that we do not have a strong understanding of what other items were important to Roman medical practitioners, or in treatment outside the context of Rome.

Like Allison (1997), this thesis has its short-falls in the fact that very little contextual information is available from the museum records and publications, information that could help expand on our knowledge of different Roman medical tools and practices. Thus, only the instruments that have already been identified as such and are similar to those found in

Italy, especially Pompeii, were considered in this thesis as a means of determining the spread of some aspects of Roman medicine. At the same time it does aim to attempt new methods of approaching the subject of the material culture of medicine.

5.3 Manufacture of instruments

Before comparing the instruments something must be said about their manufacture as a means of understanding trade and distribution. An understanding of the distribution of the instruments could have affected the way medical knowledge was spread and how implements were used.

Like so many aspects of Roman archaeology, there is the assumption that any object that appeared to be Roman was based on a standardised design that was centrally produced. For example Samian ware was manufactured in Gaul and distributed throughout the empire. A recent study of material culture from military sites in Germany has shown that people living in *vici* were fabricating items for soldiers in the styles the soldiers requested. Therefore, manufactured goods that appeared Roman (and Roman is here related to people from Italy), or who adopted a lifestyle from this area, was not necessarily made by Romans (Wells 1999 145-6). Some items found at the military sites also had native influences incorporated into them from both the people making the objects and the soldiers who had requested them, such as pottery and metalwork (Wells 1999: 145-6). Wells has noticed that Germanic societies were becoming more 'Roman' and Romans on the provinces more 'Germanic' (1999: 226). Other evidence for interaction where Roman soldiers were using local items can be seen in Germanic ceramics found in the fort of Zugmantel on the Rhine frontier (von Usler 1934, 1980). Therefore, the question is who was influencing whom?

Moreover, objects need not be linked to specific ethnic identities – material culture can be quite flexible – the way it is adapted and used and the functions and the meanings are often entirely re-worked (Jones 1997: 106-8). This means that even if a medical tool is adopted by a group living in a Roman province it might not have been used in the way Romans from Italy would have understood it.

As far as medicine is concerned, the question of who, meaning group of people rather than an individual, was making the instruments has not been an issue of much concern in most scholarship. A possible reason for this is that the instruments tend not to vary much in design between provinces, something that became evident in the museum research undertaken for this thesis. The main concentration of research in this area has been on the practical aspects of how the instruments were made (Healy 1978; Jackson 1990: 10-11). On the whole, there is not a large variety of surgical instruments in the archaeological record. This is probably because in the majority of cases one implement could be used to treat a number of medical problems; therefore the so-called 'doctor's kit' often only contained a few specific types of instruments (Jackson 1988: 114). Certain more specialised instruments, such as syringes, specula and trepanning saws, have been found, but they tend to be rare, and might represent treatment by a doctor who specialised in treating specific ailments. As discussed earlier, it is likely that the army did not support large numbers of specialists. Sometimes it is argued that the surgical instruments can be used as an indication of the presence of a specialist, for example the doctor's tomb at Bingen had a trepanning saw and other instruments that were used for treating bone injuries (Appendix 5 Table 25; Como 1925). The instruments from Bingen were found with more common instruments such as scalpels, hooks and probes. It may be that it was not an uncommon medical set, simply one that has survived because the tools were buried with the person who used them, made them, or perhaps was close to the doctor or maker. Perhaps bone-working tools were passed down from doctor to doctor, or were recycled which could explain why they are not as common in the archaeological record. All these possibilities must be considered before determining the possibility of medical specialisation and the rarity of instruments.

The types of materials used in the manufacture of the instruments could explain the ease or difficulty in making the instrument, and furthermore could have added to the cost and rarity of the instrument. Surgical instruments were made with a variety of metals, but copper-alloys are the most common because the metals were easily obtained and simple to work and cast (Healy 1978: 249). The metal was also resistant to rust, which would have lengthened the life of the implement. Other metals such as gold, silver, copper, tin, lead, iron and zinc were employed in the manufacture of the instruments. Gold and silver items are scarce, and archaeologists tend to agree that they were either luxury items or votive offerings (Healy 1978: 149-50). Some instruments have gold and silver inlay or gold platting to make the instruments more appealing to the patient, or indicating the status of the doctor or patient; however as Lucian said he would rather have a doctor with a rusty knife than a charlatan with a gold one (Chapter 4; *The Ignorant Book Collector* 29), suggesting that nice-looking instruments did not fool everyone. Iron was used for cautery ends and bone-working tools such as forceps and saw blades, but it could also be used for scalpel blades. Scalpel blades were made of steel (Appendix 3). It has also been suggested that some metals were used for their healing properties, such as lead tubing for gynaecological instruments (Healy 1978: 246-8). However, there are other instances when it seems as if the maker of the instruments was fabricating them from whatever materials they had close at hand (Jackson 1990: 10). Instruments as seen in appendices 4 through 10 were sometimes made of bone, especially spoon probes and ear probes. Horn and glass have also been mentioned in the fabrication of cupping vessels (Appendix 3). Albucasis, a 10th century Arabic medical writer, who drew much of his information from Roman and Greek sources, mentions vaginal specula being made out of boxwood (Spink and Lewis 1973), and this could be an indication that perishable materials were used in the construction of instruments and perhaps even explains why some are so rare, such as specula. Therefore, some of the instruments that have been mentioned in the literary sources, but for which we have none or very few extant examples, might have been made in larger numbers, but of perishable materials. Alternatively they might have been constructed of very specific materials that were difficult to obtain, and so made only in small numbers when necessary.

Most of the metal instruments were made by both casting and hammering the metal (Healy 1978: 249-51). The main body of the instrument would have been cast while the finer details in the blades and teeth would probably have been worked into shape by hammering and/or filing. The more complicated instruments such as specula and trepanning saws probably took more time to make and also would have required more skill, so this too could be an explanation for the scarcity of these instruments.

It seems that the majority of instruments were fairly simple to make, so it must be asked if any metal workers could have manufactured the instruments, or if most had been made in special workshops and ordered by doctors throughout the empire. There is some evidence that medical supplies were ordered for military hospitals. A papyrus fragment of an order form from a military unit in Asia Minor (BGU 1564=Sp 395, papyrus Egypt 138; Campbell 1994: 239), mentions white blankets of soft wool being ordered for the military hospital, so it is possible that tools might have been ordered in this manner as well. The blanket was made from wool, a raw material that was probably easily found throughout most of the empire, so perhaps this was ordered on account of a specialised skill involved in its production, rather than lack of raw material. Certain metals could not be obtained in all areas of the empire (e.g. copper and tin), so the metalworkers would either have to order the raw materials to make the objects, or import the goods or recycle. It probably depended on what the manufacturer deemed important to their business, and the demand of instruments from those who were purchasing the tools – soldiers, the army or doctors.

Another indication of who made the instruments comes from inscriptions marked on some of them (Künzl 1983: 31-3; Künzl 1984). Gostenčnik (1997) has recently examined forceps with the name 'Agathangelus' inscribed on them. This name appears on a number of forceps throughout the western empire and these also have a very distinctive shape. Gostenčnik has looked for parallels in both the shape and the name to determine where the workshops of Agathangelus might have been located (1997:147). From her examination it seems that there might have been two workshops, one in Italy and one in Gaul. Although her study focuses only on a few instruments, the stamp demonstrates that some instruments were being made in specific places, and doctors or people were buying them from certain workshops. It is also plausible that the doctors would commission instruments from metal-workers in the area where they served or trained and then take their instruments to wherever they travelled, possibly explaining the various locations of the instruments with the stamp.

Künzl (1983: 33-5; 1984) also states that styles of decorations might be a means of determining where the instruments were being made. There has been little study on this aspect. From the museum visits undertaken for this thesis it is apparent that this would be a most difficult task, and there did not seem to be any typical design from a specific area. However, a more accurate means of determining either the place of manufacture, or at least the place where the raw materials came from would be the employment of metallurgical analysis (Jackson 1990: 10). Once a specific program of metal analysis has been made then perhaps the decorations of the instruments can be analysed with more care to see if there are specific regional variations in manufacture.

It may be that the certain instruments were made at the fortifications. Metalwork was routinely undertaken within fortifications, and the fortress of Neuss has a room in its so-called hospital that had a high number of instruments, which might suggest a place of manufacture. These instruments are mainly probes (Appendix 4), suggesting the possibility that only certain instruments might have been made locally, whilst others might have been commissioned from special workshops. Alternatively, the instruments may have been stored or deposited in this building.

There are many ways in which instruments could have been obtained by doctors working within Roman fortifications. Yet, the manufacture of the instruments is in need of more study by archaeologists with specialist knowledge of the techniques of metal working and metal analysis in order to see if there were regional differences in fabrication. This could give us a stronger basis on which to examine the possibilities of trade and interaction with medical beliefs. It could also be another means of examining the possibility of regional and cultural variations in medical practice.

5.4 Comparison of the data

An empirical study of the medical tools is not the main concern of this thesis. The collection of data was not undertaken entirely for its own sake, nor was it the intention to produce a fully comprehensive catalogue of medical instruments on the frontiers. Rather, the intention was to generate as large and as representative a sample of medical tools from the military sites as possible in order to examine questions about variations in medical practice. All of the instruments gathered in this study are described in the appendices (Appendices 4-10). Descriptions of the intended medical functions, as described by the Roman medical writers, of the implements are provided in Appendix 3.

This study constitutes a sample of 1,078 instruments. Germania Inferior has 13%, Germania Superior 43.9%, Raetia 7%, Noricum 2.7%, Pannonia Superior 18%, Pannonia Inferior 2.7% and Britannia 11%. In itself this comprises a large sample, though it is here broken down to smaller units based on province, unit type and instrument type for the purposes of analysis. Although in some cases the artefact population is small (e.g. in the case of instruments from *numerus* forts), the validity of observation has been treated on occasion by the mean of chi-square tests; though it should be remembered that statistical significance and archaeological significance are not always the same thing (Fletcher and Lock 1991: 11-12). Archaeological significance is often more dependent upon contextual patterns or perceived significant variations from normal representations (e.g. the apparent overabundance or exclusion of specific finds from an artefact assemblage or site).

The total number of known fortifications is roughly 226 in the area of this study. Of the fortifications that have been examined there are 69 known to have produced medical instruments, representing 30.5% of the 226 fortifications (Fig. 55). Germania Superior has the highest number of fortifications with instruments (26), whilst Noricum has the lowest (one). One problem with Noricum may be the lack of archaeological work on military fortifications in comparison with the other provinces. Though, having said this, there have still been archaeological excavations on auxiliary forts in the province, so there may be other reasons for the lack of medical artefacts. This general survey shows that the number of fortifications with a yield of medical instruments is greater in the two Germanies, Britain and in Raetia. There is a noticeable decline in the numbers on the mid- and lower Danube areas. However, another issue of this comparison is to examine whether the percentages of fortifications with instruments is the same for all of the provinces, given the fact that each has a variant number of fortifications overall. Germania Inferior has 28%, Germania Superior 30%, Raetia 37%, Noricum 5%, Pannonia Superior 36%, Pannonia Inferior 10% and Britannia 54% of fortifications with instruments. This variation according to province between fortifications with or without instruments can be shown to be statistically significant (Appendix 11), illustrating apparently genuine regional differences. There is enough variation to suggest that on a provincial level at least, there is a probability that there were differences in the supply of medical care offered to the soldiers. This provides a hint of the possibility of provincial, rather than centralised, control of the medical care system.

From here it is necessary to enquire whether there is evidence for difference between the types of units receiving health care. A chi-square test was made (Appendix 12) comparing the number of legionary, auxiliary and *numerus* forts with instruments. The comparison is just significant falling between the 1% and 5% levels. The problematic part of this test is the inclusion of the *numerus* fortifications, because only those in Germania Superior have medical instruments. Therefore, for the *numerus* forts the expected numbers all fall below five, a small sample number (Fletcher and Lock 1991: 63); however, for the legionary and auxiliary fortifications the expected numbers are all above five, so the test for this remains valid. It also must be kept in mind that there are more auxiliary forts in each province compared to legionary fortifications. One would then expect a higher number of auxiliary forts to have instruments compared to the legionary fortresses. However Pannonia Superior and Noricum only have instruments from the legionary fortresses, with the exception of one instrument found at the auxiliary fort near Vindobona (Fig. 56). Pannonia Inferior has only one auxiliary fort and one legionary fortress with instruments, so the number is equal. Overall, both the epigraphic (Chapter 4) and artefactual remains demonstrate that the provision of medical treatment was made available to the different types of units from all the frontiers except Noricum and Pannonia Superior. On a percentage basis each province varies greatly with regard to the percentages of auxiliary and legionary fortifications providing evidence of Roman style medical care. For example, the auxiliary forts in Germania Superior make up 84% of the number of fortifications with instruments, whilst they make up only 55% in Germania Inferior. These differences not only suggest provincial variation, but possibly differences within the organisation of each fort. It is possible that the supply of medical care was under the auspices of the fort commander rather than provincial administration.

To take this investigation even further, comparisons of the total number of medical implements per province were made to see if there is additional evidence for their variations in health care. As mentioned, the total number of implements is 1078 and they vary considerably between provinces, with Germania Superior having 474 and Pannonia Inferior having 30 (Fig. 57). At first it might be assumed that this difference is accounted for by the amount of excavation that has occurred at each site, yet some have seen similar amounts of excavation, but with varying numbers of medical instruments being recovered. For example, 326 instruments were found at Vindonissa compared to 38 at Caerleon. At the same time some sites have seen little or no excavation because of their location, under medieval towns and modern urban centres, and this might account for the low numbers of artefacts from some sites, such as York and Mainz. Carnuntum and Vindonissa (Appendices 5, Table 2 and Appendices 8, Table 1) have a far greater number of instruments than other fortifications, demonstrating that the difference in the instrument numbers per province can be affected by a few fortifications. Yet, to present a broad idea of the numbers of instruments: Germania Superior has 474; however 326 of those are from Vindonissa, otherwise making the number 148, which is still the highest, next to Carnuntum which has 197 instruments. This sample has been subject to a chi-square test (Appendix 13) comparing the total number of instruments per province according to unit type. Again there are low numbers of instruments from the *numerus* forts, but the auxiliary and legionary fortifications have produced enough to be valid for the test. Even with this discrepancy the test shows significant variations between numbers of instruments per unit type and province, as the chi-square value falls well below the 0.1% level, again demonstrating that there is a significant difference in the evidence for medical care between the frontiers.

When examining the total numbers of instruments found in each type of unit, the legionary fortresses have a greater amount of material evidence, except in Britain and Raetia where the auxiliary forts have the higher numbers of implements. In Pannonia Inferior the numbers of instruments are the same between the one legionary and one auxiliary unit (Fig. 58). One reason to account for the higher number of instruments in the legionary fortresses might be the higher population of people living in these structures. It is likely that most legionary fortresses had a population of 4,000 to 5,000 men more than auxiliary units (Johnson 1983: 17-26). As for those provinces with a higher number of instruments in the auxiliary forts, one explanation might be the greater number of forts. The higher numbers of instruments from the fortress of Vindonissa might be explained by fortification conditions of survival, as a large number of instruments were found in a waterlogged deposit known as the Schutthügel (Fröhlich 1910: 126-9). Carnuntum's high numbers might be explained by the lack of precise provenance for many of the instruments: many could have been found in the civil settlement surrounding the fortification and possibly from the auxiliary fort in the region. Nonetheless, these are somewhat superficial explanations for the differences and there might be more substantial reasons that can be advanced.

The differences in the numbers of instruments per frontier and unit might be accounted for by the military events that occurred in each province. Raetia and Noricum were peaceful provinces until the Marcomannic wars (Chapter 3), and they did not have legionary fortresses constructed until after this event. Significantly, in Noricum the only medical evidence comes from this later time, both through inscriptions and finds. As for Raetia, many of the auxiliary forts have a small number of instruments; some of these also date to after the Marcomannic wars. The provinces that had the most warfare appear to have the highest numbers of instruments overall. Pannonia Inferior, however, is the exception to this as it was important to the Dacian campaign of Trajan and the Marcomannic Wars, so why there are not more instruments recorded, from this point of view, is surprising. Another inconsistency into possible expectations can be seen in the comparison of the German provinces and Pannonia Superior. Both were placed close to rather volatile tribes and Pannonia Superior was also affected by the Marcomannic Wars, so it may be expected that medical care would be well represented in the archaeological record; however evidence for it is only found in the legionary units. It is possible that there were military implications for why more evidence for medical care appears in some provinces and not others, but the two Pannonias do not follow the suggestion, so one must look to other explanations.

5.5 Specific instrument comparisons

From the study of inscriptions we have seen that certain categories of doctor are found in different unit types, but are only located in specific provinces. For example, evidence for the *medicus ordinarius* was found in all three unit types examined in this thesis, but only in a few provinces: Britannia, Germania Superior, Raetia and Pannonia Superior. Yet, the sample of inscriptions is too small to make any secure statements. This pattern can be tested further by juxtaposing specific instrument assemblages with unit types and provinces. Overall, Table 3 shows that certain types of instruments are far more common than others: spoon probes, spatula probes, ear probes, scalpels and forceps, and these generally appear in all of the provinces and unit types. However, it is the legions of Germania Superior, mainly at Vindonissa, that have the highest number of probes, as does Carnuntum. Scalpels are also common, but more seem to have been found in the two Germanias.

Table Three: Instrument types per unit type and province

Instrument Type	GI Leg	GI Aux	GS Leg	GS Aux	R Leg	R Aux	N Leg	PS Leg	PS Aux	PI Leg	PI Aux	B Leg	B Aux
Spoon Probe	20	8	68	15	1	21	8	28	1	2	8	11	10
Spatula Probe	20	5	49	13	0	13	6	25	0	0	0	3	5
Double Olivary End Probe	0	0	4	1	0	0	0	0	0	0	0	1	0
Double Simple Probe	0	1	0	0	0	1	0	0	0	0	0	0	1
Ear Probe	23	6	192	10	0	18	7	113	0	2	4	17	29
Button Probe	0	0	0	1	0	0	0	0	0	0	0	0	0
Olivary End Probe	9	2	3	8	0	11	3	10	0	0	0	9	3
Shears	0	1	0	0	0	0	0	0	0	0	0	0	1
Ointment Pallet	6	2	0	4	0	0	1	0	0	0	0	0	6
Medical Box	2	0	0	1	0	1	0	0	0	1	1	0	0
Instrument Case	0	0	0	0	0	0	0	1	0	0	0	0	0
Spoon Scoop	1	0	0	4	0	0	0	0	0	0	0	0	2
Scratcher	1	0	0	0	0	0	0	0	0	0	0	0	0
Scale	0	0	0	0	0	0	0	0	0	1	0	0	0
Scalpel	12	4	9	19	1	1	1	7	0	1	2	1	4
Bifurcated Hook	1	0	1	1	0	0	0	0	0	1	0	0	0
Hook	1	0	0	7	0	2	0	6	0	0	0	0	2
Needle	0	0	10	3	0	1	0	2	0	3	0	2	0
Cataract Needle	0	0	0	0	0	0	0	0	0	0	0	0	1
Dental Tool	0	0	0	0	0	0	0	0	0	0	0	1	0
Uvula Forceps	1	0	0	0	0	0	0	0	0	0	0	0	0
Rectal Speculum	0	1	0	0	0	0	0	0	0	0	0	0	0
Male Catheter	0	0	0	0	0	0	0	1	0	0	0	0	0
Female Catheter	0	0	0	0	0	0	0	1	0	0	0	0	0
Pterygotom	1	0	0	0	0	0	1	0	0	0	0	0	0
Surgical Knife	1	0	2	1	0	0	1	0	0	0	0	0	2
Foetal Hook	0	0	1	0	0	0	0	0	0	0	0	0	0
Double Needle	1	0	0	0	0	0	0	0	0	0	0	0	0
Oculist Stamp	3	0	8	4	1	2	1	1	0	0	0	3	0
Forceps	9	0	13	9	1	2	1	5	0	2	0	6	1
Bone Knife	0	2	0	0	0	0	0	1	0	0	0	0	0
Bone Scraper	0	0	0	1	0	0	0	0	0	0	0	0	0
Cupping Vessel	0	0	0	3	0	0	0	0	0	1	0	0	0
Blade	0	0	0	0	0	0	0	0	0	1	0	0	0
Bone Lever	0	0	0	5	0	0	0	0	0	0	0	0	0
Trepanning Saw	0	0	0	1	0	0	0	0	0	0	0	0	0
Bone Borer	0	0	0	2	0	0	0	0	0	0	0	0	0
Cautery	0	0	0	1	0	0	0	0	0	0	0	0	0

The table also demonstrates that certain areas not only have a higher number of common instruments, but a greater variety (as would be expected with a higher sample size). Germania Inferior's legionary fortresses, both units in Germania Superior and Pannonia Superior's legions (although this is mainly Carnuntum) have the greatest range of instrument types. This suggests that either certain areas were adopting more Roman-style medical tools than other areas, or that it might be a product of a greater sample size. One medical object that has a specific regional distribution is the oculist stamp, found mainly throughout civilian settlements in the northwestern provinces; although there are exceptions as they were also found in Africa, and even on the remains of a Roman ship wreck off the coast of Italy (Feugère, Künzl and Weisser 1985). The same pattern appears on the table, as the majority of stamps were found in Germania Superior and they do not appear in Pannonia Inferior. Curiously, this pattern also applies for the spatula probes. The majority of sharp hooks were found in the auxiliary units of Germania Superior and in the legion of Carnuntum, but they also appear in Germania Inferior, Raetia and Britannia.

For more specific examples of instrument adoption one can see that certain instruments are only found in fortifications linked to a single unit. Caerleon, for example, has a possible dental tool (Appendix 10, Table 2, number 4; Lee 1862: 67). Whilst engaged in fieldwork the author did not see any other instrument of this type, conceivably because similar instruments have not been identified as medical tools by archaeologists (Appendix 10, number 4;). A cataract needle was found at Carlisle. The auxiliary fort at Vechten, in Germania Inferior has a rectal speculum (Appendix 4, Table 4, number 1). It might have been used in the removal of missiles, perhaps being the type of instrument described in Celsus (Appendix 3) that appeared to be similar to a Greek letter. Something called a scratcher, again without a depiction or description, is noted for Neuss (Appendix 4, Table 1, number 70). Although its identification is insecure, it has been retained within this sample. A possible foetal hook was found at Mainz (Appendix 5, Table 1, number 5). If its identification is correct this is a rare instance of a female related instrument found in a military context (Fig. 59). Dental forceps were found at Vindonissa, and might also have been used in bone surgery (Appendix 5, Table 2, numbers 1 & 2). The auxiliary forts from Germania Superior also have a number of more unusual instruments in comparison with other provinces. Ladenburg had scalpels, hooks and an implement for scraping bone (Appendix 5, Table 3). Bingen has a collection of mainly bone working tools from a cremation burial probably related to the Roman fort that was supposedly built at the site (Como 1925). The instruments included in the set were cupping vessels, a trepanning saw with circular blades, along with tools used for lifting bones and scalpels (Appendix 5, Table 25). Lauriacum (Appendix 7, Table 1, number 4) and Neuss (Appendix 4, Table 1, number 8) have an instrument called a pterygotum or ear speculum (Fig. 60). Both a female and male catheter are published in the medical findings from Carnuntum (Appendix 8, Table 1, numbers 17 and 18).

This closer inspection of the instruments shows that in most cases only certain areas, or even fortifications, were adopting the use of specific Roman style medical tools. This provides stronger support for the argument that there were provincial differences in medical care between the frontiers. It is not only medical tools that show this distinction, but other finds as well. Military belt-plates appear more in Germania Superior than any other province; Bishop and Coulston argue that this is because of a greater amount of excavation (1993: 197). However, to argue against this it should be noted that there has been quite a lot of excavation in Britain, Germania Inferior and Raetia, so perhaps the pattern of belt plates demonstrates that there were regional differences in the military in aspects other than medicine. If there were differences in the treatment provided one needs to try and find an explanation for why this was so.

5.6 Testing distribution

Since not all of the excavated fortifications appear to have any medical care provision, as evident through the epigraphic and/or instrument remains, perhaps there was a procedure whereby certain fortifications were designated to act as central areas that offered more advanced health care. This idea is considered by Wilmanns (1995a: 108-116) who looked at the distribution of inscriptions and buildings that have been identified as *valetudinaria.* She concluded that there did not seem to be a structural pattern of distribution, but believed that the sick were transported to a place with a doctor or a hospital. However, because the identification of *valetudinaria* is tenuous (Chapter 6) it is important to look at the distribution of instruments and inscriptions from fortifications on the frontiers to see if there is an equi-distant spread of fortifications with evidence for Roman style health care. Essentially, the reason for studying the distributions is to see if there might have been certain fortifications that acted as designated areas for medical treatment. Although moving an ill soldier to another fortification does not seem to be a convenient practice it is still worth consideration because it may lead to new conclusions about the arrangement of medical treatment in the army. To test this theory, distribution maps have been prepared to see if the locations of fortifications containing epigraphic and medical implement evidence were equidistantly spaced (Figs. 61-65).

To begin with, Noricum and Pannonia Superior only have evidence for Roman-style medical care from the legionary fortresses. Noricum, having only one legionary fortress, has 30 medical instruments (Appendix 7, Table 1) and one inscription from Italy that mentions a doctor for the unit (Appendix 2, Table 4, number 19). Three legionary fortresses were constructed in the province of Pannonia Superior, with very few auxiliary forts. There is no evidence to suggest Roman-style health care in the auxiliary forts, and little from the legionary fortresses of Vindobona and Brigettio. Inscriptions for doctors come from Carnuntum (Appendix 2, Table 5, numbers 20-21) and a grave field outside Brigetio (Appendix Two, Table 5, number 22). The majority of the instruments were found at the site (Appendix 8, Tables 1-3; Fig. 61).

Pannonia Inferior has some evidence for health care being offered outside the legionary unit. Not only were the inscriptions found at Aquincum, the only legionary fortress in the province (Appendix 2, Table 6, numbers 24-33), but one inscription was found at Intercisa (Appendix 2, Table 6, number 35) and Ulcisa Castra (Appendix 2, Table 6, number 34). There were instruments found at Aquincum and Intercisa (Appendix Nine, Tables 1-2). The units that have evidence for Roman health care are all located within close proximity to each other (Fig. 61).

Raetia, unlike Noricum, does have evidence for medical treatment in the auxiliary forts. Yet when looking at the distribution map (Fig. 62) there does not seem to be an even pattern in the distribution of fortifications that have instruments and inscriptions. For the auxiliary forts there seem to be clusters of units with instruments, rather than an even dispersal. The only identifiable inscription was found in the legionary fortress (Appendix 2, Table 3, number 18). The map also demonstrates an unusual pattern of instrument numbers, as some forts with one or two instruments, such as Gnotzheim, are in an area with forts with more medical tools, such as Ellingen.

The clusters continue to appear in Germania Superior (Fig. 63). Many of the auxiliary forts constructed in the Taunus-Wetterau region have evidence for medical tools, while those with inscriptions are not concentrated in a single area. There is also a noticeable cluster of forts on the Antonine frontier, but few on the Neckar line of fortifications located behind it. The legionary fortresses all have evidence for inscriptions (Appendix 2, Table 2, numbers 5-6, 11-13), but only Mainz and Vindonissa have evidence for instruments (Appendix 5, Tables 1-2).

Germania Inferior seems to have more of an equal distribution of auxiliary units with instruments in the northern section of the province (Fig. 64), whilst the legionary fortresses of Nijmegen, Neuss, Bonn and possibly Xanten have evidence for Roman-style instruments and are fairly equidistantly placed in relation to each other. The inscriptions for the fortresses were only found in Bonn (Appendix 2, Table 1, numbers 1-2) and possibly Vetera (Appendix 2, Table 1, number 4). The evidence found at Vetera is specific to the civilian settlement, but there is always a possibility that soldiers could have opted to be treated by a Roman-style doctor in a nearby area.

For Britannia the concentration of units with evidence for medical care was found on the frontiers of Hadrian's Wall. Yet, there is evidence both from inscriptions and instruments for the legionary fortress of Chester (Appendix 2, Table 7, numbers 36-37; Appendix 10, Table 3) and instruments from Caerleon (Appendix 10, Table 2; Fig. 65a). The auxiliary forts in Wales have a very low yield of medical instruments, basically only one or two probes (National Museum of Wales, unknown site). Since most museums and site records for Wales have no instruments or inscriptions, one should question where, or how the soldiers were receiving treatment. The northern frontier of Hadrian's Wall, however, seems to have a noticeable distribution of instruments and inscriptions. Two auxiliary forts with instruments, Corbridge and Carlisle, were located on main roads leading to Hadrian's Wall from the north and south, whilst in the central area of the frontier there is an inscription for a *medicus ordinarius* at Housesteads (Appendix 2, Table 7, number 39). The forts with instruments appear to be located in the central and eastern area of the Wall (Fig. 65), with only a small number of instruments being found in units in the western area of the frontier (Appendix 10, tables 10-12).

Having presented basic descriptions of the distribution of units with evidence for medical care per province, models can now be put forth to offer an explanation of how medical treatment might have been arranged in the Roman army. It is clear from the maps that each province varied in arrangement of fortifications with medical tools and inscriptions. Three patterns appear on the distribution maps, which indicate variations in the way medical care was provided to soldiers in the Roman army. Certain provinces seem to have had fortifications with finds relating to medicine in specific areas, or clusters, such as Britannia. These fortifications also seem to be equidistantly placed from one another within the province. The second pattern that appears has groups of fortifications with evidence of Roman medical tools clustered together on the frontiers. Whilst the final seems to have no pattern at all, and the fortifications with evidence for medical care seem to be randomly spaced throughout the frontiers.

Britannia, the northern section of Germania Inferior and possibly Pannonia Superior appear to have the most evidence for central fortifications dedicated to medical treatment. In Britannia, it is possible that Caerleon and Chester acted as medical centres for some auxiliary forts on the Welsh frontier. Yet, they are a far distance from the auxiliary forts on the west coast of Wales, so one would expect that there was some other form of medical treatment made available to these soldiers. Otherwise a sick or wounded soldier or a doctor would have to travel to and from the legionary fortresses. For the frontiers of Hadrian's Wall and northern Germania Inferior the auxiliary forts, along with the legionary fortresses on the Rhine, all seem to be spaced fairly equidistantly apart from one another. The location of the fortresses in Pannonia Superior appear to have been better suited to act as centralised medical centres. The fortresses are placed fairly equal in distance from one another and each has five to six auxiliary forts between the other. Therefore, it seems possible that medical treatment might have been offered through these central fortifications, or a doctor was able to travel from these places. Thus, these provinces might have arranged the provision of health care from certain fortifications, rather than at every one.

Noricum and Pannonia Superior are interesting because they are the two provinces that only have remains of medical tools and inscriptions from legionary units. It may be that in these places the legions were designated places for soldiers from auxiliary forts to receive treatment, as already described for Pannonia Superior. However, the legionary fortress for Noricum was not based in the centre of the frontier line of the province and many of the auxiliary forts were a long distance from the site, so it would mean that soldiers or a doctor from Lauriacum would have had to travel an unreasonably long distance for treatment. Moreover, there does not seem to be any evidence for medical treatment in Noricum's auxiliary units that were constructed a century earlier than Lauriacum. This suggests a number of possibilities. It may be that the auxiliary units of Noricum were provided with treatment, but there is no supporting evidence for this, or that there might have been some treatment made available by a doctor who travelled from fortification to fortification, hence the lack of evidence. Finally, there might not have been any medical treatment, or at least Roman-style medical treatment offered in particular units, which may be an indication that each unit was permitted to organise medical care in their own manner.

Pannonia Inferior, like Noricum, has only a little evidence for health care in the province, most of it in the legionary fortress. However, two auxiliary units also have evidence for treatment, but they were constructed in close proximity to Aquincum, so on this basis the theory of a centralised fortification designated for medical treatment does not appear to be plausible. It may be that the fortress of Aquincum was the main medical centre for the frontier because the inscriptions from the auxiliary forts in this province only mention *capsarii*, who might possibly have provided basic first aid. There is no evidence, besides Intercisca, for other auxiliary forts with instruments. Overall there seems to be a similarity with Noricum because Aquincum is a far distance from auxiliary forts in the south of the province. Again there is the possibility that each unit was choosing its own form of treatment.

Raetia and Germania Inferior show evidence for health care in both the legionary and auxiliary fortifications. However, the distribution of the units appears to be in clusters. It might suggest that certain areas of these frontiers were designated as places for medical treatment, or that the units with Roman-style medical care might have influenced others close by. In Germania Superior one of the groups of units appears in the Taunus-Wetterau region because many were constructed during the reign of Domitian, when there was a military campaign (Chapter 3). The same might be true for the Antonine frontier beyond the River Neckar in Germania Superior. Since Raetia saw little military action, perhaps the groups of units with evidence for medical care were influenced by neighbouring troops.

Looking at the distribution of instruments on a regional scale presents further evidence that there were variations between the frontiers in the way that Roman medical care was offered. Whilst both types of units were clearly offered treatment there is, however, very little evidence for widespread care being offered to all the units. However, it seems that the provinces or even the units themselves might have had a choice about organising medical treatment.

5.7 Cultural comparison of material culture

It has already been mentioned that historical events and/or provincial organisation might have had some effect on the way that medical care was organised in the military. Yet, if one considers historical events to be the main reason for regional variation one must ask why so few medical tools exist in certain areas that saw military action, such as Pannonia Inferior? Illness and injuries would have been common in daily activities of building and training, so evidence of medical care is also to be expected in areas that were not as militarily active, such as Noricum. Perhaps medical care was offered to all soldiers, but it might not have been what we would consider Roman-style medical treatment.

Here I would like to develop the idea that variation within medical practice in the Roman army extended not just as a result of regional systems of organisation, but because units and soldiers from different ethnic groups retained something of their own traditions of healing. It may be that on occasion they were influenced by the people occupying the region in which they were stationed. It may also be that they were influenced by Roman-style medicine, but rather than adopting it outright they changed aspects to suit their own understandings of medical treatment.

In the previous chapter an examination was made to see if there was any evidence of certain groups adopting the use of Roman-style doctors, or at least calling their doctors by Roman titles. It seemed that groups from Gaul had the most evidence for inscriptions that referred to Roman-style medical personnel; however the numbers were too small to make the study wholly valid. To continue with this line of investigation the auxiliary forts with known units that contained medical implements were compared. This was done to see if only certain units were adopting Roman medical tools, or if there is a random pattern of units borrowing medical tools. Of course this does not necessarily imply that they were using such instruments for the same purposes.

Table 4: List of auxiliary forts with named units where medical tools have been recovered

Fort	Province	Unit Type	Unit Name	Country	MI
Vechten	GI	Cohors millaria equitata Ala Cohors quingenaria equitatae	Brittonum Thracum Hispanorum	Britain Thrace Spain	17
Valkenburg	GI	Cohors quingenaria equitata. Cohors quingenaria equitatae	Gallorum Thracum	Gaul Thrace	4
Heftrich	GS	Numerus	Catherensium	Noricum	2
Zugmantel	GS	Cohors quingenaria	Treverorum	Gallia Belgica	19
Holzhausen	GS	Cohors quingenaria	Treverorum	Gallia Belgica	2
Saalburg	GS	Cohors quingenaria	Raetorum	Raetia	9
Groß-Krotzenburg	GS	Cohors quingenaria	Vindelicorum	Noricum	1
Wiesbaden	GS	Cohors quingenaria Cohors quingenaria Cohors quingenaria Cohors quingenaria Cohors quingenaria	Dalmatiarum Pannoniorum Thracum Delmatarum Raetorum	Dalmatia Pannonia, Thrace Dalmatia Raetia	4
Neckarburken	GS	Cohors quingenaria equitata	Aquitanorum	Gaul	1
Bad Wimpfen	GS	Cohors quingenaria Cohors quingenaria Cohors quingenaria equitata	Aquitanorum Hispanorum Germanorum	Gaul Spain Germany	2
Stockstadt	GS	Cohors quingenaria Cohors quingenaria. Cohors quingenaria	Hispanorum Gallorum Gallorum	Spain Gaul Gaul	1
Langenhain	GS	Cohors quingenaria equitata	Aquitanorum	Gaul	1
Öhringen	GS	Cohors quingenaria Cohors quingenaria	Helvetiorum Belgarum	Helvatia Gallia Belgica	1
Mainhardt	GS	Cohors quingenaria equitata	Asturum	Spain	1
Straubing	R	Cohors quingenaria	Raetorum	Raetia	21
Weißenburg	R	Ala	Hispanorum	Spain	6
Gnotzheim	R	Cohors quingenaria Cohors quingenaria equitata	Bracaraugustorum Thracum	N-W Spain Thrace	1
Dambach	R	Cohors quingenaria equitata	Aquitanorum	Gaul	1
Dunaújváros	PI	Ala Cohors milliaria sagatorum	Tungrorum Hemesenorum	Gallia Belgica Syria	15
South Shields	B	Cohors quingenaria equitata.	Gallorum	Gaul	10
Wallsend	B	Cohors quingenaria Cohors quingenaria equitata	Nerviorum Civium Romanorum Lingonorum	Gallia Belgica Gaul	3
Halton Chesters	B	Ala	Pannoniorum	Pannonia	2
Chesters	B	Ala	Asturum	Spain	13
Housesteads	B	Cohors milliaria Numerus Numerus	Tungrorum Frisiavonum Hnaudfridi	Gallia Belgica Frisia Germany	6
Birdoswald	B	Cohors milliaria. Cohors quingenaria	Tungrorum Dacorum	Gallia Belgica Dacia	5
Corbridge	B	Cohors milliaria equitata	Vardullorum	Spain	23
Carlisle	B	Cohors quingenaria	Gallorum	Gaul	3

Table 4 contains data from 27 auxiliary forts with known units and the number of medical tools that had been found within them. One initial problem with this study is that certain forts had a number of units stationed at them, and without good contextual information it is impossible to know to which unit the instruments belonged. Out of the 27 entries, 16 forts (59%) on the list have single units, or at least are only known to have had these units. Statistically one may argue it is not a very sound comparison; however, the examination is still worth considering in order to establish whether or not certain patterns begin to emerge, as with the epigraphical comparison. In fact from the 16 forts with instruments a pattern does begin to appear. First of all, groups from Gaul (The Treverii, Aquintanae and Galliae) have two forts each, or six forts in total, with instruments, equalling 37% of the total number of forts. Units from Spain (Asturum, Hispania and Vardullorum) occur five times or 31% of the time. Also included are two groups from Noricum, two from Raetia and one from Pannonia. When comparing this with the inscriptions (Table 2, Chapter 4) it is very interesting to note that in general the emerging patterns in both studies match. The units from Gaul and Spain have both inscriptions and Roman-style instruments. One Norican unit of the *Vindelici* has both an inscription of a doctor and an instrument (at Groß-Krotzenburg). This is the only fort that has both types of evidence.

As mentioned, the difficulty with the data presented in Table 4 is that some forts had a number of units of different origin stationed at them. However, when looking at those associated with a number of units the same pattern begins to appear: groups from different areas of Gaul appear 11 times, groups from Spain four times, whilst Raetia and Pannonia appear once. There are also potential linkages between finds of inscriptions and instruments for these units that might tell us which groups were using the instruments. For the site of Dunaújváros there is an inscription for the cohors Hemesenorum, so perhaps the instruments belonged to that unit. The unit from Gaul at Valkenburg and Tungria at Housesteads both had inscriptions, so it is possible that the tools might have belonged to those troops. Although one can argue that the sample is too small, there is a recurrent occurrence of units from Gaul and Spain, suggesting that certain ethnic units, these included, were more open to adopting aspects of Roman-style medicine.

The next stage of the analysis was to investigate whether any similarities existed between units from certain regions and specific types of medical instruments (Table 5). This was undertaken in order to investigate whether certain forms of surgery or medical practice were more openly adopted or performed by certain ethnic groups. The table mentions the home of the unit and the instruments. There were of course units throughout the empire with the same name, and on this table where there was an instance when two units from different forts had the same type of instrument found in it they are designated with a '+'.

Table 5: Medical instruments per ethnic group

Instruments	Catharensum	Vindelici	Aquitani	Gallorum	Treveri	Raeti	Vardulli	Asturum	Hispani	Pannoni
Spoon Probe	1	1	1+1	2	6	2+6	2	3	3	2
Spatula Probe	0	0	0	0	2	1+5	3	1	1	0
Ear Probe	0	0	0	8	5+1	7	8	7	2	0
Scalpel	0	0	0	1	3	1	3	0	0	0
Surgical Knife	0	0	0	0	0	0	2	0	0	0
Hook	0	0	0	1	0	0	0	0	0	0
Cataract Needle	0	0	0	1	0	0	0	0	0	0
Olivary End	1	0	0	0	1+1	2	2	0	0	0
Spoom Scoop	0	0	0	0	1	0	1	0	0	0
Double Ended Olivary	0	0	1	0	1	0	0	0	0	0
Double Simple Probe	0	0	0	0	0	0	1	0	0	0
Forceps	0	0	0	0	0	1	1	0	0	0
Ointment Pallet	0	0	0	0	0	1	1	2	0	0
Oculist Stamp	0	0	0	0	0	2+2	0	0	0	0
Button Probe	0	0	0	0	0	1	0	0	0	0
Shears	0	0	0	0	0	0	0	1	0	0

Unfortunately Table 5 shows relatively little, but it is worth discussing because some items are more common to certain groups than others. There are two instruments that appear to be common to all, or most, of the groups: the spoon probe and the ear probe. One instrument that seems more common to a single group is the spatula probe from the Spanish units. There are three groups that share more instruments in common than other units, those from Raetia, Belgica (Treveri) and Spain (Vardulli). The table shows Raetia and Belgica have more than one unit sharing the same instrument types, possibly implying that certain units had adopted specific Roman instruments, or surgical procedures. In support of this, one can look at oculist stamps that appear more frequently in the northwest, mainly Gaul (Feugère, Künzl and Weisser 1985). Here they appear to be common for the units from Raetia and examples are not associated with other known units. This further suggests that each unit probably choose the instruments that best suited their needs.

Further support for these observations comes from another source of evidence, graves containing Roman-style medical tools from civilian sites. Patterns appear in Künzl's (1983) study of surgical instruments from tombs. Gaul and Spain have more burials, whilst Britain and Noricum have very few. Gallia Aquitania has four burials and Gallia Belgica has 15 burials. Gallia Lugdunensis and Narbonensis have one each. In Germania Inferior 16 graves with medical instruments were found in and around legionary fortresses and large civilian settlements. Eleven of these were from Cologne. Germania Superior had seven. Hispania does not have many tombs with instruments, but a few exist in each of the three provinces. Baetica has one tomb, Lusitania has four and Tarraconensis two. Thus, it appears that the areas with more so-called doctors' burials are the same regions from which military units with strong evidence of Roman-style medical practice came.

The virtual absence of epigraphic and artefactual remains from other regions, such as Britannia, Dalmatia and Dacia (shown on Table 5), suggests that not every unit coming into contact with Roman ways of life were automatically adopting a new lifestyle. These patterns appear in the so-called doctors' burials as well: Britannia has only two burials and Dacia and Dalmatia have one each (Künzl 1983). Interestingly, a number of Spanish groups are not connected with evidence for inscriptions or instruments (Appendix 1, Part 2). This may be because of the limited scale of the excavation at the sites they are known to have occupied, or that only certain Spanish units adopted aspects of Roman medicine. The argument taken here is that medical treatments more familiar to those in Italy were made available to the different auxiliary units, but were rejected or changed by units with different ideas about health care and treatments of the body. Such a scenario would hardly be unique for the Roman world. For example, with Roman Britain Hingley argues for the continued use of roundhouses of indigenous groups or part of a rejection of Roman concepts of lifestyle (1999: 146-7). There is also evidence of auxiliary soldiers buried at Kempten in Bavaria, who combined both German and military identities through their grave goods (Wells 1999: 135-6). These examples are demonstrations of Dietler's statement that cultural interaction is not a simple process of diffusion between an active donor and a passive recipient (1995: 90). He describes how, in studies of Greek contact with groups in what is now France and Bavaria, Hellenocentric readings of interaction between the different societies have been created because modern European cultures tend to place the Classical world at the zenith of civilisation (Dietler 1995: 90). Romanocentric readings of the past are also created on account of this belief, and they assume that any culture coming into contact with Rome would have wished, after seeing the Roman way of life, to adopt a similar lifestyle because of its supposed superiority. One example of this is how Roman technology is seen to be better than that of provincial populations' (Hingley 1999: 147). Such attitudes do not escape Roman medicine. It is assumed that those who did not have classical medical care would have wanted it because modern scholars have regarded it as superior to the less understood forms of provincial medicine. It seems to be an underlying assumption that is demonstrated in arguments about Romanisation, such as with Wilmanns, who states that Roman style medicine would have been openly adopted in the army by the 2nd century (1995b: 121).

Künzl does discuss evidence for native and Roman interaction in regard to medicines by showing that Romans did adopt some 'Celtic' medicines from plants; plants being described by their indigenous name and not a Greek or Latin ones (1991: 189). Although

Künzl suggests possibilities for interaction, the army is still seen as a homogeneous group, employing similar medical practices. Moreover, this underlying supposition of the superiority of Roman medicine, as it seems to the author, is demonstrated by a lack of study into provincial practices of medicine; again Künzl does so to an extent, but it is almost always viewed in the context of Greek influence on 'Celtic' and Germanic medicine before a Roman influence (1991: 185). One reason for this is that archaeologists only concentrate on the understood aspects of Roman medicine from the Latin and Greek medical literature and rarely look for other forms of medical practice through archaeological remains – this is a 'text restrained' archaeology. Künzl states there was a collision of the Roman republic with the 'Celts' in the 1st century leading to a confrontation between a technologically superior *Hochkultur* and a developing one (1991: 185). Yet there were many problems in classical medicine: there was no anaesthesia, no guaranteed cure, and no standardisation, which could cause confusion in other culture's interpretations of the subject. It is possible, as demonstrated by the lack of Roman-style medical instruments and inscriptions from some military contexts, that certain auxiliary units may have rejected Roman medical practice; or if tools were found, adapted them to their own understanding of how to use them.

Since the Gallic and Iberian cultures have the most evidence for a Roman-style of medical treatment, an examination was made to see if there were more 'Roman' aspects in their culture than others. The understandings of native groups within the empire have traditionally lain in the scope of prehistory, and there is little interaction between those who study the Roman archaeology and those who study the native except at the very point of transition. Furthermore, Romanists tend to use the classical historical sources to try and understand the life-styles of native groups, but when comparing the archaeology there are often obvious exaggerations made in the sources along with many misunderstandings. Along with the use of classical sources, scholars also rely on 19th century linguistic designations of the terms 'Celtic' and Germanic, yet by looking at the material culture of these groups it is clear that even if they were in the same linguistic group socially there were many variations (Wells 1995: 173-4). The Treveri for example, although they lived in Gallia Belgica thought of themselves as German through their ancestry, but in their religion that had adopted Gallic traits (King 1990: 153-5). This one example demonstrates the complexities of determining how people identified themselves. By looking at more general aspects of both cultures it is clear that they adopted aspects of Roman lifestyle to different degrees. For those who lived in Gaul it is obvious that somethings Roman were adopted, such as attitudes towards cleanliness, as more baths and toilet instruments appear, but perhaps this says something about their attitudes towards their bodies before the Romans arrived (Woolf 1998: 242). In terms of association it seems that groups in Gaul did have more contact with the Romans, and it is possible that they were more willing to accept Roman medical treatment, or at least have doctors with Roman titles in their units and to use instruments. With the exception of Baetica, which seems to have been more accepting of a Roman lifestyle, the rest of the Iberian Peninsula still retained its language, art, religion and oppositional attitudes against Rome (Curchin 1991: 178; 181-6). It could be that certain aspects of Roman lifestyle were adopted, or adapted by different Spanish groups as is evident through the inscriptions and remains of medical instruments. Attitudes towards identity and the Romans were not the same across the empire and different groups would have adopted Roman practices only if they thought them necessary to their society.

5.8 Deposition of finds

It has been mentioned throughout this chapter and in Chapter 1 that an understanding of the deposition of Roman instruments could tell us much about the way they were intended to be used, and about attitudes towards disease and medicine. It is argued here that the deposition of instruments can be used as a means of determining culturally-specific attitudes between units in the Roman army towards medicine and the body. From the outset it should be made clear that the uses and meanings of objects (medical tools included) extend beyond the obviously functional. Because of the way in which they are made and used, all objects carry meanings (Hodder 1987; Shanks and Tilley 1987), and their meanings in turn affect the manner in which they are employed in practice and deposition (Hodder 1982). Deposition of all classes of material culture can include casual dumping and "more directed, intentionally structured incorporations that are consciously bound up in specific symbolic values" (Whittle et al: 1999: 355). Because of the varied, contextual meanings of material culture, rubbish is not a universal category as indicated by Moore's study of the Marawket (1982). She demonstrates how items are discarded according to their gender association. The deposition is a reproduction of the symbolic categories that constitute their culture. Moore's study demonstrates that every culture perceives refuse in a different manner, and that objects can carry complex symbolic associations that condition how they are discarded. By looking at depositional patterning in the archaeological record, attitudes towards objects can be presented as well as more general attitudes intrinsic in a specific society.

Studies of deposition in relation to the Roman army rarely consider complex questions about how and, more importantly, why objects are deposited in specific places. In general deposition tends to be understood in the functional terms of recycling, refuse disposal and deliberate clearance (Bishop and Coulston 1993: 34). According to Bishop and Coulston there are not as many metal finds as one might expect from Roman military sites because metal objects were frequently being recycled (1993: 34). Their argument is convincing for some aspects; however, not all metal objects were recycled, and some objects are found in some very strange deposits indeed. It has been argued that a box of equipment from Corbridge, buried in the floor of the building identified as the *fabrica,* or store building (Bishop and Dore 1988: 128) was buried for recycling (Bishop and Coulston 1993: 35). However, it is questionable why something meant for recycling was carefully packed in a chest with the armour wrapped in cloth and placed under a floor. Whilst Bishop and Coulston suggest (1993: 37) the hoard was awaiting repair, one must question why it was left there for centuries? Other possibilities for its deposition suggest themselves, including it being some form of votive deposit. This is not the only box of equipment to be found buried. A hoard was found at Ribchester, which contained intact pieces of armour, some that had been de-silvered and some that was damaged. It is suggested that it was either put away for future use, or awaiting recycling (Jackson and Craddock 1998: 100). Again it is questionable why such a mix of objects would have been buried? One thing that they have in common is that both might have belonged to Spanish units. The Ribchester hoard may have belonged to the Ala II Asturum, and the Corbridge hoard might have belonged to the Cohors Vardullorum. Perhaps, although only a suggestion, burying objects had a ritual, rather than practical function in Spanish culture, and this might indicate that there were different ideas about deposition amongst different groups within the Roman empire.

Another argument is that objects were buried during deliberate episodes of clearance. Again, this line of reasoning is often taken as 'fact' without discussion of other suggestions. In the case of the unusual deposition within the Newstead pits, argued by Bishop and Coulston to be related to clearance (1993: 34), it is possible to see this material as being deliberately and ritually deposited (Clarke and Jones 1994). In some instances human skeletons were buried in the pits, suggesting that the action of burial was more than simple clearance, but perhaps comprised votive boundary offerings (Clarke and Jones 1994: 120). In civilian contexts, infants and body parts were buried in villa sites in Roman Britain (Scott 1991: 117) and appear to have had a ritual significance, as some were laid in foundations and on the axis of the house. Other possible examples of ritual deposition can be seen in the burial of cavalry helmets in the environs of the legionary fortress of Nijmegen (van Enckevort and Willems 1994: 127-134). Although they were not all in perfect condition, similar to the objects at Corbridge and Ribchester, such objects would probably have been purposefully deposited because of their symbolic, rather than economic, value (Clarke and Jones 1994: 119).

The cultural or 'identity' value of an object will often determine the way it is deposited. Birds-headed winged pendants, for example, seem to have been found only where Thracian cavalry units occupied sites, and these objects might have been a symbol of the unit (Bishop and Coulston 1993: 197). Since they have not been recycled, one might suggest that the Thracian units had a specific cultural understanding about how the objects were to be discarded. Another example is seen at the site of Velsen, where along a ridge near the site a mixed set of objects was found that strongly suggests ritual activity (Bosman 1995: 89). Bosman notes that there were 59 military items found along with bone and indigenous pottery. The majority of the bone is horse, and 90% of the pottery is indigenous. Deposits like this seem to have been a Frisian rather than a Roman practice, and Bosman questions whether the Romans recognised the ritual importance of the site and used it along with the local Frisians, or perhaps whether it belonged to Frisian soldiers (1995: 94). These examples are certainly suggestive of cultural variations in deposition with Roman military sites.

The body is a prime source of symbolism, and it is not surprising that the placement of objects closely associated with the body should embody complex rules. Van Driel-Murray, for example, has demonstrated how shoes were ritually deposited in wells and house foundations (1999: 135-7). It is conceivable that other items associated with the body, such as medical instruments, could carry a ritual significance as well. An object that had been used in medical practice might have had its significance increased because of its association with a specific person or the sick body. It is interesting in this context to note the occurrence of two Roman instruments at Stonehenge (Cleal et al. 1995: 433, nos. 32, 35), along with a large group of coins, pins and brooches (Cleal et al. 1995: 431) – practical evidence that is suggestive of cult activity. Medical tools might also have been considered to be polluted if they had been used in an unsuccessful operation, or belonged to a dead or rather unsuccessful doctor, and may have been deposited in specific areas because they were considered somehow harmful, or taboo, so they were disposed of in order to keep from 'infecting' people or places.

The difficulty with assessing the detail of depositional practices is that many of the fortifications were examined in the late 19th or early 20th century, and records of find spots were not kept. It would have been interesting to continue with the theme of known auxiliary units to see if there might have been more information on cultural variation in depositional practices. Nonetheless, the record keeping does, as yet, not allow for such questions to be considered. However, those sites where recording was clear will be discussed to see if there are any provincial differences in deposition.

In a few instances there is sufficient contextual detail to study intra-site patterning. We can start with the fortress of Chester (Figure 66). The fortress only has 13 tools, but they generally appear in restricted areas. Three instruments were found in the courtyard building (Nrs. 2 & 3), two of which were broken. Three were found in what has been identified as the first cohort's barracks (Nrs. 4 & 5), one in a northeast barrack (Nr. 1), four in the vicus (Nrs. 6 & 7) and one pair of forceps was found in the amphitheatre. The instruments generally seem to have been found in small groups, perhaps indicating that instruments were only used or deposited in specific places.

The site of Caerleon, located in southwest Wales, has yielded 38 instruments. When examining their distribution (Figure 67), it becomes immediately apparent that the instruments seem to appear in clusters, albeit in small numbers. The areas they are concentrated in are mainly in the tower/rampart area (1), the amphitheatre (2), the barracks (buildings 3 & 4), the baths (5) and a possible workshop (6). The rampart area had five probes of varying sorts, two of these instruments are broken, one bent, but the other two were in good condition. Five instruments were found in the amphitheatre: three were broken and two in good condition. The barracks of the first cohort had a spatula probe in good condition buried in a post-hole, itself a rather unusual context (3). The barracks in Prysg field (4) has one probe with inscribed lettering on it and three ear probes in good condition. A surgical needle and a few probes were found in the so-called workshop (6). The baths and the vicus drains also have a higher number of instruments, and with the baths it seems that this might be one place where surgery was performed because children's teeth showing signs of surgical extraction were found in the drains (Zienkiewicz 1986: 223). One broken spoon probe was found in the headquarters building (7). One scalpel was found outside the fortress in a so-called rubbish pit (8). From the patterning it is clear that there is some form of clustering of instruments, which might indicate specific places where they were made, used, or permitted to be deposited. Most interesting are the ones found in the rampart area of the fortress and in the post-hole of the barrack. In the case of the scalpel found in the rubbish pit, since it was in good post-hole condition one can ask if it had been deliberately deposited because of pollution taboos? It might also be asked if the pit was for rubbish or whether it really served another purpose?

The fortress of Neuss in Germania Inferior has three areas where the instruments seem to be clustered (Fig. 68). One of these is described as the hospital (1), and it has 10 instruments, mainly probes, and four scalpels. The other area is a group of barracks (2), where seven instruments were found. Seven instruments, mainly ear probes, and all in good condition, were found in the headquarters building (3). Two instruments were possibly found on the corner tower (4), but they might have come from building five. The bath had a few instruments (6) and one or two were scattered around other areas of the fortress. Three probes and one scalpel were found in the south section of the fortress, but the exact location of the instruments is not known (Lehner 1904 and Watermann 1970). As with Caerleon, it is noticeable that the instruments appear in clusters, but in Neuss they appear in different areas of the fortress. There is the possibility of instruments being deliberately deposited in the ramparts, but this is not completely certain.

The auxiliary fort at Oberstimm (Fig. 69) in Raetia has nine instruments with details of their find spots recorded (Schönberger 1975). The buildings they seem to appear in are the possible workshop (Nrs. 1 & 2), which has four instruments and a courtyard structure (Nrs. 3, 4 & 5). Neither one is identified as the hospital building. Again the clustering appears to be a common aspect to instrument finds.

The auxiliary forts of Birdoswald and Housesteads (Figs. 70 and 71 respectively) also have the find spots of instruments recoded. Yet, the numbers are too small to note whether patterns appear in their deposition. From the plan they seem to be scattered in and around the forts.

Vindonissa, a legionary fortress in Germania Superior, has the greatest number of instruments (325), and again they appear in clusters (Fig. 72). Sixty instruments were found in an area called the Schutthügel, a rubbish deposit[1] located outside the fortress (1). This deposit has a number of instruments in good condition. The fact that many are in good condition suggests that the instruments were ritually deposited and might have been placed in this region because they were considered unclean and associated with disease. It is also possible that they were thrown over the side of the fortress as a boundary offering. The barracks do not have many instruments with seven in total (2 & 5), but the area in the principia has a high number (3), along with the bath area across from the headquarters building (4). The so-called hospital has a few instruments as well (6). One instrument was found in the south gate tower (11), something common at Caerleon. There were also a few other instruments scattered around the fortress, but it is noticeable that they were generally deposited in groups.

[1] I would like to thank Dr. C. van-Driel Murray for bringing to my attention the fact that the Schutthügel is thought to be a rubbish deposit.

In order to 'test' the validity of these distributions, the location of surgical instruments was compared to that of another common artefact type - horse-trappings (Fig. 73). Ninety-one were found in the Schutthügel (1), 13 in the so-called hospital (6), 13 in area (2), 34 from the area of principia (3), 18 from barracks (5 & 7), 18 from the amphitheatre (12), whilst there were more found in other areas around the fortress. This seems to suggest that different types of objects were found in different areas of the fortress, perhaps because each had specific places of deposition. Thus, there does seem to have been a difference in the places metal objects were discarded within Vindonissa, suggesting disposal practices varied according to item.

Overall it is noticeable that each fortress has different areas where the instruments were deposited and each contained different numbers of instruments. The majority do not seem to appear in a random pattern, but in clusters. Some instruments seem to have been deposited as part of ritual practices, especially those in the rampart areas of the fortresses and the one found in the post-hole at Caerleon. Those instruments that were most likely deposited as rubbish were sometimes found in good condition, begging one to ask if they were thought to have been polluted, or if they belonged to a dead soldier or doctor and were thus considered 'unlucky'. Furthermore, it is suggested that the different patterns of deposition within each fort may be the manifestation of different cultural attitudes. Thus with these differences one can think back to the anthropological examples of medical practices to understand that medicine is culturally specific, and that even if one cannot say anything with certainty this exercise has hopefully made us think more about attitudes towards small finds and cultural variations in the military.

Other forms of ritual deposits are those found in tombs. In the context of Roman burials with medical tools Künzl states that tombs are the best way to see ancient reality (1986:

130), because they offer a closed context for which to observe the past. What should be said is that they offer a very selective view of reality, since burial practices frequently present a distorted view or idealised image of a dead person and social relationships (Parker Pearson 1999). An example of this comes from a beaker grave burial from the British Neolithic where an arthritic skeleton was buried with the remains of military accoutrements. This assemblage probably displays how the deceased, or his family wished to be remembered, rather than showing a realistic view of the dead (Thomas 1991: 20). It is likely that Roman burials with medical tools tell us more about the selection of instruments that were permitted to be placed within the tombs and had a symbolic importance for their deposition than any kind of clear reality. Usually instruments were found in small quantities, probably as token offerings, rather than the entire medical kit. Where it seems that complete kits have been found in graves, for example Colophon (Caton 1914) and Bingen (Como 1925), instruments might be considered as personal objects, a part of the doctors' identity, and therefore buried with them. It might also be perceived that the doctor was so horrible that his or her instruments were buried as a means of ridding them from society. The deposition of instruments in tombs would have almost certainly had a symbolic value different to those found within fortifications. Perhaps they were not even part of the person they belonged to, but belonged to a family member, as might be the case with the instrument found in the child's tomb in Worms, Germany (Künzl 1983: 78). Thus, the tombs only show a single view of a complex reality.

5.9 Civilian treatment

A question that was raised in the previous chapter was whether there might be evidence for military doctors treating civilians living in the area of fortifications? There was one inscription from Drobetae that seemed to suggest this did occur. The only other evidence of medical interaction comes from the literature of the Soranus and Celsus who were aware of other practices. Nonetheless, these do not answer the question about who was caring for whom. To look at this in closer detail the medical tools can be used to see if there is any evidence for more gender specific instruments, particularly ones that relate to female care (i.e. individuals who are clearly not soldiers). The majority of instruments are not gender specific and can be used on all ages and genders. Yet, gynaecological tools and catheters were intended to be gender specific, so they can be used in this study to try and determine whether care was provided for others who were not in the army. Scott has pointed out that women and children are often not looked for in the archaeological record (1997: 5), and this is the case with the Roman army, where it is assumed that it is a male dominated society with few women, so they are rarely considered. Yet, soldiers had wives, indiginous women would have lived near fortifications and there would have been interaction, so by looking for gynaecological instruments, one might be able to say whether the military doctors cared for non-soldiers. The provision of care probably depended on the beliefs and the rules and regulations, extent and nature of relations between the military and civilian populations of those living in the fortifications, rather than their gender.

The female catheter from Carnuntum (Appendix 8, Table 1, number 19) and the foetal hook from Mainz (Appendix 5, Table 1, number 5) suggest that care was available to women on the frontiers. No find spots were noted for either instrument, so it is not clear if they were found in the fortresses or in the extra mural settlements. Yet, since the instruments tend to be Roman in design, it at least suggests that Roman medical practices were made available to the civilians or the soldiers' wives. There is also argued to have been a possible bolt for a screw piece to a vaginal speculum (Fig. 74) from the site of Niederbieber (Gaitzsch 1983: 596). This piece was not included in the appendices because it cannot be attributed with absolute certainty to a speculum and perhaps belonged to another object, related to carpentry for example. Milk-teeth from the fortress baths at Caerleon strongly suggest that health care was available for people other than soldiers; in the case of infants (Zeinkiewicz 1986: 223). Baths outside the fortress at Vetera and an inscription of a doctor from the site indicate that there might have been Roman health care available to the civilians in the area. From some evidence, the teeth in the bath and instruments from the bath, medical treatment definitely seems to have been offered to civilians, but the instruments can only be used to suggest this possibility as none are truly gender specific.

5. 10 Conclusion

This study seeks to question the overall assumption of homogeneity that underlies all studies of military medicine. As mentioned there is the assumption that the organisation of the military to have provided uniform health care across the empire because, as Vegetius (Mil. 3. 2) states, all soldiers were entitled to be cared for by a doctor's art if they were ill. The way in which this is stated tends to suggest that a set standard of treatments was available throughout the frontiers, and in all types of fortifications, much as in the way that grain was supplied on a centralised basis (Whittaker 1994: 98-104). However, the archaeological remains of the instruments have demonstrated that the medical care system varied between provinces. Although one cannot say much about the specific details of differences in medical care and traditions in the Roman army, it can be said that there are variations in the frequency and use of Roman medical inscriptions, Roman instruments and depositional practices amongst different units. These may be based on different reasons: historical events, provincial organisation, and there may be a link to different cultural perceptions of body and medicine. With a closer look at the deposition of instruments, and with a better awareness of how various societies defined medical tools and their use, one could make more informed comparisons of the sites and units to see if there are differences in military medical care. However, from our current understanding of the information available and reliance upon earlier archaeological reports, one is limited in the interpretations that can be made, but it is hoped that future investigations will consider these problems with more care. Thus, under the facade of the Roman army lay a mixture of different cultural traditions - a complex milieu of indigenous and Roman.

CHAPTER SIX
Questioning the identification of *valetudinaria*

6.1 Introduction

The question of variability in medical treatment amongst the different frontiers and unit types has so far been tested by a comparison of the inscriptions relating to medical personnel and the artefactual remains of medical tools. To take this further, the next step would logically be to compare the remains of buildings identified as hospitals in order to see if they are specific to certain units or frontiers. In spite of the fact that many people use these buildings to support their interpretations of Roman medical care (e.g. Davies 1989 (1970a): 221-4, Jackson 1988: 134-6; Majno 1975: 382; Penn 1964: 257; Richmond 1952: 3, Salazar 2000: 81; Wilmanns 1995b: 103-16) there is a need to assess whether there is sufficient archaeological evidence to sustain the interpretation of these structures as *valetudinaria*. This issue is raised because the identification of the Roman military hospital was made at the beginning of the 20th century and has been accepted without question since that time. Over the last century or so there have been numerous archaeological excavations of so-called hospitals in Roman fortifications, but the interpretation of these structures continues to be made in the same manner, regardless of new archaeological methods and theoretical means of interpretation.

There is no question that *valetudinaria* did exist in some legionary and auxiliary fortifications; they are sometimes, though rarely, mentioned on inscriptions and in other literary sources, mentioned below. Archaeologically the first Roman military *valetudinarium* to be identified was that at the legionary fortress of Neuss, located on the lower Rhine (Koenen 1904: 180-2). Koenen identified the building as a *valetudinarium* because it contained a room with ten probes (Appendix 4, table 1). Four scalpels were found in other rooms of the structure (Appendix 4, table 1). Besides the instruments, the layout - a building with a number of small rooms, or wards, divided by small hallways that would aid in keeping the rooms quiet - was similar to the German plan of civilian and military hospitals (Figs. 75-78) of the 17th, 18th and 19th centuries (Brat 1966; Jettner 1966: 82, 144-5), and this would have influenced his understanding of how a hospital should be arranged. Following his naming of the building, others with a similar design were accepted as *valetudinaria* without question, which they still tend to be. As Bidwell says "Courtyard buildings in or behind the central range have long been identified as hospitals; conclusive evidence of their function has never been forthcoming from auxiliary forts, but much larger courtyard buildings in fortresses have been satisfactorily identified as hospitals" (1997: 71). Yet, Bidwell does not explain what the evidence is for this satisfactory identification, as 'hospitals' are not the only buildings to have had instruments found within them. Press also shows a willingness to accept Koenen's identification as she said, "the discovery of the building at Neuss brought an answer to the question concerning the layout of the legionary hospital's design and plan" (1988: 69). Press goes on to say, "some archaeologists had doubts as to the correctness of the identification of the building, but the discovery of other buildings with a similar plan confirmed Koenen's opinion" (1988: 69). Unfortunately she does not explain who the archaeologists were that had doubts, nor does she say what the doubts were nor why they had them. Yet, how could a building with a similar plan confirm the identification of the *valetudinaria*, especially since many do not have any archaeological material to support this; it merely shows that other structures of this layout were constructed in other fortresses, but it should not be taken for granted that they were intended to be hospitals. Moreover, these are not the only structures to have a courtyard plan. *Principia* (Johnson 1993: 104-132), *praetoria* (Johnson 1983:

132-9), some *fabricae* (Johnson 1983: 163-4, 183-8) and some storage buildings (Johnson 1983: 164) also have courtyard plans. Some of these buildings' identities are fairly secure, as *principia* were to be found in the centre of fortifications and certain *fabricae* have definite evidence for metalworking, such as at Oberstimm (Johnson 1983: 185). Yet not all of these buildings appear to have assured identities, as there have been arguments over whether the building at Corbridge was a *valetudinarium* or *fabrica* (Hanson 1979: 1; Johnson 1983: 163, note 152). There are also granaries, or storage buildings from Italy constructed in a corridor plan that are similar in plan to some auxiliary 'hospitals' (Johnson 1983: 164). Thus, the inclination to accept the identification of a building as a *valetudinarium* on the basis of four scalpels and one room with medical instruments (all of which can serve non-medical functions), and a possible anachronistic preconception of how a hospital should be arranged, indicates that there is a need to re-examine the evidence to see if the identification of this building type is secure, or if it was and is based on a tenuous argument.

The main first issue of this chapter is to ask whether one can securely define the structures that have been identified as hospitals, as *valetudinaria*. The second point is to see if the buildings identified as hospitals share the exact plan or if they are different. This comparison can be used to continue questioning the hypothesis that there were variations within the Roman army and this could be related to medical practice. To do so the literary sources, architectural remains and remains of artefacts from within the structures will be studied.

6.2 Literary evidence

The literary evidence unfortunately provides us with little explanation about how *valetudinaria* were expected to appear. However, at the same time, Hyginus gives us the impression that they were to be a part of every marching camp at least at the time he was writing in the late 1st century, and this expectation is carried over by scholars for the construction of *valetudinaria* in permanent fortifications (e.g. Bidwell 1997; Johnson 1983; Press 1986). Questions are raised about the identification of *valetudinaria* in auxiliary forts, but never in legionary fortifications (e.g. Bidwell 1997: 71; Johnson 1983: 163-4), because there is a strict expectation that the *valetudinaria* should be of similar and easily recognisable plan. Buildings of similar plan appear in all fortifications, but perhaps there is too much of an expectation that they were to all serve the same function. Since the buildings identified as *valetudinaria* in auxiliary forts are not of the same plan, more questions are raised about their existence than in legionary fortifications. The only two definite epigraphical sources that mention *valetudinaria* for a specific fortification come from auxiliary forts. An inscription from an auxiliary fort, Mantissa Addendorum, occupied by a second cohort of *equites*, at Stojnik in Serbia (Appendix 2, number 42), has the word *valetudinarium* inscribed on it. Sadly the provenance of the inscription is not noted. Had the inscription been associated with a particular building, perhaps the structure could have provided an understanding about the possible layout of hospital buildings. A tablet from the fort of Vindolanda also mentions the word *valetudinarium.* The tablet contains a fragmentary list that mentions 343 men who were associated with the workshop. It states that of the 343 men, 12 were shoemakers, then it lists builders for the bath house, the word *valetudinarium* and the fragment continues with other references to positions associated with the *fabrica* (Bowman and Thomas 1994: 155). Since the text is damaged there is no indication as to whether the word *valetudinarium* is associated with those who built it, worked in it, or made tools, such as instruments, for it, but what it seems to do is provide a link with the *fabrica*.

The closest epigraphic evidence for the existence of *valetudinaria* in legionary fortresses comes from inscriptions of the *optio valetudinarii*. Two inscriptions were found in Lambaesis in Africa (CIL VIII 2553; CIL VIII 2563) and one was from an unknown unit in Italy (CIL VI 175). From the area of study one was found in Bonn (Appendix 2, number 1) and two from Aquincum (Appendix 2, numbers 25 and 26). All of these are definitely from legionary fortresses, with the exception of the inscription from Italy, which is thought to have come from either a cohors urbana or praetoria (Wilmanns 1995b: 152-3). The only inscription that has a find spot recorded is one from Aquincum (Appendix 2, number 25), and it is assumed that where it was found was the location of the *valetudinarium* (Wilmanns 1995b: 214); however there is very little structural evidence to support the statement. Even if it were from the *valetudinarium* the lack of architectural remains fails to provide information about the layout of the building. The inscription from the so-called hospital at Aquincum was found with another one that mentions a *medicus* (Appendix 2, number 24). Both were erected as altars dedicated to healing deities, so it might relate to an area of a temple rather than a *valetudinarium*.

There are other inscriptions that are thought to be associated with *valetudinaria*, but these mention doctors rather than a person associated with a specific structure. Two were found together at Chester (Appendix 2, numbers 36 & 37), but the area where they were found that Wilmanns identifies as a *valetudinarium* (1995b: 207 & 214) has very little structural evidence and has not been thoroughly explored or understood (Mason 2000: 410). A piece of *spolia* from Carnuntum that mentions the word *capsarius* was found built into a wall of the so-called hospital building (Appendix 2, number 20). Given that this is a piece of *spolia,* built into a building wall, it is most likely not in its primary context, making it more difficult to use as support for the identification of the *valetudinarium.* It may have been incorporated within a later building phase of the *valetudinarium,* but one cannot say whether or not the inscription defines the building as the *valetudinarium.*

Another, indirect, indication of hospitals existing in fortifications is provided by a papyrus fragment found in Egypt (BGU 1564=Sp 395, papyrus Egypt 138; Campbell 1994: 239). This gives an impression that hospitals, or at least items associated with the body, were kept clean. The fragment, which has been mentioned previously, is an order form from a military *valetudinarium* in Cappadocia requesting a white blanket to be sent to the fortification. The order requested that the blanket should be plain and white, eight feet, eight inches (6 cubits) long, five feet, eight inches (4 cubits) wide and weighing three pounds nine ounces (4 minae). It was also asked in the order that the blanket be of good, soft pure white wool without any stain and that is to be well woven, firm, with finished hems, satisfactory without damage. It was ordered in the second year of Antoninus Pius' reign. Since the inscription mentions the blanket being of pure white wool and with no stain, one is inclined to ask whether such standards were made of all *valetudinaria,* or only in certain units or provinces, as the importance of cleanliness of items might not have been a universal in Roman health care. Perhaps it is only the items associated with the body rather than the structure that were expected to be clean. Unfortunately Hyginus and other writers do not mention anything about this aspect of the *valetudinaria,* and one is only left with the suggested possibility that some *valetudinaria,* at least, might have been maintained as clean buildings.

As mentioned earlier, Hyginus provides us with a slightly better understanding of the location of the *valetudinarium* in the fortification in his *Liber de Munitionibus Castrorum*. According to Hyginus (4), the *valetudinarium* was to be constructed beyond the *praetorium*, or the commanding officer's private quarters. As a means of keeping the building quiet, he suggested that the *veterinarium* and the *fabrica* be constructed about 70 Roman feet away from the *valetudinarium* to prevent noise from entering the building. It is often assumed that his suggestion for the location of the building is followed (e.g. von Petrikovitz 1975: 98), but when comparing fortifications of both the legionary and auxiliary units it becomes immediately apparent that each has a different arrangement of buildings, and the buildings that have been identified as *valetudinaria* are not always located in the area that Hyginus suggests. Sometimes they are located closer to the *fabrica* and the barracks, which might have been rather loud places at certain times during the day or night with soldiers' movements. Of course Hyginus was discussing the location of areas in temporary camps mainly made of tents so the distances could have varied from those made of wood or stone, and things might have been different depending upon the materials used in the construction of buildings in permanent fortifications.

An interesting point that can be made about Hyginus' suggestion for *valetudinaria* is that they were to be located along with the *fabrica* and the *veterinarium*. These three buildings were used for a form of repair and craftsmanship, be it of the body or something else, an association that was noted from the Vindolanda tablet mentioned above (Bowman and Thomas 1994: 155). Thus perhaps the *valetudinarium* was expected to be in the area of these buildings by means of metaphorical and functional association.

Other primary historical sources that discuss that placement of the wounded and ill soldiers on Roman military campaigns have been used by modern medical historians as a means to further support the existence of *valetudinaria* (e.g. Davies 1989: 221-2; Johnson 1983: 159-65; Nutton 1969: 262-3, 1995: 49-51; Scarborough 1976: 78-9). Nutton believes that the *valetudinarium* was based on a group of tents (1995: 49). When the Latin or Greek is examined carefully it becomes clear that the meanings of some historical statements might have been over-interpreted, as the sources relate to soldiers on campaign, not in permanent fortifications. One example of a historical source that is interpreted by Davies to be evidence of a *valetudinarium* is from Hadrian's biography, where a statement is made about how he would visit the sick in their quarters, which is a demonstration of his being a concerned emperor whilst on campaign: "*Aegros milites in hospitiis suis videret*" (SHA *Hadr.* 10. 3). It is important to point out from this passage that Hadrian visited the sick in the *hospitium,* rather than in a *valetudinarium. Hospitium* is similar in meaning to the Greek word *ξενοδοχειον* and can be translated to mean a place for foreigners to stay, literally a place to receive hospitality. Thus the Latin indicates that the sick and wounded were not necessarily placed in a *valetudinarium* for treatment or recuperation, but perhaps in another part of a building, or in a separate area of the campaign fortification.

The biography of Severus Alexander (SHA *Severus* Alexander 47. 2) also shows him visiting the sick in their tents: "*aegrotantes ipse visitavit per tentoria milites*", implying that this was probably a common practice, or at least expected of emperors and generals. Since the writer uses the word for tent, rather than *valetudinarium*, it tends to suggest that the soldiers were placed in their tents, whether this is implies specific tents for the sick is not certain, just because he visits the sick in their tents does not automatically imply a separate area, or set of tents. It is possible that the sick were placed with others, healthy or wounded, in their ranks. As the plural for tents is used it might imply a single group of tents used as a *valetudinarium*. There is a further suggestion that the soldiers were placed in their regular tents from Tacitus. Tacitus says that in the same tents some nursed the wounds of brothers, others of relatives: "*Isdem tentoriis alii fratrum, alii propinquorum volnera fovebant*" (*Hist.* 2. 45). From these three statements it is difficult to say if *valetudinaria* were set up during all military campaigns, only a few, or if they were set up at all.

According to Majno (1975: 382) a quotation by Livy (10. 35. 7) provides the reason why *valetudinaria* were created. Livy states that during the Samnite Wars in 294 BC soldiers sharing quarters with the casualties were dispirited because they were kept awake by the groans of the wounded and the dying: "*sed militum iacere animos; tota nocte inter volnera et gemitus morientium vigilatum esse*". The statements from Tacitus and those about Severus Alexander seem to imply that even after Livy wrote the wounded might still have been placed with the healthy soldiers on campaign. At the same time there is no evidence to say they were not placed somewhere separately. Moreover, none of the statements mentions the term *valetudinarium*, so it is impossible to say when, or why *valetudinaria* might have been established. Majno's statement can only be taken as a suggestion, but it does display the fact that soldiers, at least during the time Livy was writing (as his statement might have been made on situations with which he was familiar rather than what actually happened), were most likely living with the wounded. Yet, these statements are referring to soldiers on campaign and they provide no strong evidence to suggest how *valetudinaria* might have developed in permanent fortifications.

These statements do not give us an idea of when people were admitted to the *valetudinarium*. It is not clear if only those who were suffering from certain ailments or types of wounds were admitted. The fact that emperors and commanders visited the sick soldiers, and Livy's statement about the wounded and the healthy being placed in the same tent, might mean that the *valetudinarium* was full, especially if there was a high number of casualties, and only then could the most serious of cases be brought into the hospital.

In support of the fact that *valetudinaria* might not have been made available to soldiers on campaign is the literature mentioning wounded soldiers being left behind in friendly villages if they were unable to continue with the march. Obviously, if a troop had to continue with marching there might not have been time to set up a *valetudinarium* and the soldiers could have been left behind in a friendly settlement. The idea of leaving soldiers in this situation is also mentioned well after the time Hyginus was writing. Julius Caesar did this during his campaigns in Africa. He halted for the evening to care for the sick and the wounded and if they became too much of a burden he sent them to stay behind in the local village: *"Labienus saucios suos, quorum numerus maximus fuit, iubet in plaustris deligatos Hadrumetum"* (*BA* 21. 2). He also mentions halting to care for the wounded during the Gallic Wars for three days in order to tend to the wounds and to bury the dead: *"cum et propter vulnera militum et propter sepulturam occisorum nostri triduum morati eos sequi non potuissent"* (*BG* 1. 26. 5). The biography of Severus Alexander continues by saying that if the soldiers did not regain their health the emperor would have them sent to the most upright house-holders or highly esteemed matrons in the cities and country districts near to the campaigns: *"per civitates et aegros patribus familias honestioribus et sanctioribus matrionis eos distribuebat"*, (SHA *Severus Alexander* 47. 3). It appears that if there had been *valetudinaria* on campaign, as Nutton argues there were (1969: 266, n 1) on account of the shape of the so-called *valetudinarium* at Haltern appearing to be like a group of tents, then soldiers would not have been placed in their tents or left behind in friendly villages. Furthermore, the conditions of being on campaign, with frequent movement, may have made it impractical to construct such specialised buildings as *valetudinaria*.

For soldiers not on campaign there is the possibility that perhaps only patients suffering from certain diseases or wounds were expected to be placed in the *valetudinarium* for recuperation. The daily report from Vindolanda, mentioned above, lists the number of soldiers who were available for their daily duties and the numbers and whereabouts of those who were absent (Chapter 4; Bowman and Thomas 1991: 62, 66; Bowman and Thomas 1994: 93-4, 98). Ten per cent of the soldiers who were absent were missing because of illness. Those who were ill were divided into three categories: those suffering from eye problems, injury and illness. One suggestion for this division is that the three groups were divided because they had different places to convalesce. For example, those who were absent because of illness might have been left to recuperate in their barracks. This might be further supported by a papyrus fragment from Egypt that comprises the remains of a soldier's letter to his parents. The soldier, stationed in Egypt, was ill because of food poisoning caused by rancid fish. In his letter he mentions being fed by members of his troop (P. Mich 478 in Davies 1974: 130). This could imply that he was cared for by fellow soldiers - had he been in a *valetudinarium* he would probably have mentioned a doctor or someone else associated with the medical field feeding him. At the same time it might also be an indication that soldiers sometimes helped their ill comrades, either in their barracks, or in the *valetudinarium*. This could indicate that the soldiers in some units, when ill, may have stayed in their barracks depending upon the nature of the disease. It might also be an indication of specific troops using different care that was not standardised across the empire. Again more questions are raised about the nature of the *valetudinarium* from this statement. It was mentioned in Chapter 4 when discussing the possible interpretations of the Vindolanda tablet of a daily strength report (Bowman and Thomas 1991: 62, 66; Bowman and Thomas 1994: 93-4, 98) that this division might have been an indication of a specific doctor being provided for these treatments, but then one must ask where the treatments were being offered, suggesting the possibility that there might have been different ideas about how a *valetudinarium* should be constituted according to the different military units' cultural understandings.

A comparison of descriptions of civilian *valetudinaria* could be useful; unfortunately, however, descriptions of civilian *valetudinaria* are even more vague. Xenophon speaks of a man suffering from an eye disease leaving a surgery: "*Καὶ ἐντυχών τινι ὀφθαλμιῶντι ἀνθρώπῳ ἀπιόντι ἐξ ἰατρειού*" (Hellenica II. 1. 3). From this it seems that in Greece, people were able to visit the doctors' home. Celsus is the only Roman writer that mentions *valetudinaria* outside a military context and comments that the larger the building the less treatment there was made available to the people by the person in charge of running the structure: "*et qui ampla valetudinaria nutriunt, quia singulis summa cura consulere non sustinent*" (Proemium 65). This statement in itself implies that such structures did exist. There is another suggestion by Harig that there might have been *Tabernae Medicae* (1971: 185-7; Jackson 1988: 65), or basically a shop where one could receive treatment. Galen also mentions visiting patients in their own homes; though it has been argued by Horstmannshoff that he did this mainly for the wealthy. It is also known from Galen that doctors would have patients visit their homes (1995: 84-5, 91). It is possible that poorer patients might not have received visiting doctors, but had to visit the doctor's themselves, if many doctors held the same attitudes as Galen about whom they preferred to treat. Another suggestion is that civilians were treated with folk-remedies by those whom they deemed wise enough to understand their problems; perhaps both visited each other, yet this is not mentioned in the practical medical literature. The civilian evidence points to a number of possibilities for people to receive treatment, suggesting that there may not have been one specific place for civilians to have health care offered to them and this should be kept in mind when the archaeological material is considered for the Roman military.

6.3. Structural evidence

To add to our understanding of *valetudinaria*, the archaeological evidence for the structures needs to be considered in detail to see if there is enough support for their identification. The first Roman military *valetudinaria* were identified late in the 19th century, though curiously such attributions have rarely been questioned. A re-examination of the evidence will help by either presenting stronger evidence for such existing identifications, or it will demonstrate that there is insufficient data to state what such buildings are, and that one must be more cautious when accepting archaeological interpretation as fact, or truth, without question.

However, before discussing the architectural features of the buildings identified as *valetudinaria*, an issue that must be discussed centres around the arguments over the development of *valetudinaria* in the Roman world. Debates exist in scholarship about how Roman military *valetudinaria* came to be. Some scholars feel that they should have developed out of pre-existing structures, whilst others feel they represent an innovation specific to the Roman army.

According to Haberling (1909: 442) civilian settlements functioned as *valetudinaria* first and he believed that the sick and wounded soldiers were cared for by the local population, just as they were during the military campaigns. This could be correct in some cases; however, no broad archaeological study has been made to see if there is supporting evidence for this. Some medical tools were found in civilian settlements, such as at Caerleon and Chester, for example (Appendix 10, Tables 2 and 3), but the context of the finds is only recorded for an area in general, rather than a specific structure. Moreover, these civilian settlements are contemporary with the fortresses and not pre-existing structures. This theory remains possible given the fact that there are reports of soldiers being left behind in friendly villages whilst on campaign. However, whether a *valetudinarium* developed from places in the *vici* cannot be said with any certainty, as there is no structural evidence on which to base a comparison, and even if there were, the structures of *valetudinaria* in the fortifications might not have been based on those in *vici*.

Krug believes that the *valetudinarium* developed from accommodation provided in religious sanctuaries, such as that for Aesculapius at Epidaurus, (1984: 207-8). From the archaeological remains it seems very likely that sanctuaries had rooms provided for those who visited to rest, and possibly to receive medical treatment in cases of sanctuaries relating to healing. These rooms are generally thought to have had space for a number of separate beds, rather than providing private accommodation (Krug 1984: 207-8). It is debatable whether the doctors treated patients in these rooms or if they were treated elsewhere, as there are many votive offerings from different areas of the sanctuary. Perhaps treatment in certain places depended on the type of disease. It is known that doctors resided at the sites as well as 'spiritual healers', such as priests and priestesses. It may be that both worked with one another, but without better evidence one is unable to make any specific statements about what actually occurred at the healing sanctuary. It might be that these rest places were not intended for healing by a doctor, but by a visitation or vision from a god, probably Aesculapius, in a dream or hallucination. Whether these buildings were the inspiration for *valetudinaria* is also difficult to determine because they had a religious function. On the other hand we assume that Roman *valetudinaria* would have been fairly rational (i.e. conforming to our notion of being a purely functional structure), with the exception of possible cult rooms, but it may be that some troops, depending upon their beliefs, placed their unhealthy soldiers in buildings that were associated with religious functions, rather than the identified *valetudinarium*.

Harig, on the other hand, feels that the *valetudinarium* were developed in the military (1988: 84). Since Haltern, a fortification constructed during the reign of Augustus on the Lippe frontier, apparently has the first *valetudinarium*, Harig feels that they were part of the emperor's development of the health care system. Again this is difficult to determine, especially when there is a question about whether *valetudinaria* have been identified correctly. Since all of the arguments regarding the development of *valetudinaria* are conceivable, but have very little supporting evidence, one cannot say with certainty what the origins of *valetudinaria* were.

There is a strict idea that the architecture of military *valetudinaria* should conform to a certain plan, an idea that constricts scholars from asking questions and making comparisons that could bring to light other aspects of *valetudinaria* that have yet to be considered. Such aspects might include whether different plans for *valetudinaria* existed in different fortifications, and if each unit had a different understanding about what a *valetudinaria* should be. It also has to be asked whether the present identification of buildings as *valetudinaria* is secure.

The *valetudinarium* at Neuss, mentioned above, was identified as such because a group of instruments was found in one room of the structure. Its layout appears to be very similar to the 19th and early 20th century German military hospitals (Fig.76-78; Jettner 1966: 144-5) and this may well have informed the original interpretation. After the structure at Neuss had been acknowledged as a *valetudinarium*, buildings with similar designs were also recognised as such. The general layout of the structures identified were similar; however even these vary from one fortification to another in terms of their size and the detail of their plan. Generally, the structures are based on a rectangular plan constructed around a central courtyard (Fig. 58) (i.e. Baatz 1970: 8-10; Jackson 1988: 136-7; Majno 1975: 382-96; Nutton 1969: 262-3; von Petrikovitz 1975: 88; Salazar 2000: 81; Scarborough 1976: 68 Wilmanns 1995b: 104-5). The buildings in legionary fortresses had a courtyard that was surrounded on three sides by an inner row of small rooms, or 'wards'. The inner ring of rooms faced onto a hallway that was surrounded on three sides by an outer ring of wards. Each ward consisted of two rooms divided by a small hall, each of the two rooms opened onto the small hall, rather than onto the larger central hall. The rectangular plan described is mainly identified in the legionary fortresses; smaller versions of the rectangular plan surrounding a courtyard have been identified in some auxiliary forts, but with only one ring of rooms surrounding the courtyard. Another plan that has been identified as a *valetudinarium* for auxiliary forts is a rectangular structure with a central hall surrounded on four sides by a single row of small rooms. The front of the structure is understood to be the area where the reception room, operating theatres, kitchens and rooms with a religious function were placed. These rooms were identified on understandings of rooms incorporated into hospitals in the 19th century. Even Salazar points out that there is not enough evidence for operating theatres within *valetudinaria*; although she assumes that this would make more sense than a situation where the doctors moved from room to room; yet she rightly points out that the Greeks and Romans might have had different ideas about 'common sense' arrangements (2000: 70, 81-2).

Legionary buildings that have been identified as *valetudinaria* occur at Inchtuthil, Caerleon, Vetera I and II, Haltern, Neuss, Bonn, Vindonissa, Carnuntum and Lotschitz in inner Pannonia Superior, and Novae on the lower Danube in Moesia Inferior. There are also some claimed for the fortresses at Chester, Vindobona, Lauriacum, Regensburg and Aquincum, but these have even fewer structural remains for their identification to be based upon with any certainty. In auxiliary forts so-called *valetudinaria* have been identified at Housesteads, Benwell, Pen Llystyn, Wallsend, Valkenburg, Oberstimm, Wiesbaden, and Künzing. Presented below is a detailed discussion of each so-called *valetudinarium*.

6.3.1 Legionary Structures

Haltern (Fig. 79). The structure identified as a *valetudinarium* was built in the praetentura and was oriented on a north-south axis. It dates to the late 1st century BC, and was probably built for the campaigns of Drusus. The structure was built in the courtyard style, but was not entirely excavated so there is some question about the actual size of the building. Stieren (1928; 1930: 197) believes that it was roughly 43.0 x 80.0 metres and that the inner courtyard measured 33.0 x 63.0 metres. The north half of the building was studied, and what was excavated measured 50.5 x 76.5 metres, equal to 3,863 sq. metres. The inner hall of the building measured 26.5 x 40.0 metres equalling 1,060 sq. metres.

Twenty-five wards were found, but there is an estimated number of 50. They each measure 3.5 x 4.0 metres and are thought to have had enough room to hold two or three beds (Schultze 1934: 59). The little hallways between the sets of wards measured one metre in width. There were no characteristic finds from the building that would indicate it was intended to be used for health care purposes (von Schnurbein 1974: 67-8; Jettner 1966: 1-2). The one medical find from the site was a lead stopper from a medicinal jar that had the words *radix Britannica* inscribed on it, which was a medicine for scurvy. The inscription was found in the *principia* not the *valetudinarium* (Johnson 1983: 161; Stieren 1928: 70).

Vetera I. (Fig. 80) This structure was constructed between 47-54 AD for the two legions, V and XXI, stationed at the fortress. It was built in the courtyard style on the west side of the fort south of the via principalis in the praetentura. It measured 73.0 x 58.4 metres or 4,320 metres square. The main hallway that runs around the interior of the building is 5.0 metres wide. The entrance is located on the north side of the building. Vetera I's *valetudinarium* was fully excavated. The entrance had a number of rooms constructed on the outer porticoes that are claimed to be shops. These are thought to be a means of keeping the building quiet, though the degree of silence would depend on the types of shops that were constructed onto the front of the building. The first room is described as an entrance hallway and measured 9.3 x 14.0 metres. The connection to the via principalis is through a large corridor hall, measuring 8.4 square metres. Following the entrance was a large hall that was divided into three parts by two rows of Corinthian columns (Oelmann 1931: 225). There are two small rooms located to the side of the large colonnaded room that were suggested to have been used for an admissions' office and possibly doctor's accommodation. At the side of one of these rooms was a niche claimed to hold the figure of a healing god, but there are no archaeological remains of such a figure, or any object found within the niche. Sixty small rooms were found surrounding the central courtyard and each measured roughly 3.4 x 3.0 metres. Moreover, they were thought to have held two beds, equalling 120 beds in total. This would not seem to be many beds for two legions, given that the average estimated number of beds is 6 to 10 per cent for an entire legion. A possible operating theatre was suggested for the room that jutted out into the courtyard. This measured 8.0 x 12.6 metres. A kitchen was suggested for the large room to the left of the so-called operating theatre (Jettner 1966: 3-4). A bathing complex was found near the entrance of the building (Lehner 1929: 126-32). There may have been toilets given the presence of drains found running beneath the building (Böcking 1987: 137; Pitts and St. Joseph 1985: 30, 95; Schultze 1934: 58; Watermann 1980: 30).

Vetera II (Fig. 81). The second legionary fortress at Vetera also had a building that has been identified as a *valetudinarium*. It is claimed to have been constructed before AD 70 during the reign of Nero. It was constructed around a large courtyard surrounded on three sides with sets of two rooms. One of the larger rooms in the structure was argued to have been an operating theatre (Böcking 1987: 137). It is a square building 83.5 metres on the outside with an interior circuit of rooms of similar form measuring 40.2 metres. The building is 1,616 metres square (Böcking 1987: 137; Pitts and St. Joseph 1985: 30; Watermann 1980: 30).

Neuss (Fig. 82) This so-called *valetudinarium* has an uncertain date and may have been constructed in the Claudian or Neronian periods. The building was excavated between 1887 and 1901, and was found to be of a standard courtyard plan, but a little more than half the building has been revealed. It was constructed in the latera praetorii on the south side of the via principalis and opposite the praetorium or the commanding officer's quarters. Measuring 89.0 x 49.0 metres, it had a colonnaded portico on the front of the building. From the portico its interior was reached by a long entrance hall. There was a group of smaller rooms in the area of the entrance and these might have been cult rooms. One of these rooms had a hearth that could have been used for religious purposes, but may also have served another function. The remaining three sides of the rectangular hallway were divided into wards (Jettner 1966: 4-5). A courtyard measuring 11.4 x 8.6 metres was discovered and it had a peristyle, possibly covered, surrounding the four sides of the area (Haberling 1909: 448-50). The room claimed to be an operating theatre jutted into the courtyard. It also had a hearth. The building had about 60 wards that measured 5.13 x 3.6 metres. A toilet is thought to have existed because of a drain found leading out of one of the rooms (Schultze 1934: 59-61); however, no remains of a latrine have been uncovered. It was the south-east corner of room 51 where ten medical implements were found, and along with them were found pottery vessel fragments, pieces of bone, oyster shell and egg shell (Koenen 1904: 180-2). Herbs were found in the *valetudinarium* during excavations in the 1960s, and argued to have been used for medicinal purposes (Knorzer 1963; Watermann 1978: 1-2). Whether they were used here or stored in the structure cannot be said with any certainty.

Bonn. The so-called *valetudinarium* was excavated in 1954 and found to have been of the courtyard style. It is thought to have been built somewhere between AD 180 and the third century. It was constructed in the praetentura on the west of the via principalis. It has not been fully excavated so it is estimated to have measured 110.0 x 90.0 metres, and argued to have been able to hold 180 sick or wounded soldiers (Jettner 1966: 6; Watermann 1980:

30). Yet, the structural evidence does not reveal enough information to support these statements with any certainty.

Vindonissa (Fig. 83). Located in the praetentura, the building identified as a *valetudinarium* was constructed of stone and measures 70.0 x 60.0 metres or 4,410 metres square (Anonymous 1970-71: 33; Pitts and St. Joseph 1985: 30; Tabanelli 1958: 41; Watermann 1974b: 353; Watermann 1980: 30). It was built in a similar courtyard style as the other legionary structures thought to be *valetudinaria*. The courtyard was surrounded on three sides with small wards and measured 37.8 x 26.6 metres, with a large entrance room in the front of the building. The structure was located on the via principalis next to the *principia* (Simonett 1937: 202-3).

Lauriacum. This structure argued to be a *valetudinarium* was not fully excavated, but measured 90.0 x 50.0 metres and was built in stone (Watermann 1980: 30). It lies in the praetentura. The fortress was constructed after the Marcomannic Wars, so the structure dates to the late-2nd century and it had three building phases. The third phase is dated by coin evidence to at least the reign of Valentinian I (364-367). It has a six metre wide corridor and a 58.5 x 22.5 m courtyard. The last third of the building has water channels, which might represent a latrine (Swoboda 1937: 265). Twenty-three wards have been found, measuring 5.6 metres wide and estimated to have had places for six beds in each room (Swoboda 1937: 270).

Lotschitz (Fig. 84). Although this is not located on the front line of the frontiers the fortification has a building identified as a military *valetudinarium* and will be taken into consideration here. The structure was constructed in the typical courtyard style and measures 23.0 x 168.0 metres. It dates to the 2nd century (Tabanelli 1958: 45). It had two larger rooms that are argued to have been an operating theatre or an entrance hall (Lorgar 1919: 117-8). Estimations have been made that there was enough room to hold 420 beds (Swoboda 1937: 270).

Regensburg The stone building claimed to have been a *valetudinarium* has seen very little excavation (Watermann 1980: 30). Thus there is little structural evidence on which to base its claimed existence.

Vindobona. This structure, too, has hardly any structural remains, making its identification as a *valetudinarium* questionable. It is thought to be a *valetudinarium* because it is located in the praetentura and because one of two altars found in the building had the name Aesculapius inscribed on it. Furthermore one probe was found within the structure, along with other non-medical finds of green and brown glass, tile fragments, part of a sieve and a knee fibula (Neumann 1965; Watermann 1980: 30). One wall of the building, M15, had bits of courseware pottery along with grey and brown glass. Most of the finds date to the 2nd and 3rd centuries (Neumann 1965: 99-113). Since there was an altar found *in situ*, a suggestion was made that the room probably had a cult purpose associated with healing gods, yet this does not necessarily indicate that it was intended to be the cult room of a *valetudinarium*. The first altar reads [I(ovi)] O(ptimo) M(aximo)/ Apollini/et Sirona[e/Ae]sculap(io) or Ae]sculap[io]/P(ublius) V(otum) S(olvit)/l(ibens) l(aetus) m(erito). The second altar found in the structure reads Ap(ollini) So(li) et Sir[o/n]ae (Neumann 1965: 103; Neumann 1980: 28). Since other gods are mentioned as well, there is no reason why this altar was particularly associated with the cult room of a *valetudinarium*.

Carnuntum (Fig. 85). The stone building claimed to be a *valetudinarium* measures 82.0 x 73.0 metres or 5,890 metres square. It was built in the latera praetorii located on the corner of the via Quintana and the via praetoria. (Haberling 1909: 441; Pitts and St. Joseph 1985: 30; Watermann 1980: 30). The structure was excavated in 1904 and found to have been constructed in two periods. The building of the second period is an example of the so-called courtyard *valetudinarium* structure (Haberling 1909: 452 and 454). The main entrance is located on the eastern side of the building. Unlike other structures there is not always a division of wards into two rooms, but sometimes they are grouped into three and four rooms together. The outer circle of rooms had one room with a hearth, which is argued to have been used for the kitchen. One of the rooms was decorated with *opus spicatum*. Two other rooms had clay floors. Rooms 10 and 11 were heated by a hypocaust. Room 15 was constructed with flue tiles from a hypocaust on its southern wall. Room 16, two rooms away from room 15, has a T-shaped hypocaust beneath its floor. The inner ring of rooms is little like those in other *valetudinaria*, as one room had a hypocaust and another a small stone trough (Groller 1906: 53-5). The courtyard had a landing with steps on its west side, something that does not seem to appear in the other buildings identified as *valetudinaria*, with the exception of Novae. There were some architectural remains found in the courtyard - part of a column shaft, part of a column foot and a Corinthian capital. In the middle of the courtyard was a possible well or a hole for the column. The south front of the main room 37 had a hypocaust. A drain was constructed on the west part of the main building on the 48.0 metre cloaca maxima of the camp. It was 70.0 cm high and 50.0 cm wide (Groller 1906: 57-62).

Novae (Fig. 86) Although this fortress is not in the area of study, being in the lower Danube, it is mentioned to demonstrate that buildings of similar plan were found in other parts of the empire as well. The structure was situated in the praetentura and measures 5,970 square metres. The average size of the wards measured 5.35 x 4.70 metres and is estimated to have enough space for two to six beds. There was a latrine found in the western wing and a storeroom of lamps (Press 1988: 77). One room did have a few instruments, but they are said to have been broken, and could have been placed in the *valetudinarium* for another reason. Novae is one of the few buildings to have had a contextual study of artefacts (Dyzcek 1995), and it displayed some interesting patterning in the distribution of objects (discussed below) that make one question the identification of such structures even more. It also appears to have had a small temple in its courtyard.

Inchtuthil (Fig. 87). The *valetudinarium* in this fortress was excavated in the summer of 1957 and found to have 60 wards located around a central courtyard. The building was constructed on the left side of the latera praetorii, corresponding with the *fabrica* on the right side, and adjacent to some barracks. The building measures 91.44 x 58.52 metres equal to 5,351 metres square (Pitts and St. Joseph 1985: 95). The courtyard measured 21.33 x 59.74 metres or 1,274 metres square. The main entrance was located on the south-east facing the granary. There was no forehall or large reception room, and the main entrance gave access to the main circulatory corridor through a small vestibule. At the south-east end of the inner range of rooms was a hall, room A, that measured 13.41 x 4.88 metres flanked by two smaller rooms, measuring 3.66 x 4.88 metres, and is suggested to have been the operating theatre. The reason for this definition is that one of the small rooms was equipped with numerous hearths argued to have been used to sterilise instruments. Since the Romans were unaware of sterilisation, and furthermore probably would not have needed a number of hearths even had they been used for this purpose, another function for the room must be sought (perhaps a workshop or kitchen). The wards measured 3.96 x 4.27 metres in size. It has been suggested that there were four beds in the *valetudinarium* for each *contubernium*, or 40 beds for each century, which is quite a large amount of space for ill and wounded soldiers. Few material remains were found to suggest the purpose of the structure (Pitts and St. Joseph 1985:91-101).

Caerleon. The fortress is Flavian in date, but was rebuilt in the early 2nd century and eventually demolished at the end of the 3rd century. The building claimed to be a *valetudinaria* has very little structural evidence, as not much excavation has taken place in the area. Most of its plan is, therefore, speculative. The main argument for its identification is based on its similar position to that of other buildings identified as *valetudinaria* at the fortresses at Haltern, Lauriacum, Xanten and Lotschitz, that are in the praetentura. The so-called *valetudinaria* took the typical form of a double range of rooms separated by a wide longitudinal corridor, flanking three sides of a courtyard. A large hall, 25.0 metres in length, projected into the courtyard. The central corridor was 6.7 metres wide. It is difficult to give an estimate of the number of rooms. In the outer range they measured some 3.6 by 4.6 metres. Internally they appear to have been divided into sets of three with a small hall dividing them. There were no latrines found, but a possible drain for one was uncovered. Tanks were found in the courtyard that may have been used to collect rain from the roofs of the building (Murray-Threipland 1964: 86-123). It is believed that the rainwater would have been used for medical purposes, but since many Roman houses had *impluvia* to catch rainwater for the purpose of drinking, it seems unlikely that the water would have had a special medical purpose. The numerous remains of amphorae suggests a concentration of imported commodities in this building, perhaps storage. A handle from one suggests that it was Amirian wine, a white wine from Italy that had medicinal purposes. No surgical instruments were found in the building (Boon 1972:

75-7). At the end of the 3rd century the tanks in the courtyard were filled in (Wilson 1965: 199).

Chester. The so-called *valetudinarium,* located behind the principia, has little in the way of structural remains. The structure was excavated in 1980 and measured roughly 65 x 150 metres. It was first identified as the commanding officer's quarters (Frere 1983: 297-8), but the true purpose of the structure is not understood (Mason 2000: 410).

6.3.2 Auxiliary Structures

Valkenburg (Fig. 88). This auxiliary fort was thought to have had a wooden *valetudinarium* constructed in the 1st century. Built as a smaller version of the courtyard style, the structure measures 35.0 x 12.0 metres. It is located in the praetentura (Watermann 1980: 30). However, it has also been argued to have been a *fabrica* (Schönberger 1979: 135-41), demonstrating the difficulty in defining the building on its structural evidence alone.

Wiesbaden (Fig. 89). This so-called stone *valetudinarium* was constructed in the praetentura of the fort. It measured 15.0 x 22.0 metres (Watermann 1980: 30). It was built on a long rectangular plan with a central hallway, rather than in the courtyard style (Schönberger 1972: 54).

Oberstimm (Fig. 90). The building claimed to be a *valetudinarium* was constructed in a rectangular plan around a central hall in the latera praetorii. It measures 18.0 x 13.0 metres (Watermann 1980: 30). The building was occupied in a number of periods. The *valetudinarium* dates to roughly AD 40 to 69. There were small corridors between the double rooms. There may have been a latrine in the northeast corner (Hassall 1983: 115; Schönberger 1972: 57-62). The building was constructed next to the *fabrica* and behind the *praetorium* (Johnson 1983: 238)

Künzing (Fig. 91). The building identified as a *valetudinarium* was constructed during the 1st century in the praetentura of the fort. The wooden structure measured 30.0 x 15.0 metres (Watermann 1980: 30). It was built as a rectangular structure that ran around a central corridor. The entrance was located on the north wall and measured 3.2 metres wide. The first room, room one, was especially large measuring 7.5 by 5.3 metres (Hassall 1983: 107; Schönberger 1975: 53-4).

Corbridge (Fig. 92) The structure at Corbridge originally identified as a *valetudinarium* has since been argued to be a *fabrica*. Building 5 inside the large forum at the site was first identified as a *valetudinarium* because of its similarity to the buildings at Künzing and Oberstimm, having a series of rooms laid out on both sides of a central corridor. It measured 28.0 x 13.0 metres and was made of stone (Daniels 1969: 97-101; Watermann 1980: 30; Gillam and Tate 1971: 8; Richmond and McIntyre 1938-39: 132-4). An iron bound chest was located under the floorboards of the structure, and contained the remains of armour, weapons and tools. Davies argued that these were put away to rust, so that the rust could be used for medicinal purposes (Davies 1969/70: 177). Nevertheless, it should be asked why someone would have placed the metal objects in a chest if they wished them to rust quickly and why these objects were not retrieved. The plan of the building also resembles workshops, as pointed out by Daniels (1969: 126). However, another suggestion is that its proximity to the granary that makes it more likely to be a store building. The building at Corbridge was similar to store houses in Rome (Bishop and Dore 1988: 128). Again the building at Corbridge is a good demonstration of how a single structure could have a variety of purposes.

Housesteads (Fig. 93). The stone building identified as a *valetudinarium* has been much discussed (Bosanquet 1904; Charlesworth 1976; Crow 1995 50-1; Wilson 1972: 306-8), and comparison has been made with other auxiliary structures identified as *valetudinaria*. Measuring 30.0 x 22.0 metres it was constructed in the courtyard style (Watermann 1980: 30). The building was located in the latera praetorii behind the headquarters building. It had a west entrance that led onto the via decumana. The central courtyard was surrounded by a low wall that supported a colonnade. On the north side of the structure close to the western entrance, a large room was constructed that has been claimed to have been the operating theatre. Around the other three sides of the courtyard were smaller rooms. There was a latrine in the lower southwest corner. It was first excavated in 1904 (Bosanquet 1904: 239) and re-examined in 1970 and 1971. In 1971 most of the Hadrianic plan from the east range of rooms was excavated (Wilson 1971: 250). The structure was found to be different from the plan published by Bosanquet in 1904. Most rooms in the south range had three floor levels, each composed of earth and pebbles and some walls had been altered. There was a series of drains that were not connected with latrines, but have been suggested for the ablutions of the building (Wilson 1972: 306-8). Bosanquet found cross walls in the large room, which tends to suggest that at one point the room was smaller. There are possible remains of hearths found in the eastern end that show burning so intense that they may have been used for metal working (Charlesworth 1976: 19). There are other suggestions that the structure could have been an armoury or a workshop; however it is generally assumed that it was a *valetudinarium* (Crow 1995: 50-1).

Benwell (Fig. 94). The so-called *valetudinarium* was built immediately behind the commandant's house on the south side of the Via Quintana in the praetentura. It was another courtyard building similar to that at Housesteads, measuring 24.70 x 22.50 metres. It proved impossible to excavate the building in its entirety, so only the east wing and part of the north-south wing were examined. The wings were divided into a series of small rooms and one larger room was found projecting into the courtyard. The position of the structure within this fort provided the sole indication to archaeologists that this was a *valetudinarium* (Simpson and Richmond 1941: 22).

Hod Hill (Fig. 95). A timber building claimed to be a *valetudinarium* located in the praetentura south of the via principalis was excavated in the 1950s. It measures 24.3 x 18.29 metres with a central courtyard, while the hall measures 18.29 metres long and 7.62 metres wide. The amount of space allotted for the wards is about 48.78 metres, thought to have accommodated roughly 90 beds, or about 12.5 per-cent of the population. This was for a total strength of 718 men (Richmond 1968: 85-6). The structure is similar to *fabrica* and storage buildings.

Wallsend (Fig. 96). The building identified as a *valetudinarium* was excavated in the early 1980s and was re-examined in the later 1990's and was identified because of its location in the latera praetorii (Frere 1983: 289). In 1984 the range in the north was excavated and shown to have had undergone later modifications. Overall the building measured 15.0 by 23.6 metres. A large room excavated in the north was argued to be an operating theatre. A latrine was found in the southern end of the structure (Frere 1984: 277).

Fendoch (Fig. 97). The so-called *valetudinarium* was in a position of relative seclusion north of the commandant's house in the latera praetorii. It was 12.19 x 32.3 metres long. The building had a long central corridor. There were eight wards in the east and another room identified as a reception hall found in the west (Richmond and McIntyre 1939: 132-4).

Pen Llystyn. The central section of the fort had the commandant's house, the principia, two granaries and a long building with 11 rooms identified as the *valetudinarium.* For the most part the so-called *valetudinarium* was clearly exposed. Its identification was made on the grounds that it is analogous to the structure at Fendoch. It was 45.73 metres long by 7.62 metres wide. A row of ten wards was found. Burnt patches almost certainly representing hearths were found in the two main rooms located at the end of the structure (Hogg 1968: 133-4).

Doune. A building similar to the corridor plan *valetudinaria* has recently been revealed in an auxiliary fort in Stirlingshire, Scotland. The building has no artefactual remains that would identify it as a *valetudinarium*, but the archaeologist in charge stated that it had a similar plan to those already discussed (Moloney pers. com).

6.4 Discussion of the structures

The descriptions and figures of the *valetudinaria* demonstrate notable variations between each structure in terms of plan and location. To begin with, the buildings are usually compared according to their size and structural layout, so this will be discussed first, followed by descriptions of room types, summary analysis of their locations within the fortifications and finally other possibilities for the function of these structures.

6.4.1 Size and Structural Layout

The size of the legionary structures ranges from 73.0 x 58.4 metres at Vetera I to 123.0 x 68.0 metres at Lotschitz. The central hall-style buildings identified as *valetudinaria* located in auxiliary forts range from 18.0 by 13.0 metres at Oberstimm to 35.0 by 12.0 metres at Valkenburg, and the courtyard style structures in auxiliary forts range from 30.0 by 22.0 metres at Housesteads to 24.7 by 22.5 metres at Benwell. It must be pointed out that some of the sources that provide information about the sizes of the structures disagree in their measurements, so the sizes given are sometimes approximations. One reason for this is that many buildings have only been partially excavated, and the extent of the rest of the structure is speculative. By looking at the figures of the structures it is clear that the majority of the buildings' plans are based on conjecture, rather than surviving architectural remains. Despite this problem, there is still a noticeable difference in the sizes of the remaining parts of the structures, demonstrating that if the buildings are *valetudinaria* then they were not constructed on a standard scale.

6.4.2 Description and Arrangement of Rooms

The interior of each structure contains a different arrangement of rooms, which further supports the idea of variation within the army. In the legionary fortresses, those buildings that have been excavated thoroughly all have a courtyard plan with two rows of wards. Yet, the wards are of different sizes. For example, although small, Caerleon's measures roughly 3.6 x 4.6 metres and Neuss' 5.13 x 3.6 metres. The auxiliary fort at Künzing has wards measuring 4.3 x 3.8 metres, even though the sizes of these are not very different they are also similar in size to barrack rooms. The barrack at Valkenburg measures 3.5 x 4.0 metres in the larger of the two rooms and 3.5 x 2.0 metres in the smaller front room. Housesteads, only having a larger single room, measures 3.5 x 8.0 metres (Johnson 1983: 169 fig. 129), which is longer than the two rooms combined at Valkenburg. Since the rooms in both structures are thought to have been intended for sleeping, comparisons were made of rooms in buildings thought to have had different purposes to see if there are noticeable differences in size. The *fabrica* at Wiesbaden, for example (Fig. 89), has rooms of many different sizes and shapes, but the smaller ones measure in the range of 4.5 x 3.5 metres and 3.0 by 3.0 metres (Johnson 1983: 186). The tribune's house at Inchtuthil again has rooms of various size but some are similar in size to the *valetudinaria* rooms, measuring 3.5 x 5.0 metres, 4.0 x 4.0 metres and 4.5 x 6.0 metres (Johnson 1983: 138, fig. 104). Finally a comparison of room sizes in the *principia* demonstrates that the size of the bedrooms in *valetudinaria* cannot be used as a means to determine the function of the structure, as the rooms measure 3.5 x 4.0 at Valkenburg, 4.0 x 4.0 at Saalburg (Fig. 98) and 4.0 x 3.5 at Künzing (Fig. 99), for example (Johnson 1983: 124, fig. 95, 129 fig. 98). The bedroom size of the *valetudinarium* and the *principia* room size at Künzing are very similar. Thus, room size cannot be used to determine the intended use of the structure. If one looks at the fortress of Inchtuthil (Fig. 100) and the fort of Oberstimm (Fig. 101) as visual examples of room comparisons within fortifications, it begins to become apparent that many of the room sizes within different structures of the same fortification are similar size.

The different kinds of room within a structure are also used to determine the purpose of the building. Von Petrikovitz (1975) and Press (1988) believe that all *valetudinaria* had baths, but there is certainly not enough evidence from the structural remains to support this assumption. The so-called *valetudinarium* in Vetera I had a bath and some rooms in Neuss and Carnuntum had a hypocaust system, which are often associated with bathing. However hypocausts were also used to heat rooms. Warm rooms would certainly have been sensible for the sick and wounded soldiers, as well as the provision of their own baths, preventing the need for them to leave the comfort and warmth of the *valetudinarium;* nonetheless, there is not enough structural evidence to support the idea that every *valetudinaria* would have had a bath or heating. Bathing was a means of treatment in Roman times and some soldiers were even sent to baths for recovery, such as at Baden Baden in Germania Superior, Baden in Switzerland and Aquae Sulis (Bath) in Britannia (Doppler 1970/71: 26). It is possible that some *valetudinaria* did have private baths for the sick, but it is also possible that if baths were not provided in the structure then the sick were either sponge bathed, sent them to the camp bath, or might not have been bathed, depending on the beliefs of the unit towards the sick and cleanliness. Moreover, heating might only have been provided depending on the environmental understandings of the illness and its cure, as discussed previously with building constructions.

Latrines are also assumed to have been placed in all so-called fortification *valetudinaria.* Yet, there is little evidence for this (e.g. von Petrikovitz 1975: 101). There was a possible latrine found at Housesteads and one at Wallsend. Neuss, Vindonissa and Lauriacum had drains running out of the structures, but their intended purpose has only been assumed to be for latrines. There are no archaeological remains of toilet seats to support the assumption that all of the drains were intended for this purpose. Again a latrine would seem to make common sense; however the sick soldiers might have been encouraged to use the camp latrines, as a means of obtaining fresh air when they walked to the structure, or if they could not, perhaps bed-pans were used. Latrines might not have been the nicest smelling places, and Hippocrates (Decorum 15) warns against the sick being placed in an area that reeked of foul odours, so perhaps latrines were not placed within the structures, that is assuming they are *valetudinaria.*

Operating theatres are integral to any modern hospital, so most Roman *valetudinaria* are expected to have had one as well (Schultz 1934). In spite of this claim no evidence for their existence in Roman medical care comes from the literary sources. Salazar does point out that there is nothing in the literature to support the rooms' existence (2000: 81). The only indication we have about the rooms in which doctors had to work is from Celsus, who recommends a well-lit area to perform a cataract operation: "*Post haec in advorso collocandus est, luco lucido, lumine adverso, sic ut contra medicus paulo altius*" (7. 7. 14C). The Hippocratic writer of *In the Surgery* (III) stated that the surgeon was to be placed conveniently to the part of the body that needed treatment. Quite often it is suggested that the patient sat rather than lay down (e.g. Celsus 7. 7. 14C). Archaeologists believe that the physical remains of rooms that protrude into the courtyard such as at Neuss and Vetera I were operating theatres, because it is believed they would have had brighter light and fresher air (von Petrikovitz 1975: 101). This argument complies with the statements of Celsus and the Hippocratic writer, but it does not explain why the larger rooms in other structures such as at Housesteads, Wallsend, Künzing and Oberstimm have been defined as operating theatres on account of the need for space of the equipment and doctor's movement. In comparison, modern operating theatres need room for an operating table, electronic equipment, a team of surgeons and nurses, large lamps and tanks for anaesthetic gases. No Roman operating theatre, if they existed, would have needed room to accommodate the same number of items that are used in modern surgery. The painting of Aeneas from Pompeii having a spearhead removed from his thigh depicts him standing, perhaps a position with which the artist was familiar. This might suggest that there was not much call for large operating rooms to accommodate a surgery bed. We can assume that in some cases the doctors performed surgery in separate rooms from the places the soldiers were resting, but it might have depended on the type of treatment that was being offered. Thus, the anachronistic expectations of operating theatres having existed, and their having to be large rooms is imposed on Roman *valetudinaria.*

The final two rooms that are mentioned repeatedly in the descriptions of *valetudinaria* are the possible kitchen and cult room. Some of the structures have hearths within them that were originally suggested to have been used by doctors to sterilise their instruments (Schultz 1934: 55). However, as it became clear that this was not practised by the Romans the hearths were then argued to have been used as a component in kitchens. Kitchens in Roman fortifications are not widely known of because it seems that most soldiers were expected to cook their own meals, and hearths are often found throughout many buildings and could have had a variety of functions, such as cooking, heating, craft activities and so forth. It is again one of the arguments that common sense suggests, to us, that a kitchen in the *valetudinaria* would have been convenient. However, without secure contextual records of the archaeological finds from rooms with hearths it is impossible to say what their intended function or functions were. It may be that the soldiers cooked for their sick comrades in their barracks, rather than there being kitchen staff in the *valetudinaria.* Thus without artefactual evidence of food remains or cooking implements, one cannot indicate with certainty if kitchens were part of the *valetudinaria.* The hearths in the so-called *valetudinarium* at Housesteads have evidence for high temperature burning (Crow 1995: 50-1), probably an indication of metalworking rather than cooking, making it probable that this particular building might have been a workshop.

The cult rooms claimed to have been part of all the *valetudinaria* are also lacking in evidence for most places. The structure at Vindobona had two altars found within one room (Neumann 1965: 103; Neumann 1980: 28). However, one of the altars had been reused as *spolia* in part of the wall of the building, whilst the other was found *in situ*. The altar found *in situ* was dedicated to Aesculapius and Jupiter, whilst the other was dedicated to Apollo. Novae has evidence for a small shrine dedicated to the healing deities of Aesculapius and Hygia, as well as Jupiter and Minerva (Dyzcek 1995: 201-2). A building that has altars dedicated to gods of health need not necessarily be a *valetudinarium*, it could have had another function, perhaps as places were 'clubs' or religious societies would meet (Johnson 1983: 30, 111). Some forts had buildings used for places for socialising and these were often based around religious activity, making it plausible that the room at Vindobona and the structure at Novae might have been used for a social and/or religious function.

6.4.3 Location of the structures

Every Roman fortification has a different layout of buildings, from this difference it is clear that Hyginus' description of a marching camps was either based loosely on what he saw at the end of the 1st century in permanent fortifications, or that marching camps might have followed a stricter plan than was adhered to in the case of permanent fortifications. As mentioned, the building that has been identified as the *valetudinarium* was not always found in the area of the fortification that Hyginus recommends, but was constructed next to different buildings, such as barracks, *fabrica, principia, praetoria* and granaries. If, on the contrary, Hyginus was followed then the plan of the *valetudinarium* varies because not all of the buildings located behind the commanding officers' houses are of the same design.

The legionary fortresses of Haltern (Fig. 102), Vetera I (Fig. 103), Bonn (Fig. 104), Vindonissa (Fig. 105), Vindobona, Lotschitz, Lauriacum (Fig. 106), Caerleon (Fig. 107) and Novae had buildings claimed to be *valetudinaria* in the praetentura, whilst others were constructed in the latera praetorii: Neuss (Fig. 108), Carnuntum (Fig. 109), Inchtuthil (Fig. 100) and Chester (Fig. 110). In the auxiliary forts the so-called *valetudinaria* located in the praetentura were at Valkenburg (Fig. 111), Wiesbaden (Fig. 112), Künzing (Fig. 113), Benwell (Fig. 114) and Hod Hill. Those in the latera praetorii were found at Oberstimm (Fig. 101), Housesteads (Fig. 115), Wallsend (Fig. 116) and Fendoch.

Another problem with undue dependency upon Hyginus as a source is that many of the identified *valetudinaria* were found next to *fabrica*, barracks, baths and granaries. Hyginus suggested that the *valetudinarium* be constructed a quiet place, yet again his advice does not seem to have influenced everyone who built the structures, because the locations of many so-called *valetudinaria* do not appear to have been in quiet areas. Vetera I was located next to a gate with possible shops constructed at its entrance, whilst Künzing's argued *valetudinarium* was built between a gate and a granary and in front of a barrack block. Vetera I might have had shops built into the structure. The *fabrica* next to the possible *valetudinarium* at Oberstimm and across the way from Inchtuthil were probably not quiet either. Barracks and a bath building were constructed in the area of the *valetudinarium* in Vindonissa. Caerleon's might have built next to a *schola*, a 'clubhouse' or place for socialising. This brings us back to questioning what the Romans thought of as quiet, as one would not expect shops and the granary during deliveries and daily distributions of grain (Rickman 1971) to be peaceful, especially if the soldiers and workers were talking, moving goods, carts and so forth. The same problem might occur in the barracks and baths. Gates could also have been noisy places when carts were brought through them.

It has been made clear by Vegetius that soldiers were expected to live in a healthy area (Chapter 3). This is supported by a statement of Vitruvius (6.1) who says that the human body requires a certain climate to live comfortably and that buildings and rooms should be constructed in a manner to assure this comfort. He suggested that rooms should be arranged according to the season in which they were being used. The summer dining room in a villa, for example, should face north because it will be cool and dry. It would seem that if there were recommendations for structures to be constructed in a salubrious manner the architects of the *valetudinaria* would have considered this point, as it is a building associated with the health and well-being of the body. However, when looking at the placement of the so-called *valetudinaria* in their fortifications, evidently the advice of Vitruvius might not have been followed because the *valetudinaria* were not all constructed in the same area of each fortification and their orientations vary as well. Housesteads, for example, faces west, Künzing faces east and Oberstimm faces south. The same discrepancy is found in the legionary fortifications. Caerleon's entrance is thought to have been placed to the east whilst Neuss' faces north. The other difficulty with this is that we are relying on a Roman writer from 1st century Italy in order to explain how a healthy building should be constructed, when there is the possibility that units from different areas and different time periods (as attitudes do change through time) would have had other ideas about what constituted a healthy aspect of a building.

6.4.4 Structural comparisons

The *valetudinarium* is not the only building within Roman fortifications to have had a courtyard plan, so it is rather difficult to base its identification on this aspect alone. If one wishes to identify *valetudinaria* on the basis of structures with courtyard plans and rooms surrounding the centre, other buildings such as the commanding officer's quarters in most fortifications and the tribune's houses at Vetera I and Vindonissa could also be identified as *valetudinaria* rather than private residences. Some even had hypocaust systems and baths like the structures identified as *valetudinaria* at Vetera I (Fig. 80) and Carnuntum (Fig. 85). Even though it is the double room arrangement that has been taken as essential for the identification of *valetudinaria* there is not enough recorded evidence from archaeological site reports to support the fact that these were bedrooms. With this in mind, and with very few contextual studies having been made of the artefacts from these structures, one could easily identify many buildings as *valetudinaria* on their plans alone.

Not only can other buildings be identified as *valetudinaria*, but the so-called *valetudinaria* also show signs of having held different functions, such as storage places or workshops. Workshops with courtyard plan buildings have been identified by the remains of slag pits and hearths from metalworking at Inchtuthil, Corbridge, Oberstimm, Wiesbaden (Fig. 89) and Valkenburg (Fig. 88) (Johnson 1983: 183). The workshop at Wiesbaden also had the remains of a hypocaust in two of its rooms (Johnson 1983: 185), just like the *valetudinarium* at Carnuntum. Thus, it is important to note that perhaps other buildings besides dwellings had hypocausts and it is not a strong means of identification for a *valetudinarium*. The so-called *valetudinarium* at Valkenburg has not only been identified as a *valetudinarium* (Watermann 1980: 30), but on occasion as the *praetoria* and *fabrica* in the fort (Schönberger 1979: 135-41). The building was identified on its ground plan, but it was not until more studies were made of the hearths and artefacts that a more positive identification of a workshop was made. This should be taken as a word of caution for anyone intending to use the ground plans of a building as proof of its function.

The presence of medical tools has also been taken as supporting the identification of *valetudinaria*. However, simply because instruments were found in structures does not automatically imply that they were used in the building as medical tools. Other objects found with them are rarely recorded, which is unfortunate given that they might help in the identification of the use of the tools. An example, mentioned in chapter 5, is of scalpels found in a workshop near Bonn that appear to have been associated with leather working. Here it seems that the 'medical' tools might have been used to cut leather. Moreover, the tools in the so-called *valetudinaria* at Neuss and Novae (Dyzcek 1995: 202) were generally found in a single room, perhaps indicating a place of storage or manufacture. The majority of the tools from Novae were broken, so perhaps they were discarded here or were in storage for recycling. Furthermore, the finds might have been deposited after the building went out of use. Here again the identity of buildings should be based on thorough contextual studies of all the finds. Only then should comparisons be made of similar style buildings to see if the same sorts of finds are appearing in the same types of building.

6.5 Cultural views of space

Scholars describe the finer details of the *valetudinarium* arrangements as if the buildings were modern hospitals. The sleeping arrangements are discussed by Majno (1975: 387) and von Petrikovitz (1975: 101), who state that there was probably space for four or five people, each having their own beds (Fig. 117). To the modern reader, this seems perfectly reasonable; nonetheless we know very little about the sleeping arrangements of the Romans. When looking at other cultures it becomes clear that the one person or couple per bed is not always the norm. The Pennsylvania Dutch or Amish practice bundling, whereby they use their beds as couches in the winter months. Since the Amish do not have heating in their houses they find that it is more comfortable and practical to invite a guest to sit under the covers of their beds for warmth. In order to avoid possible 'temptation', a length of wood known as a bundling board is placed down the centre of the bed separating the two occupants (Professor G. Glass pers. comm.). Mention can also be made of the 16th century 'great bed of Ware' (held in the Victoria and Albert Museum) that could have slept about fifteen people. In the Inns of colonial America an overnight visitor paid for a space rather than a room and might have had to sleep in the same bed with a stranger, or even on the floor. These three examples demonstrate that even in modern and post-medieval times the bed and sleeping arrangements take on culturally determined forms.

One could argue that this does not consider the sleeping arrangements of the ill; however, medieval paintings of hospitals reveal that sleeping arrangements were not always a single person per bed. It has been argued that the scenes of a male and female in the same bed were spouses; however, this argument does not explain paintings with three people placed in the same bed (Furniss 1970: 3). It is possible, therefore, that soldiers might have had different sleeping arrangements while they were sick or even when healthy in their barracks. The ancient sources do not provide a clear picture of how Roman sleeping arrangements were to be spaced. Recalling the blanket that was ordered for the hospital in Asia Minor, the size is quite large, certainly double, and perhaps it was meant for two people, rather than one. From the Hippocratic writings (Decorum 15) we learn that a patient was placed in rooms according to the environment, but we do not know if the person was at home, in a *valetudinarium*, or in a room or bed alone.

The anthropological study of proxemics demonstrates that people define their space and environmental surroundings according to cultural norms (Argyle 1988: 184; Deetz 1977: 25). In certain cultures people will stand closer to one another whilst speaking to people than in other cultures. Arabs, for example, will stand closer and face each other more directly than Americans (Argyle 1988: 58). This space does not only affect the manner people use non-verbal communication with their body, but also the way they organise their architectural arrangements as well as their domestic and office furnishings (Argyle 1988: 185-7; Rapaport 1990: 10). Although this can be done more easily through modern anthropological examinations, there are means of questioning cultural understandings of space through archaeological studies. To do so, contextual examinations of artefacts are imperative for understanding how a society understood their architectural and environmental surroundings (Deetz 1977: 25; Kent 1990: 3).

The cultural study of space has not been considered by Romanists to any great extent, but recently there have been some attempts to take such issues into account (e.g. Allison 1997). If Roman archaeologists had taken greater care to record the context and association of all artefact categories properly it would be easier to make such examinations that would be beneficial in attempting to understand how people organised their space; and this could be reflected in how they cared for their ill, whether it was acceptable to place the sick in the same beds, rooms or buildings as the healthy, or if they should be separated. A study by Bartlett demonstrates that mentally ill patients were taken out of hospitals designated for all types of illness in the 18th and 19th centuries and placed into asylums as a means of segregating them even further from society. She demonstrates this in a discussion of the architectural features of these new buildings (1994: 179-181). This shows that there was a change in attitude towards people with a certain type of illness, one that was dangerous enough to require the complete segregation of the patients from society. If one could use the study of proxemics in Roman medical archaeology, such attitudes might become apparent.

There has been one contextual study of the finds from a so-called *valetudinarium*, that at Novae. Although Dyzcek (1995) refers to the building as a *valetudinarium*, if we eliminate the identification of the building and simply look at the arrangement of finds, some interesting patterns begin to appear. In the so-called bedrooms of the structure were found many metal fragments: pieces of armour and a bronze helmet, phalerae, and iron spearhead, along with many fragments of chain. He also says that with these rooms were found items possibly related to use in the *valetudinarium*, such as lamps, vessel handles and fibulae (Dyzcek 1995: 200). He does not explain why these are to be specifically related to *valetudinaria*, as lamps were used in most buildings. Being part of normal domestic equipment, fibulae and vessel handles are also found in many areas of fortifications. The small vestibules between the bedrooms had types of tableware and butchered animal bones including a dolphin's rib (Dyzcek 1995: 200-2). Room 48 had a store of broken probes and physicians caskets (Dyzcek 1995: 202). This could indicate that health care was offered to the soldiers in this particular room, rather than in the entire building, or it might also indicate storage or deposition. Room 35 was thought to be the room were patients were examined, simply because fragments of two physicians' caskets and a spatula probe were found in the room. The central courtyard of the structure had altars dedicated to Hygia, Aesculapius, Jupiter and Juno, suggesting that there might have been some form of sanctuary in the centre (Dyzcek 1995: 202-3). If one looks at the finds there seem to be specific places where items were kept, or discarded (there is no discussion on whether these finds were from the time of the building's use, abandonment or destruction). Yet, the items tend not to tell us whether the building was a *valetudinarium* because, in addition to the broken instruments, there was a great variety of items that could relate to a range of functions and other activities.

6.6 Building differences in support of medical variation

The differences in the styles of buildings identified as *valetudinaria* helps to support the argument that there were variations within the Roman military. The comparison shows that the soldiers did not construct their buildings to conform to a very specific plan. There are differences in the architecture of buildings where the function is understood, such as baths and latrines, which further supports the argument that aspects of the military were not all standardised.

6.7 History of hospitals

According to Thomas archaeologists tend to use their present day experiences as a means of explaining how things functioned in the past (Thomas 1990: 15) – this is a basic form of analogy. As previously mentioned, when looking at the descriptions of Roman hospitals there has been a tendency to describe them as if they were modern hospitals. Koenan made the initial identification of a *valetudinarium* in the early 20th century, at Neuss, and it is quite likely that Koenan's interpretation was heavily influenced by his familiarity with contemporary military and civilian *valetudinaria*. When looking at plans of 19th century German military hospitals we see that they were divided into small wards, and had operating theatres, latrines and baths. Clearly this template has been applied in the identification of Roman military *valetudinaria*, as shown above with the idea that baths, kitchens and latrines should be present, though they do not appear in every structure that has been designated a *valetudinarium*. In the context of a recent excavation of a building identified as a *valetudinarium* within an auxiliary fort in Doune, Sterlingshire, the structure had been described in the media as if it were a modern hospital (C. Moloney pers. comm), with an operating theatre and wards, as well as possessing an herb garden. However, the excavator stated that the identification was based on its similarity to other buildings identified as *valetudinaria* alone: there were no medical finds, plant remains or specific rooms that could be identified as having a certain medical function (C. Moloney pers. comm). Behind all this is the modern expectation that a public building will be definable by its 'institutionalised' architectural form. A tight link is made between form and function. Evans points out in the post-Roman west institutionalised buildings designed for a specific purpose, as we think of them, tend to be a feature of the 18th century and later (1990: 648). It is clear that there were some buildings in the Roman military that might be classed as institutional, such as the barracks and the headquarters building. However, even these differ from fortification to fortification (Johnson 1983: 105-56). It is possible that the *valetudinarium* was not an institutionalised building in as much as its form was not rigidly perceived. The comparisons shown above indicate that the expectation that all *valetudinaria* were built with the same features is merely an assumption, and the structural evidence shows very little of what is often expected to have been 'typical'.

Since there are many questions raised in this thesis about the identification of the structure of the Roman *valetudinaria*, and no known contemporary civilian hospital to compare them with, one must look to see if there are any similarities to hospitals of a later date, as seems to be implied with Koenen's identification. The first known hospital outside the Roman world is the Byzantine hospital, or *nosokomeion*. These were not simply places for the sick to receive help, but for the poor to be given food (Miller 1985: 38). It seems that these hospitals were only found in the East and did not spread to the Latin west (Nutton 1995: 78). Little information survives about the plan of these structures and whether there were separate military hospitals, as there were in the Roman world.

Islamic hospitals were constructed in many towns, but they too served a number of purposes. The sick were not only treated there, but a place for the poor to be fed and libraries for scholars were built into them (Conrad 1995: 136; Khan 1983: 198-9; Sayili 1980: 112). Soldiers were able to be treated at these hospitals, but the first military hospital recorded in Islamic medical history was a campaign hospital, not a permanent building. The Selguq kings of Turkey started the mobile hospital units to keep their soldiers in good condition from the 11th to the 13th centuries. The equipment for the hospitals was said to be carried by 200 camels (Khan 1983: 200-201). Not all Islamic hospitals were built on the same plan or served the same functions, as they were influenced more than one type of medicine. Some were constructed as Indian hospitals, which acted as medical dispensaries only, whilst others were influenced by Greek medical translations and acted as places of medical science and practical treatment (Sayili 1980: 114-5, 117).

Others were large structures with mosques, pharmacies, kitchens, gardens, baths and lecture rooms, as well as wards for patients (Conrad 1995: 136). Since these hospitals were influenced by a number of medical traditions, there does not seem to have been a direct connection between the expectations of the Roman military *valetudinaria* and those of the Muslims.

If we continue to follow the logic that the Roman *valetudinaria* were expected to have been similar to the 19^{th} - 20^{th} century hospitals, then one would expect the medieval hospital to be based on a similar plan. However, Medieval hospitals were designed in an open basilica, similar to a church, possibly because many were run by the church. Most large medieval buildings follow one of two plans. The first is the church plan or basilica, and the second is the large open hall used in the construction of high status structures: the limited range of both institutionalised and domestic structures can be seen in Medieval towns such as Cambridge (RCHME 1959). In medieval basilica hospitals there was usually a chapel or a group of chapels at the end of the nave so patients could witness the daily celebrations. St. Mary's in Newark, Leicestershire, had room for 30 inmates and had room for a single bed each. The beds were supposed to be arranged so that the patients could observe the daily religious services from their beds. There was separate accommodation for hospital staff, usually in an unattached building located off the side of the infirmary. Travellers often lodged with the sick, in the same rooms, and there does not seem to have been a division of genders (Carlin 1989: 28; Furniss 1970: 3; Nutton 1995: 150-1). Renaissance Italian hospitals were also based on the basilica plan. In some cases the hospitals were constructed in a cruciform design where everyone could observe the daily religious services taking place in the centre of the building (Henderson 1989: 76). Thus, the medieval hospital, for which there is more evidence, bears little resemblance to that of claimed Roman *valetudinaria*. Perhaps the medieval doctors rejected the plan of Roman *valetudinaria* if they were aware of it, or perhaps the design does follow the Roman one, and the Roman *valetudinaria* plan has been mis-identified: could large basilica buildings, such as that attached to the bath at Caerleon (Zeinkiewicz 1986) be a contender for a *valetudinarium*? Whatever the case, the comparison of Roman military *valetudinaria* with medieval ones suggests that the model of the Roman *valetudinarium* was probably not carried over in the middle ages.

There were no particular military hospitals during the medieval period. Furniss points out that soldiers were lucky if they were able to return home and be treated for battle wounds in a public hospital (1970: 2). The Knight's of St. Johns, a military order, set up hospitals but these had grown out of a hospice for the poor in Jerusalem. Traditionally the hospital of St. John's offered many services: alms giving, a place for the lepers to live, maternity care, child care and a place where soldiers wounded in battle could also be treated (Luttrell 1994: 64-5). There were no particular architectural structures that defined the building, as it could be a great hall with a chapel, similar to monastic hospitals, or it could have been built in the local architectural tradition of the place where the hospital was being constructed (Luttrell 1994: 75-6).

The idea of a military hospital does not seem to have come into being until the later middle ages, and the majority of evidence for them only appears in the 18th century. It was mentioned earlier that it is about this time that institutionalised structures begin to become commonplace. One example of this can be found in the development of the Dutch military hospital, which developed over a long period of time (Langeveld 1989). The Spanish military hospitals, both permanent and field, are known to have been developed during the reign of Ferdinand of Aragon, in the late 15th century. Being an invading force, the Spanish could not rely on the services of Dutch civilian hospitals for treatment. The army of the Netherlands came into being in the late 16th century during the revolution against Spain, but the soldiers were taken to civilian hospitals for treatment (Langeveld 1989: 90-1). The hospital system for the Dutch developed because the soldiers had to pay for their own medical treatment in the civilian hospitals. By the late 18th century a separate system of medical care with its own buildings was formed (Langeveld 1989: 91- 102). The military hospital buildings of the late 19th century in the Netherlands were designed to conform to the Dutch idea of a structure that would promote a cure. The philosophy was 'air - is – life', in other words, the patients were to receive plenty of fresh air. The hospital at Leiden, for example, was constructed around a pavilion. Separate wards were created that could be closed off in case of an outbreak of contagious disease (Langeveld 1989: 122). Both civilian and military German hospitals also follow the same plan and philosophy. The Peter Freidrich Ludwigs Hospital had the necessary components expected by recent scholars in Roman military *valetudinaria*: entrance hall, living rooms for the surgeon, large halls at the entrance with room for about ten beds, toilets, baths and small rooms that could hold six patients (Brat 1966: 8, 22). One wing of the hospital was designated for the military (Brat 1966: 18). The academic hospital in Gottingen had a similar ground plan as well as specific rooms for surgery (Jettner 1966: 144-5).

The historical development of hospitals does not seem to show a Roman influence (if Koenen and others have described Roman *valetudinaria* properly), but rather what seems clear is that recent northern European military and civilian hospitals have influenced the interpretation of what a Roman hospital should be. It seems more likely that if the Roman *valetudinaria* had been an influence for Byzantine and medieval hospitals then they would not strictly have been used for the treatment of illness and injury, and they would probably have been built on a basilica plan. The main point of discussing hospitals in other historical contexts is to show that they had different forms of structure, function and meanings throughout time, and there is really no reason why Roman *valetudinaria* would have been similar to more modern hospitals as archaeologists have defined them.

6.8 Artefactual remains

The final aspect that should be investigated relates to where remains of medical instruments were found in the fortifications, because this might provide a better indication of where the *valetudinaria* were located. The artefacts found in so-called *valetudinaria* will be discussed to see if they can provide any evidence about the intended purpose of the structures. Since many of the forts were excavated at the turn of the 20th century the provenance of the instruments was not always recorded with much care (Appendices 4-10). The location of medical instruments in other areas of the fortifications will also be discussed because this might shed some light on where soldiers were receiving treatment.

None of the instruments from the auxiliary forts in Germania Inferior were recorded by their excavators with much detail. The instruments from Neuss (Appendix 6; Fig. 83) are of interest because a number of probes and forceps were found in the so-called *valetudinarium*; four scalpels were also found in the building, although in other rooms. This structure was not the only building to have yielded instruments. The majority of these were found in a single room, room 51, tending to suggest some form of storage rather than a surgical area, especially since they were mainly probes. The baths at Neuss had a few instruments as well. The principia has seven instruments pointing to the possibility that people were either receiving treatment here, grooming themselves in public, or the instruments might have had another function. Ten instruments were found in the barracks, and it is therefore possible that the fortress doctor could have travelled to the rooms. Eleven instruments were found in other buildings throughout the fortress. Thus the majority of the instruments do not come from the so-called *valetudinarium*, which might indicate that soldiers were able to receive treatment in a variety of places. Of course, the location of the finds need not be a direct reflection of where treatment was taking place – their distribution only reflects a place of loss or final deposition.

In Germania Superior (Appendix 7) the majority of recorded instruments come from auxiliary fortifications. The fort at Ladenburg has surgical instruments from the bath, located outside the fort; however because it is in such close proximity to the fort it was probably used by the soldiers. However, evidence from Caerleon suggests that women and children also bathed in military baths (Zienkiewicz 1986: 223), so it is possible that this happened at Ladenburg, implying that the instruments might not have necessarily been used by, or on, the soldiers. The instruments found in the baths included a scalpel, a bone scraper, a serrated spoon or wound scoop, an ointment box, a spatula probe and an ointment pallet. Instruments were found in the fort baths at Okarben and Hofheim (Appendix 5, table 12 and 14). If these finds were a direct reflection of medical activity, it seems that some form of treatment, be it medical or personal hygiene, might have been offered in the military baths in Germania Superior.

Perhaps in certain places there was no *valetudinarium,* so the fort doctor was provided with a room or set of rooms to work from wherever there was available space in the fortification. This is perhaps not only implied by the instruments found in baths, and the single room of instruments in the *valetudinaria* at Neuss and Novae, but by two instruments found in the west corner tower of the auxiliary fort at Holzhausen (Appendix 5, table 4) and Mainhardt (Appendix 5, table 24). The instruments are probes that could have been used for personal hygiene as well, indicating that soldiers might have been preening themselves whilst on duty. Alternatively, the location of the instrument in a tower or corner of a structure might suggest an area where trash was discarded, as occurred at Caerleon (Philip McDonald pers comm.).

The legionary fortress at Vindonissa (Appendix 5, table 2; Fig. 62) has a comparatively high number of instruments that have survived in good condition. Besides the instruments found in the Schutthügel (discussed in Chapter 5), a number of instruments were found in certain structures of the fortification. A large majority of instruments were found in the *principia* and the area of the baths. This might indicate that care was being offered in these buildings, or instruments were being stored or deposited in the structures. The so-called *valetudinarium* had 13 medical tools, but it also had 99 military accoutrements (Unz and Dechler-Erb 1997: 66). Some of the finds are pieces of scabbards, belt plates, cavalry decorations such as *phalerae*, spear heads, terminals for military aprons and buckles for armour. These finds do not automatically suggest that the building was a *valetudinarium.*

Compared to other provinces, Britain has more instruments with better contextual information. Instruments were found in a number of areas throughout the fortress at Caerleon (Appendix 10, table 2; Fig. 69). The finds from the amphitheatre illustrate the possibility that the soldiers, or perhaps civilians, had no qualms about cleaning themselves in public, but disposal does not always indicate places of use. The instruments seem to have been clustered in the barracks. Whilst the baths have remains a pair of forceps

(Appendix 10, Table 2, number 5) and milk teeth with evidence for surgical removal (Zienkiewicz 1986: 223). The teeth in the drain provide the strongest evidence for surgical treatment in a particular building, whether the instruments found in the bath belonged to the doctor, or were used for personal hygiene cannot be determined.

The fortress at Chester (Appendix 12; Fig. 70) has a small number of finds, but they show some clustering as well, especially in the barracks. The amphitheatre, like that at Caerleon, had a pair of forceps. Outside the fortress three ear probes and one set of forceps was found. No *valetudinarium* can be determined on the basis of artefactual finds alone.

At Housesteads no instruments were found in the building claimed to be a *valetudinarium* (Appendix 10, Table 9; Fig. 76). The few instruments from Birdoswald were mainly found in the area of the granaries (Appendix 10; table 10, Fig. 82). One ear probe was discovered in building 197, a granary, whilst the area around building 198, also a granary, contained an ear probe and an ointment pallet. Found on the via praetoria was another ear probe, and an ointment pallet was found in the topsoil in section A. There is not enough evidence from either fort to say where the *valetudinarium* might have been located.

Clearly from the evidence of finds, the structures identified as *valetudinaria* do not seem to have been very clean, at least in their final stages of use. It seems more likely that the buildings were used, or also used, for storage or as workshops, which is supported by the evidence supplied by auxiliary structures that the buildings were either *valetudinaria*, *fabrica* or for storage. Thus, the argument that the buildings were meant to have been *valetudinaria* is not strictly supported by the artefactual evidence.

As a final note of caution, although it is important to look at the finds from each structure to attempt to determine its function, it must be remembered that artefacts can be moved from one place to another and are not necessarily found in the locations where they were used or originally deposited (Schiffer 1987). For example certain buildings might have gone out of use, and the objects in them could have been moved to another structure. The obsolete building might then have been used as a place to deposit rubbish brought in from elsewhere. Roman archaeologists sometimes assume that artefacts occur in the same place that they were used, implying they were dropped as 'primary' refuse. Undoubtedly the situation is much more complex (as illustrated in Chapter 5). Thus by looking at the find spots of the instruments it is rather difficult to give a precise idea about where they were intended to be used. The one exception may be with bath buildings where many instruments have been found. The spread of instrument find spots across forts does indicate that the *valetudinaria* cannot be determined from finds alone as the excavator of Neuss and archaeologists who followed have tended to uncritically accept.

6.9 Other possibilities for *valetudinaria*

Unfortunately there seems to be little conclusive evidence for specific Roman military buildings serving as *valetudinaria.* The structural evidence appears to fit the late 19th century version of what a *valetudinarium* should be and the artefactual remains are insufficiently recorded to suggest any particular style of building being adopted as a *valetudinarium* throughout the frontiers. On the basis of artefactual material, the barracks and baths seem to have more evidence for medical treatment, and it is only the structures at Neuss, Vindonissa and Novae that have produced remains of surgical tools. There is no reason why the *valetudinarium* had to be based on a strict plan, or that it should conform to what a modern hospital should be. Given that the medieval, Islamic and Byzantine hospitals served a range of other functions, so might Roman *valetudinaria*.

Archaeologists may also have been misled into expecting military *valetudinaria* to comprise separate buildings. There remains a possibility that the *valetudinarium* was one element (perhaps a set of rooms, or a doctor's office) within a larger structure or complex. This can be suggested by the fact that the term is mentioned along with the *fabrica* on a Vindolanda tablet discussed above (Bowman and Thomas 1991: 61, 66; Bowman and Thomas 1994: 98). Although the Romans were obviously concerned with personal hygiene, which is evident from the number of public and private baths and chatelaines, they were unaware of the causes of disease through bacteria. Thus they might have placed *valetudinaria* within other buildings if the area appeared clean, but this still does not imply that the area was sterile. The link between *valetudinaria* and *fabrica* implied by the Vindolanda tablet and Hyginus (4), and by the instances of workshop debris and medical instruments occurring in the same structure, suggests another intriguing possibility – that the two were often physically and conceptually linked. Given that often there are embedded links between quite varied and disparate technological practices (e.g. Siller 1999), treatment of the human body, of animals and the repair and manufacture of objects, may have been viewed as closely linked, with all such operations performed in a single area, or even building. The word *valetudinarium* might also be an indication that the *valetudinarium* was physically one part of the workshops, rather than being a separate building itself, as is seen in the terms used for parts of baths such as *frigidarium* and *calidarium*.

Finally there is the possibility that a soldier could choose from a number of places to receive medical treatment within the fortress. It seems that the baths were a likely spot. This is not only supported by evidence of teeth and instruments in military baths, but the civilian bath at Xanten had instruments found in it (Appendix 4, Table 9). The area of the bath in which they were found had two rooms adjacent with a small hall dividing them. This arrangement according to Künzl was similar to the wards found in military *valetudinaria* (1989/90 147; 1986: 445-6), and he believes that this similarity along with the presence of instruments implies that the rooms were used for medical treatment. The two rooms are comparable to those defined as the bedrooms, rather than a place for treatment, but this is based on modern conceptions of the Roman *valetudinarium* (Fig, 118 a & b). Whether the rooms are based on those from the so-called *valetudinaria* is rather difficult to answer because there are many rooms in other buildings that are of similar arrangement to the ones Künzl mentions, but it seems that it might have been a place for a doctor to offer treatment

Certain barracks have clusters of instruments that might indicate where soldiers were treated, or where the doctor resided. So, from the information available in the archaeological record, there seems to be a number of suggestions about where soldiers received treatment, but little can be said about the structures that have been identified as *valetudinaria*. It seems as if there are more questions than answers about their identification.

6.10 Conclusion

It is clear from the evidence presented in this chapter that it is difficult to determine where a *valetudinarium* might have been located in the fortifications, let alone how the structure appeared. It seems the assumptions about their identification have been driven by the anachronistic expectations of how a *valetudinarium* should be arranged, and by the use of archaeological evidence to create a universal explanation for the range of activities and functions contained within them.

It may be, however, that this lack of specifically arranged structures supports part of the argument in chapters 4 and 5 that the organisation of the medical care system in the Roman army was done on a local rather than centralised basis. Even though the structures identified as *valetudinaria* cannot be securely defined as such, the differences within the buildings themselves could supply further support for the ideas that there were variations within the army. First of all some fortifications have evidence for the courtyard buildings while others did not. Secondly the structures varied in size and layout. It is likely that most fortifications had some form of health care offered, but in different places depending on the needs of those inhabiting the fortifications. Since it is too difficult to define what a *valetudinarium* is, there are problems in determining provincial differences in health care treatment across the frontiers on the basis of the *valetudinaria* evidence alone, even though the information provided by the inscriptions and medical tools tends to support this.

CHAPTER SEVEN
Conclusion

7.1. Restating the questions

The main issue of this thesis was to question whether there was a standard system of medical care in the Roman army. This query was raised because it is generally assumed in scholarship on Roman military medicine that there was a single system by which all units organised their distribution of medical care, rank of doctors and style of treatment. The perception that most aspects of the Roman army were the same throughout the empire has led modern scholars to attempt to deduce the exact specifications of how the medical care system functioned and what the doctors' title indicates about their rank (e.g. Davies 1969, 1970, 1989; Richmond 1952; Wilmanns 1995a & b). Although they are useful studies, and ideas about how the distribution of medical care was offered to the units might have applied to some groups of soldiers, the scholars have not questioned the assumption that medical care was the same throughout the empire. The understanding that the Roman army comprised an homogeneous group of soldiers is an idea that is beginning to be challenged in recent scholarship (e.g. James 1999), and this provides a context for questioning the assumed homogeneity of military medical care. Thus, before more work can be continued on medical treatment in the army, one must seriously consider whether there is enough evidence to support the idea of a uniform system of health care, it not being prudent to base scholarly arguments on assumed understandings with little supporting evidence. On a broader scale, many arguments in other aspects of Roman military studies are based on little-challenged beliefs formed in the late 19th or early 20th centuries. Although there have been considerable changes in archaeological methods since that time, along with an increasing amount of evidence from excavated material, the interpretation of newly excavated finds often continues to be conducted to fit preconceived ideas, rather than challenge them.

In order to undertake this study the traditional classical archaeological approach could not be used, because it generally relies on descriptions and typological discussions of material culture, but makes little use of the context and deposition of the material remains as a main source for interpreting the past. Additionally, in studies of classical medicine the archaeological material is frequently tied to the literary sources. As Salazar (2000: 230) says in her book on the literature of war wounds in antiquity:

> "In addition to the literary evidence, there is also a fairly large amount of archaeological evidence. Although on its own this material would be open to numerous, contrasting, conjectures, it can be used along with literary evidence and in comparison with it."

To be fair, Salazar is not a trained archaeologist; yet her statement is consistent with the general belief in classics, as discussed in the introduction, that material remains are somehow secondary to the literature, and even if the two demonstrate opposing points of view, as Salazar says they sometimes do, she still insinuates that without literary sources to support the material remains there is no point in interpreting meanings from artefacts. The narrowness of this approach is obvious because the literature does not tell us everything about past societies, and it seems fair to say that even as a source of material culture literature is open to just as many "numerous, contrasting conjectures". Furthermore the literature is seen as the only context in which the material culture can be ascribed a meaning; however, if material remains are examined within their own context (their location and associated finds) more can be understood about the functions, meanings and role in social practices of finds. Many parts of the Roman empire do not have much in the way of a literary record, as even extant epigraphic sources only provide us with glimpses into the structures and thoughts of these societies. It is the archaeological material that must primarily be relied upon to gain insights into provincial Roman societies. Since the area of study is essentially proto-historic, broader interpretative methods, used in both post-colonial and prehistoric archaeology, can be used with Roman materials as well, and these methods were used in this thesis to gain a better understanding of Roman military medicine.

An initial question was raised about the influence of military events and cultural backgrounds of units within the army to see if these aspects might have had an influence on the way the units organised aspects of their official and daily lives. There are some noticeable changes to the frontiers during and after major military events, and it was considered whether these helped influence the way units or the province organised their medical care. It was asked if the auxiliary and legionary units had the same type of medical care made available to them, or if there were differences. There were certainly differences in pay between the units, so there might be evidence for differences in standardisation of organisation. Additionally, asking if there was evidence for civilians being cared for by military doctors raised the question of military and civilian interaction.

Throughout this thesis the value of incorporating anthropological understandings of medical care was stressed, because the body and its care are culturally defined. The Roman army consisted of multi-cultural units that might not have had the same medical understandings of the Romans from Italy, on whom so many of the assumptions of the army's daily life are based. With very few exceptions, the military and cultural aspects have not been considered in Roman medical archaeology and when they have been it is generally in the context of ideas of 'Romanisation'. It is important to understand that the Roman empire was not culturally homogeneous, but made up of many societies, each with their own beliefs and understandings that had an obvious impact on the way that medical care was provided. Furthermore, the frontier areas in which the Roman army were stationed were complex social systems with many different kinds of interaction taking place, offering opportunities for different medical traditions to mix and develop.

7.2 A review of the study

It was noted that certain frontiers had more evidence for Roman-style health care than others did. One explanation for this was the effects that military events might have had on the use of Roman medicine, and it is interesting to note that, with the exception of Pannonia Superior, the provinces with the most evidence for health care through inscriptions were those that had the most warfare. Another point that was noted was that the calibre, or rather type, of doctor, did not differ between units - auxiliary, *numerus* and legions all had the same types of doctors, so it seems that there was no bias for the type of medical care offered to the units.

Very similar patterns began to appear when the range and distribution of medical instruments are examined, in that the provinces with the most evidence of Roman-style medical instruments are the ones with the most warfare. As for the comparison of units from the same areas, those using Roman-style tools were the same as those erecting inscriptions commemorating Roman-style doctors: these are mainly units from areas in Gaul and Spain. Chapter 5 demonstrated that the system of medical care in the military was probably not the same throughout the frontiers, as also suggested by the epigraphic remains, and that there are complex issues pertaining to cultural beliefs towards the body and attitudes towards medicine which might be deducted through the deposition of instruments. It is clear, from the information at hand, that not all units were using Roman medical tools and this might be a demonstration of their nonconformity in issues relating to the body when the units came into contact with Roman medicine.

One would expect to continue the comparisons of medical care on the frontiers with the buildings identified as *valetudinaria*; however it was necessary to question the correctness of the identity of the structures (Chapter 6). The identification of so-called *valetudinaria* was made at the beginning of the 20th century and has been accepted since that time. However, there is really little evidence to support this. Despite the fact that we have little understanding of how the Romans understood a *valetudinarium* to be, the Roman *valetudinaria* were described as if they were like those in Germany between the 17th and 19th centuries.

7.3 Possible suggestions for medical care

Allason-Jones (1993: 37; Repeated in 1999: 144) says in her general discussion on Roman military medical care in the north of Britain that the evidence for health care in the area is very uneven. To balance out the discrepancies she suggests using the finds of instruments to support the paucity of epigraphical and architectural remains, whilst the remaining holes can be filled by comparing the finds from other areas of the empire. This statement shows an expectation that the medical system in one part of the empire must be the same, because certain aspects from one area are expected to compliment another. Yet, with the evidence available the studies made in this thesis suggest that there was not a uniform system of medical care in the army. It is possible that there was medical care supplied to all soldiers as suggested, but perhaps one should not expect the same kind of medical treatment to have been offered throughout the frontiers.

Historical processes certainly played their part in shaping the diverse nature of medical provision. For example, evidence for medical care in Noricum is only present after the Marcommanic wars. Germania Superior has plenty of evidence for medical care, and there were many military conflicts in that area, supporting the possibility that historical events might have had an influence on the supply of health care. Yet, there are some complex problems with this. Some provinces with evidence for medical care and warfare only have certain types of fortifications with evidence for treatment. For example, Pannonia Superior only has medical tools and inscriptions from legionary fortifications; with the exception of one tool from an auxiliary fort near the legionary fortress of Vindobona. The province of Pannonia Inferior, although it does have evidence from both auxiliary and its legionary fortification, the finds from auxiliary forts come from ones located close to Aquincum. It seems that these provinces arranged their health care in different manners. Of course military events might not have been the entire reason for health care being offered to soldiers. Germania Inferior has epigraphic evidence for doctors from the 2nd and 3rd centuries, during a time of relative peace, and the same situation applies to Britannia. It seems, therefore, that there might be other factors influencing the organisation of health care that are more complicated than simple military events.

Another suggestion that can be made from the evidence available is that individual units chose their own type of medical care rather than the army or provincial administration.

This was tested in relation to auxiliary units in order to see if any patterns appeared in the units from specific areas adopting the use of Roman-style medical practices. Patterns appeared in the comparisons of both the epigraphic and instruments remains, in that units from Gaul and Spain are associated with the most evidence for the adoption, or perhaps adaptation, of Roman-style medical care. Anthropological studies of contact between different groups, undertaken with reference to their medical care, have demonstrated that there are definite reactions by societies when introduced to new medical practices not familiar to their own. In some cases the treatments were rejected outright and in others they were adapted to fit the societies understandings of them. It is highly likely that such processes would have occurred with the units from different cultural groups coming into contact with Roman practices.

Aspects of cultural interaction might also be found in medical evidence relating to women and children. Though not often considered, it is important to explore the possibility that military doctors might have cared for civilians within the area of the fortification, or for the soldiers' wives and children. However, the evidence was fairly slim, as there is only one definite female instrument from Carnuntum and its exact provenance is not known. It is always possible that military doctors could have cared for civilians, which could have allowed for the spread of Roman-style medicine in some cases, but there is simply not enough evidence at present to support the argument either way.

It seems more than coincidental, at the moment at least, that certain units were borrowing Roman medical tools and others were not, as well as making inscriptions for doctors. This might suggest that medical care in the Roman army was far more complicated than previously expected. Rather than having a uniform system of care, it may be that it was a system affected by historical events, provincial administration and cultural backgrounds.

For the field of medical history, this study not only has implications for how medical care was organised in the Roman army, but has hopefully contributed to understanding something about the anthropology of the body. Cultural beliefs and feelings about the body can be incorporated into the history of medicine to expand our knowledge of how medicine was practised.

7.4 Epilogue: suggestions for future work

The study of medical care in the Roman army can lead to other areas of examination in Roman health care: 1. it is important that anthropological studies of perceptions of the body be considered in any aspect of health care, because it can be used to determine differences in attitudes towards bodies of varying genders and ethnic backgrounds. This can also be used to show the acceptance and spread of Roman-style medicine. On a broader scale it will help to demonstrate interaction between Romans from Italy and contact with those living in the provinces of the empire or beyond.

2. At a more 'practical' level, productive comparisons could be made between the evidence of health care in the Roman army and navy. However, there is little archaeological material, with the exception of epigraphic remains. It is known that its doctors were paid double in the navy, which could indicate differences in military organisation, and also in attitudes towards doctors and their work.

3. Further study of bathing complexes located outside and inside fortifications, such as at Baden, Bath and Baden Baden, could also help to improve our understanding of Roman attitudes towards recuperation in the military. They should also be explored in greater detail as possible means of health care provision.

4. By making comparisons of instruments found on civilian sites with those on the frontiers there might be opportunities to understand how the army functioned and how it was influenced by local traditions and beliefs. Studies of this sort might lead to a better understanding of the relationship between military and civilian care. Here is an opportunity to examine whether there were instruments or epigraphic remains that might tell us more about the health care of women and children.

5. Further discussions about the range of medical tools are of utmost importance. It may be that tools which we would consider only to be employed in irrational practices were used as important aspects in the practice of medicine. Although they are not mentioned in the medical texts, irrational tools, such as divining rods, amulets and even curse tablets, for example, might have been incorporated in Roman and provincial Roman medicine.

ABBREVIATIONS FOR APPENDICES

Appendix One

H Hospital
M Medical Implements
I Inscription

Appendix Two

AE *L'Annee Epigraphique*
CIL *Corpus Inscriptorum Latinorum*
ILS *Inscriptiones Latinae Selectae*
PR. Provenance

Appendix Four-Ten

Inv. No. Museum Inventory Number
L Length of the Instrument
Il. Illustration number
PR. Provenance
NA Information not available.

Museums

Britain

BR 1 Yorkshire Museum
BR 2 Roman Legionary Museum, Caerleon
BR 3 Newport Museum and Art Gallery
BR 4 Grosvenor Museum, Chester
BR 5 Corbridge Museum
BR 6 Arbeia Museum, South Shields
BR 7 Museum of Antiquities, Newcastle upon Tyne
BR 8 Chesters Museum
BR 9 Tulley House Museum, Carlisle

Germania Inferior

GI 1 Clemens-Sels Museum, Neuss
GI 2 Rijks Museum van Oudheden, Leiden
GI 3 Rijks Museum van Oudheden, Nijmegen
GI 4 Rheinisches Landesmuseum, Bonn
GI 5 Rheinisches Landesmuseum, Trier

Germania Superior

GS 1 Archäologische Sammlungen im Reiß-Museum der Stadt Mannheim
GS 2 Römisch-Germanisches Zentralmuseum, Mainz
GS 3 Vindonissa Museum, Brugg
GS 4 Lobdengau-Museum, Ladenburg
GS 5 Kurpfälzisches Museum, Heildelberg

GS 6 Limeskastell und Museum, Saalburg
GS 7 Städtisches Museum, Wiesbaden
GS 8 Hessisches Landesmuseum, Darmstadt
GS 9 Heimatmuseum der Stadt, Bingen
GS 10 Museum der Stadt, Worms

Raetia

R 1 Stadtmuseen, Regensburg
R 2 Heimatmuseum, Günzburg
R 3 Prähistorische Staatssammlung, Munich
R 4 Gäuboden -und Stadtmuseum, Straubing
R 5 Wurttembergischen Landesmuseum, Stuttgart
R 6 Heimatmuseum, Ehningen an der Donau

Noricum

N 1 Museum Lauriacum

Pannonia Superior

PS 1 Carnuntum Museum, Bad Deutsch Altenburg
PS 2 Museum der Stadt, Wien

Pannonia Inferior

PI 1 Aquincum Museum, Budapest
PI 2 Historical Museum, Budapest
PI 3 National Museum, Budapest
PI 4 Museum Intercisa, DunaújvárosAppendix Six: Instruments from Germania Inferior

Instrument Material

CA Copper Alloy

Provinces
B Britannia
GI Germania Inferior
GS Germania Superior
PI Pannonia Inferior
PS Pannonia Superior
R Raetia

Chi Square test
X2 Chi Square number

APPENDIX ONE
A list of fortifications mentioned in the text --

This appendix (1, part 1) presents basic information about each legionary and auxiliary fortification mentioned in the main text of this thesis that contains material culture related to medical care. The dates of occupation, unit types and their names, if known, as well as the Latin names of the fortifications are provided as an easy reference to help the reader in case they should have any basic questions about information not readily available in the text. The fortifications are listed according to their provinces and following the name of each entry is the modern country in which it is located. At the end of each entry is a letter or letters, listed in the abbreviations that represent the type of medical information available from each fortification, such as medical instruments, structural evidence for 'hospitals' or epigraphic evidence. Finally, each fortification is depicted on a map, again according to province. It is noticeable on the maps that there is a large number of fortifications not mentioned in this list because no remains of medical instruments were found within them, information about these fortifications can be found in Appendix 1 part 2. Some of the more comprehensive desciptions of these fortifications are found in site guides. For German Inferior: Bogaers and Rüger 1974; Germania Superior: von Elbe 1974, Schönberger 1969 and Drack and Fellmann 1988; Raetia: Czysz 1995; Noricum: Alföldi 1974 and Genser 1986; Pannonia Superior: Genser 1986 and Mócsy 1974; Pannonia Inferior: Mócsy 1974 and Visy 1988 and for Britannia: Breeze and Dobson 1991.

Germania Inferior (Fig. 1 & 2)

1. Valkenburg. Netherlands. Auxiliary fort. AD 40 to 260. *Cohors III Galliorum equitata* and *Cohors IIII Thracum equitata* occupied the site at different times (Bogaers and Rüger 1974: 40-3; Bult and Hallewas 1986: 9). **I, M, H**

2. Alphen aan de Rijn. *Albaniana.* Netherlands. Auxiliary fort. AD 50 to the third century. *Cohors III Breucorum* (Bogaers and Rüger 1974: 47). **M**

3. Bunnik-Vechten. *Fectio.* Netherlands. Auxiliary fort. Early 1st century to mid-3rd century. *Cohors II Brittonum milliaria equitata, Cohors I Flavia Hispanorum equitata* and *Ala I Thracum* were stationed at the site at different times (Bogaers and Rüger 1974: 63-5). **M**

4. Kesteren. *Carvo.* Netherlands. Auxiliary fort. AD 70 to the 3rd century. Unknown auxiliary troop (Bogaers and Rüger 1974: 70). **M**

5. Rossum. *Grinnes.* Netherlands. Auxiliary fort. 1st century. Unknown troop (Bogaers and Rüger 1974: 74). **M**

6. Nijmegen. *Noviomagus.* Netherlands. Legionary fortress. The Augustan-Tiberian period. to c.175. *Legio X Gemina, Legio VIIII Hispana* and *Legio XXX Ulpia Victrix* (Bogaers and Rüger 1974: 76-9). **M**

7. Xanten. *Vetera I and II.* Germany. Legionary fortress. The reign of Augustus to the 4th century. Vetera I: *Legio XXI Rapax* and *Legio V Alaudae* the former was replaced with *XV Primigenia.* Vetera II was constructed to hold a single legion: *Legio XXII Primigenia pia fidelis*, *Legio VI Victrix* and *Legio XXX Ulpia Victrix* (Horn 1987: 639-44; Lehner 1930: 177, 183; Oelmann 1931: 221; Schultze 1934: 54-63; von Elbe 1974: 65-7). **H, M, I**

8. Neuss. *Novaesium.* Germany. Legionary fortress. Augustus to AD 105. *Legio XX, XVI Galica* and *VI Victrix* (Bogaers and Rüger 1974: 139-40; von Elbe 1974: 289-90). **M, H**

9. Bonn. *Bonna.* Germany. Legionary fortress. Augustan period to 3rd century. *Legio I Germanica, Legio XXI Rapax* and *Legio I Minerva* (Bogaers and Rüger 1974: 196-8; Horn 1987: 367-73; von Elbe 1974: 72-94). **M, I, H**

Germania Superior (Fig. 1 & 3)

10. Bingen. Germany. Auxiliary fort (?) First half of the 1st century to unknown date. Detachment of *Legio XXII Primigenia* from Mainz (Cuppers 1990: 333; von Elbe 1974: 61-5). **M, I**

11. Neiderbieber. Germany. *Numerus* fort. It was constructed in the 2nd century. It housed a *numerus* unit (Schönberger 1969: fig. 20). **I**

12. Mainz. *Mogontiacum.* Germany. Legionary fortress. 15 BC to the 4th century. The fortress was first constructed to hold two legions. The *Legio Flavian I Adiutrix* and *Legio*

XIV Gemina were the first to occupy the site. After the Batavian revolt double legionary fortresses were disbanded and the single legion to occupy the fortress was *the Legio XIV Gemina*, that was replaced by the *Legio XXII Primigenia pia fidelis* which was stationed at the site from AD 92 to the 4th century (Cuppers 1990: 458-62; Horn 1987: 54; von Elbe 1974: 253-4). **M, I**

13. Worms. *Borbetomagus.* Germany. Auxiliary Fort. Augustus' reign to the Flavian period. *Ala I Hispanorum, ala Sebosiana, ala Indiana, ala Agrippiana, cohors Raetorum, cohors I Thracum, cohors VII Breucorum and the cohors Raetorum et Vindelicorum* (von Elbe 1974: 464; Künzl 1982: 78 and Cuppers 1990: 673). **M**

14. Ladenburg. *Lopodunum.* Germany. Auxiliary Fort. AD 73/4 to Trajan's reign. *Ala I Cannenefatium* (von Elbe 1974: 235-40). **M**

15. Staden. Germany. *Numerus Fort.* Unknown unit. **M**

16. Degenfeld. Germany. Auxiliary fort. Unknown Unit. **M**

17. (183) Windisch. *Vindonissa.* Switzerland. Legionary Fortress. Tiberian to the 4th century. The units stationed at the site were *Legio XIII Gemina*, *Legio XXI Rapax* and *Legio XI Claudia* (Drack and Fellmann 1988: 540). **M, I, H**

18. Holzhausen. Germany. Auxiliary Fort. Late 2nd century to 233. *Cohors II Antoniniana Treverorum* (von Elbe 1974: 154-5). **M**

19. Zugmantel. Germany. Auxiliary Fort. AD 90 to 260. *Cohors I Treverorum equitata* (Baatz and Herrmann 1982: 502). **M**

20. Heftrich. Germany. Auxiliary Fort. Second century to mid-3rd century. *Numerus Catharensium* (Baatz and Herrmann 1982: 343-5). **M**

21. Saalburg. Germany. Auxiliary Fort. It was first constructed during Domitian's reign and it was destroyed by the Alammani in 259/60. Between 125 and 139 the fort was enlarged to occupy the *Cohors II Raetorum civium* (Schönberger 1952: 4; von Elbe 1974: 342-51). **M**

22. Kapersburg. Germany. Auxiliary Fort. AD 100 to the mid-3rd century. *Numerus Nidensium* (Beckmann 1975; von Elbe 1974: 164-6). **M**

23. Obermorlen-Langenhain. Germany. Auxiliary Fort. The fort was constructed under Trajan and it was occupied until 260. *Cohors I Biturigum Aquitanorum equitata* (Baatz and Herrmann 1982: 456). **M**

24. Strausbourg. France. Legionary Fortress. **I.**

25. Oberflorstadt. Germany. Auxiliary Fort. Trajan to the mid-3rd century. *Cohors XXXII voluntariorum civium Romanorum* (Baatz and Herrmann 1982: 274). **M**

26. Karben-Okarben. Germany. Auxiliary Fort. Constructed during the reign of Vespasian and occupied until the 3rd century. *Ala II Flavia Gemina* (Baatz and Herrmann 1982: 367). **M**

27. Wiesbaden. *Aquae Mattiacorum.* Germany. Auxiliary Fort. It was built during Gaius' reign and remained in use as a fort to Hadrian's reign. The units that occupied the fort were the *Cohors V Dalmationum, Cohors I Pannoniorum, Cohors IV Thracurum, Cohors III Delmatarum* and the *Cohors II Raetorum* (von Elbe: 1974: 444-55). **H, M**

28. Hofheim am Taunus. Germany. Auxiliary Fort. Tiberius' reign until 110. Unknown auxiliary unit (Baatz and Herrmann 1982: 350-1). **M**

29. Gross-Krotzenburg. Germany. Auxiliary Fort. It was built by Trajan around 105-110 and it seems to have been occupied until the end of the 2nd or beginning of the 3rd century. *Cohors III Vindelicorum* (Baatz and Herrmann 1982: 325; von Elbe 1974: 139). **I, M**

30. Stockstadt am Main. Germany. Auxiliary Fort. It was constructed in AD 90 and remained in use until the mid-3rd century. *Cohors III Aquitanorum equitata civium Romanorum, Cohors II Hispania* and the *Cohors I Aquitanorum* occupied the fort at different times (Baatz and Herrmann 1982: 479-81; von Elbe 1974: 374-6). **M**

31. Obernburg. *Nemaninga.* Germany. Auxiliary Fort. It was built by Domitian and was abandoned in the mid-3rd century. *Cohors IIII Aquitanorum equitata civium Romanorum* (Baatz and Herrmann 1982: 457; von Elbe 1974: 297-9). **I**

32. Elzatal-Neckarburken. Germany. Auxiliary Fort. The fort dates to Trajan's reign to the mid-2nd century. The *numerus* fort was built in AD 100 and was home to the *Brittoni Elantienses*, whilst the cohort fort was built around AD 110 for the *Cohors III Aquitanorum equitata* (Filtzinger et. al 1986: 279-82). **M**

33. Bad-Wimpfen. Germany. Auxiliary Fort. Built in AD 90 and it was probably abandoned in Pius' reign. *Cohors III Aquitanorum equitata civium Romanorum*, *Cohors II Hispanorum* and the *Cohors I Germanorum* occupied the site at different times (Filtzinger et al 1986: 217-8). **M**

34. Stuttgart-Bad Cannstatt. Germany. Auxiliary Fort. It was built during Domitian's reign and was abandoned in the mid-2nd century. *Ala I Scubulorum* (von Elbe 1974: 387). **M**

35. Köngen. *Grinario.* Germany. Auxiliary Fort. It was built in Domitian's reign and it was abandoned in the mid-2nd century. Unknown auxiliary unit (von Elbe 1974: 228). **M**

36. Osterburken. Germany. Auxiliary Fort. The fort was constructed under Antoninus Pius and was abandoned during the Alammani invasions. *Cohors III Aquitanorum* and a legionary vexillation occupied the site (Filtzinger et al. 1986: 470; von Elbe 1974: 307-9). **I**

37. Öhringen. Germany. Auxiliary Fort. Two forts were constructed at this site, both during the reign of Antoninus Pius. The western fort was occupied by the *Cohors I Helvetiorum* and two *numeri*. The smaller eastern fort held the *Cohors I Belgarium Septimiana*. Both were abandoned in c. 259/60 (von Elbe 1974: 305). **M**

38. Mainhardt. Germany. Auxiliary Fort. It is constructed in the mid-2nd century as part of the Antonine frontier. It was occupied until the Alammani invasions. *Cohors I Asturum equitata* (Filtzinger et al. 1986: 453-7; von Elbe 1974: 251). **M**

39. Hüfingen. Germany. Auxiliary Fort. This fort was built during the first years of Vespasian's reign. It was probably abandoned under Domitian's reign. *Cohors I civium Romanorum ingenorum* (Czysz et al. 1995: 75). **M**

Raetia (Fig. 1 & 4)

1. Dambach. Germany. Auxiliary Fort. The site was first built as a *numerus* fort in the mid-2nd century. Later in the same century it was enlarged and housed the *Cohors II Aquitanorum equitata*. It remained in use until the mid-3rd century (Czysz et al. 1995: 432-3). **M**

2. Gnotzheim. Germany. Auxiliary Fort. The history of the fort is unclear. It is located on Domitian's line of the Raetian frontier, but it appears to have been rebuilt in stone at the time Antoninus Pius advanced the frontier further north. It was probably occupied until the fall of the Raetian Limes. Two groups are known to have occupied the fort at different

times: the *Cohors V Bracaraugustorum* and the *Cohors III Thracum civium Romanorum equitata bis torquata* (Czysz et al 1995: 448-9). **M**

3. Ellingen. Germany. Auxiliary Fort. It was probably built during the reign of Trajan and was abandoned in the mid-3rd century. It might have been occupied by a *pedites singulares* (Czysz et al. 1995: 436-7). **M**

4. Weißenburg. *Bricianis*. Germany. Auxiliary Fort. It was built during the reign of Domitian and remained in use until the mid-3rd century. *Ala I Hispanorum Auriana.* (Czysz et al. 1995: 534-5; von Elbe 1974: 442). **M**

5. Pfünz. *Vetoniana*. Germany. Auxiliary Fort. It was first constructed under Domitian and it was destroyed during the Marcomannic wars. It was rebuilt and used until the Alamanni invaded in 233. *Cohors I Breucorum civium Romanorum equitata* (Czysz et al 1995: 500-1; von Elbe 1974: 319). **M**

6. Lonsee-Urspring. Germany. Auxiliary Fort. The fort is thought to have been constructed under Vespasian's reign. It was probably in use until Antoninus Pius' advance. Unknown auxiliary unit (Filtzinger et al. 1986: 430-3). **M**

7. Heidenheim. *Aquileia*. Germany. Auxiliary Fort. Built in c. AD 90, the fort was abandoned when the unit moved to Aalen under Antoninus Pius' command. It was occupied by the *Ala II Flavia milliaria* (Filtzinger et al. 1986: 321-6; von Elbe 1974: 147). **M**

8. Munningen. Germany. Auxiliary Fort. The fort was constructed under Domitian's command, after 110 the fort was changed into a street station. Unknown auxiliary unit (Czysz et al. 1995: 484). **M**

9 Faimingen. Germany. Auxiliary Fort. The fort was constructed in Antoninus Pius' reign. It remained in use until the mid-3rd century. Unknown auxiliary unit (Czysz et al. 1995: 441-4). **M**

10. Risstissen. Germany. Auxiliary Fort. The fort was built on the south side of the Danube as part of Claudius' line of forts. It was restored under Vespasian, but was abandoned in c. AD 85 as a result of Domitian's forward advance. Unknown auxiliary unit (von Elbe 1974: 334). **M**

11. Günzburg. *Gontia*. Germany. Auxiliary Fort. The foundation date of the fort is uncertain; it may be Claudian or Vespasianic. It was abandoned towards the end of the 1st century. Unknown auxiliary unit (von Elbe 1974: 140). **M**

12. Oberstimm. Germany. Auxiliary Fort. The fort was built in the reign of Claudius. It became a policing station in Trajan's reign. Unknown auxiliary unit (Czysz et al. 1995: 493-4). **H, M**

13. Regensburg. *Castra Regina*. Germany. Legionary fortress. It was first constructed as an auxiliary fort in Vespasian's reign. However, it was rebuilt as a legionary fortress after the Marcomannic wars in 179/80. *Legio III Italica* (von Elbe 1974: 321-2). **M, I**

14. Straubing. *Soviodurum*. Germany. Auxiliary Fort. It was built under the reign of Vespasian and was abandoned during the Alamanni invasions. *Cohors II Raetiorum* and *Cohors I Flavia Canathenorum milliaria Sagittariorum* occupied the site at different times (von Elbe 1974: 377). **M**

15. Künzing. *Quintana*. Germany. Auxiliary Fort. It was built between AD 90 and 100 and remained in use until the mid-3rd century. It first housed the *Cohors III equitata Thracum civium Romanorum* and then the *Cohors V Bracaraugustanorum* (von Elbe 1974: 233-4). **H**

16. Wallheim. Germany. Auxiliary Fort. The fort was constructed during Domitian's reign and was probably occupied until Antoninus Pius moved the frontier past the Neckar. Unknown auxiliary unit (Schönberger 1969: fig. 20). **M**

Noricum (Fig. 5)

1. Enns-Lorch. *Lauriacum*. Austria. Legionary fortress. The fortress was first an auxiliary fort built under the reign of Claudius. It was destroyed under the Marcomannic Wars and was reconstructed as a legionary fortress by the end of Commodus' reign. It was occupied by the *Legio II Italica* (Alföldy 1974: 104, 147, 153, 166, 167, 183; Genser 1986: 128). **M, I, H**

Pannonia Superior (Fig. 6)

1. Vienna. *Vindobona.* Austria. Legionary fortress. The fortress was either built in the late Flavian or early Trajanic period. An inscription was found from the *Legio XIII Gemina* from its earliest period. The legion was replaced by the *Legio X Gemina.* (Mócsy 1974: 85, 88, 99, 140; Neumann 1967: 53). **M, H**

2. Bad Deutsch-Altenburg. *Carnuntum.* Austria. Legionary fortress. The fortress was built in the late Augustan or early Tiberian period and remained in use until the late Roman period. It was occupied by the *Legio XX Apollinaris* and was replaced by the *Legio XIII Gemina* during the Dacian Wars. The site had an auxiliary fort located to its west at Petronell, which housed the *Ala I Thracum* (Genser 1986: 685-701; Mócsy 1974: 40). **M, H, I**

3. Szőny. *Brigetio.* Hungary. Legionary fortress. Originally the site was built before the Flavian period. The legionary fortress was built at the turn of the 1st century AD. The final date of occupation is unknown. It was first occupied by the *Legio XXX Ulpia Victrix* and after the Parthian War it was occupied by the *Legio I Adiutrix* (Mócsy 1974: 49, 88, 92, 99, 140, 198, 221). **I, M**

Pannonia Inferior (Fig. 6)

1. Szentendre. *Ulcisia Castra.* Hungary. Auxiliary Fort. It was probably built during the Flavian period. It was occupied by a Syrian Cohort in the Severan period (Mócsy 1974: 228). **I**

2. Budapest. *Aquincum.* Hungary. Legionary fortress. There were a number of auxiliary forts built in Budapest before it became a legionary fortress. The first forts date to the reign of Claudius. The location of the Vizivaros fort was discovered at the foot of Buda's Castle Hill and is known from tombstones. The *Ala I Hispanorum* occupied the fort from 50 to 69 and the *Ala I Hispanorum Aurian* occupied the site from 70 to 80. The Emperor Vespasian added a number of new forts along the Danube. Obuda was constructed near the area of the legionary fortress. The *Ala I Tungrorum Frontina* probably constructed Campona located to the south of the city. The first legionary fortress at Aquincum was constructed in 89 for the *Legio II Adiutrix.* It was also occupied by the *Legio XX Gemina* (Korbuly 1934: 5-10; Németh 1994: 140-4; Zsidi 1995: 14-5). **M, I, H**

3. Dunaújváros. *Intercisca.* Hungary. Auxiliary Fort. It was built during the reign of Trajan remained in use until the 4th century. It housed the *Ala I Augusta Ituraeorum* and the *Ala I Tungrorum Frontoniana* at different times (Visy 1988: 101-4). **M, I**

Britannia (Figs. 7 & 8)

1. Caerleon. *Isca Silurum.* Wales. Legionary fortress. It was constructed in AD 74/5 during the conquest of South Wales by Julius Frontinus. The fort was occupied into the 4th century. *Legio II Augusta* (Boon and Williams 1967: 1-2; Jarrett 1969: 10, 29, 31). **M, H**

2. Chester. *Deva.* England. Legionary fortress. It was completed in AD 79. The *Legio II Adiutrix* was the first legion to occupy the fortress. They were withdrawn from the province in 86/7 and were replaced with the *Legio XX Valeria Victrix.* The fort remained occupied until the 4th century (Jarrett 1969: 33-42). **M, I, H**

3. York *Eboracum*. England. Legionary fortress. It was constructed under the Flavian reign and remained in use until the 4th century. It was first occupied by the *Legio VIIII Hispana* and was replaced by the *Legio VI Victrix*. **M**

4. South Shields. *Arebia*. England. Auxiliary Fort. The fort was an outpost supply fort for Hadrian's Wall and Severus' campaign into Scotland. There may have been a cohors stationed at the fort during the reign of Marcus Aurelius. However, in the 3rd century as a supply fort, the unit stationed at the site was the *Cohors V Gallorum equitata*. In the 4th century a *Numerus barcariorum Tigrisiensium* was stationed at the fort (Breeze and Dobson 1991: 255, 257, 271). **M**

5. Wallsend. *Serdunum* or *Segedunum*. England. Auxiliary Fort. It was probably occupied by a *Cohors quingenaria equitata* in Hadrian's reign. During the reign of Marcus Aurelius the fort's garrison was the *Cohors II Nerviorum civium Romanorum*. During the 3rd and 4th centuries the unit was the *Cohors IV Lingonum equitata* (Breeze and Dobson 1991: 54, 142, 243, 271). **M**

6. Benwell. *Condecorum*. England. Auxiliary Fort. The fort was probably occupied by an *Ala quingenaria* in Hadrian's reign. Under Marcus Aurelius it was occupied by the *Cohors I Vangionum milliaria equitata*. In the 3rd and 4th centuries it was occupied by the *Ala I Asturum* (Breeze and Dobson 1991: 52, 142, 228, 271). **H**

7. Halton Chesters. *Onnum* or *Hunno*. England. Auxiliary Fort. The fort was possibly occupied by a *Cohors quingenaria equitata* under Hadrian's reign. There is no evidence

for the unit's name under Marcus Aurelius. In the 3rd and 4th centuries the unit was the *Ala I Pannonionum Sabiniana* (Breeze and Dobson 1991: 142, 271). **M**

8. Chesters. *Celunum* or *Cilurnum.* England. Auxiliary Fort. The fort was occupied by the *Ala Augusta ob virtutem appellata* in Hadrian's reign. The *Ala II Asturum* remained stationed at the site from the time of Commodus until the 5th century (Breeze and Dobson 1991: 52, 244, 271). **M**

9. Housesteads. *Velurtion* or *Borcovicium.* England. Auxiliary Fort. Under Hadrian's reign the fort was occupied by a *Cohors milliaria peditata.* In the 3rd and 4th centuries the fort was occupied by the *Cohors I Tungrorum milliaria, Numerus cuneus Frisiorum* and a *Numerus Hnaudifridi cuneus* (Breeze and Dobson 1991: 271). **M, H, I**

10. Birdoswald. *Banna.* England. Auxiliary Fort. In Hadrian's reign the *Cohors I Tungrorum milliaria peditata* occupied the fort. In the 3rd century the *Cohors I Aelia Dacorum milliaria* and the *venatores Banniensis* occupied the fort. *The Cohors I Aelia Dacorum* was the final unit at the site and remained there until the 5th century (Breeze and Dobson 1991: 54, 246, 271). **M**

11. Bowness-on-Solway. *Maia* or *Mais.* England. Auxiliary Fort. It probably had a *Cohors milliaria equitata* in Hadrian's reign and in the 3rd century. Its unit names are unknown (Breeze and Dobson 1991: 271). **M**

12. Corbridge. *Cambulodunum.* England. Auxiliary Fort. This Stanegate road fort was constructed during Trajan's reign and probably remained occupied until the reign of

Marcus Aurelius. The *Cohors I fida Vardullorum equitata milliaria* and the *Ala Petriana* were stationed at the site at different times (Breeze and Dobson 1991: 129-30, 252; Dore 1989: 31). **M**

13. Chesterholm. *Vindolanda.* England. Auxiliary Fort. The Stanegate road fort was constructed during the reign of Trajan and remained occupied until the 4th century. The *Cohors II Nerviorum civium Romanorum* and the *Cohors IV Gallorum equitata* occupied the site at different times (Breeze and Dobson 1991: 245, 271). **I**

14. Carlisle. England. Auxiliary Fort. This Stanegate road fort was constructed during the reign of Trajan and may have remained in use until the 4th century. The unit names are unknown (Breeze and Dobson 1991: 19, 90). **M**

APPENDIX ONE PART TWO
List of fortifications without evidence for medical care

Germania Inferior

1. Velsen. *Castellum Flevum* Netherlands. Auxiliary Fort. Unknown Unit. 15 BC-mid-1st century AD (Bogaers and Rüger 1974: 30).

2. Katwijk-Brittenburg. *Lugdunum.* Netherlands. Auxiliary Fort. *Cohors I Raetorum civium Romanorum pia fidelis.* First century AD - AD 260 (Bogaers and Rüger 1974: 37-8).

3. Leiden. *Matilo* Netherlands. Auxiliary Fort. *Cohors I Lucensium Hispanorum pia fidelis Domitiana, cohors XV voluntariorum civium Romanorum pia fidelis, numerus exploratum Batavorum.* First century AD – 4th century (Bogaers and Rüger 1974: 44).

4. Alphen aan de Rijn-Zwammerdam. *Nigrum Pullum.* Netherlands. Auxiliary Fort. Unknown Unit. AD 50 – 4th century (Bogaers and Rüger 1974: 49-52).

5. Woerden. *Laurum.* Netherlands. Auxiliary Fort. Unknown Unit. AD 47-3rd century (Bogaers and Rüger 1974: 53).

6. Vleuten-De Meern. Netherlands. Auxiliary Fort. *Cohors I classica pia fidelis.* Mid-1st Century AD – mid-3rd century (Bogaers and Rüger 1974: 55).

7. Utrecht. *Traiectum.* Netherlands. Auxiliary Fort. *Cohors II Hispanorum peditata pia fidelis.* AD 47 -260 (Bogaers and Rüger 1974: 58).

8. Wijk bij Duurstede. *Levefanum.* Netherlands. Auxiliary Fort. *Cohors I Thracum* in the years of 70 to 83. AD 47-270 (Bogaers and Rüger 1974: 67).

9. Maurik. *Mannaricium*. Netherlands. Auxiliary Fort. *Cohors II Thracum equitata* from 70 to c. 83, *cohors II Hispanorum equitata* from 70 to c. 83. AD 70 – 260 (Bogaers and Rüger 1974: 68).

10. Huissen. Netherlands. Auxiliary Fort. Unknown unit. AD 70 –mid-3rd century (Bogaers and Rüger 1974: 73).

11. Cuijk. *Ceuclum*. Netherlands. Auxiliary Fort. Unknown unit. Mid-1st century –c. AD 100 (Bogaers and Rüger 1974: 84).

12. Herwen en Aerdt-De Bijland. *Carvium*. Netherlands. Auxiliary Fort. *Cohors II civium Romanorum equitata pia fidelis*. AD 70 –c. 260 (Bogaers and Rüger 1974: 90).

13. Kleve-Rindern. *Harentium*. Germany. Auxiliary Fort. Unknown Unit. AD 70 – 3rd century (Bogaers and Rüger 1974: 93; Horn 1987: 458).

14. Altkalker. *Burginatium*. Germany. Auxiliary Fort. *Ala Vocontiorum, ala Afrorum*. Flavian – 4th century (von Elbe 1975: 13; Bogaers and Rüger 1974: 101-102; Horn 1987: 452).

15. Moers-Asberg. *Asciburgium*. Germany. Auxiliary Fort. *Ala I Tungrorum Frontoniana; ala Moesica felix torquata*. Early 1st century AD – 4th century (von Elbe 1974: 274; Horn 1987: 567; Bogaers and Rüger 1974: 128).

16. Rheinhausen-Werthhausen. Germany. Auxiliary Fort. Unknown unit. First Century AD – 2nd century (Bogaers and Rüger 1974: 132).

17. Neuss-Grimmlinhausen-Reckberg. Germany. Auxiliary Fort. Unknown unit. First century AD – 2nd century (Bogaers and Rüger 1974: 145).

18. Dormagen. *Durnomagus*. Germany. Auxiliary Fort. *Ala Noricum*. Flavian period – 4th century (Horn 1987: 397; Bogaers and Rüger 1974: 151; von Elbe 1974: 111).

19. Cologne-Bayenthal-Alteburg. Germany. Naval Fort *Classis Germanica pia fidelis*. Claudian – 3rd century (Bogaers and Rüger 1974: 166; von Elbe 1974: 184-5).

20. Wesseling. Germany. Auxiliary Fort. Unknown unit. First century AD –2nd century (von Elbe 1974)

21. Remagen. *Riomagus*. Germany. Auxiliary Fort. *Cohors II Varcianorum equitata civium Romanorum, cohors I Flavia Hispanorum*. Tiberian – 3rd century (von Elbe 1974: 328-9; Bogaers and Rüger 1974: 208-13).

22. Krefeld-Gellep. *Gelduba*. Germany. Auxiliary Fort. AD 70 to the late 4th century. *Cohors II Varcianorum equitatae quingenaria* (Bogaers and Rüger 1974: 135-6; Horn 1987: 529-30; von Elbe 1974: 230-2).

23. Cologne. *Apud Aram Ubiorum*. Germany. Auxiliary Fort. Augustan period to AD 50. *Legio I Germanica* and *Legio XX Valeria Victrix* (Bogaers and Rüger 1974: von Elbe 1974: 184).

Germania Superior

1. Andernach. *Antunnacum*. Germany. Auxiliary Fort. *Cohors Raetiorum*. Tiberain - Flavian (von Elbe 1974: 306; Cuppers 1990: 304-6).

2. Koblenz. Germany. Auxiliary Fort. Unknown unit. Tiberian – Flavian (Cuppers 1990: 418-9; von Elbe 1974: 178-9).

3. Gross Gerau. Germany. Auxiliary Fort. Unknown unit. Vespasianic – late 2nd century (Baatz and Herrmann 1982: 322).

4. Gemersheim. Germany. Auxiliary Fort. Unknown unit. Early 1st century AD -Flavian (von Elbe 1974: 138; Cuppers 1990: 372-3).

5. Rheingoheim. Germany. Auxiliary Fort. Unknown unit. Claudian - Vepasianic (Cuppers 1990: 455-7).

6. Heidelberg/ Neuenheim. Germany. Auxiliary Fort. *Cohors XXIIII voluntariorum civium Romanorum, Cohors II Augusta Cyrenaica equitata.* Mid-1st century AD – c. 233 (von Elbe 1974: 145; Filtzinger et al. 1986: 316-8).

7. Speyer. *Noviomagus.* Germany. Auxiliary Fort. Unknown unit. Late-1st century BC – Flavian (Cuppers 1990: 559-61; von Elbe 1974: 366).

8. Bendorf. Germany. Auxiliary Fort. *Cohors I Thracum.* Flavian - ? (Cuppers 1990: 331-2).

9. Niedernberg. Germany. Auxiliary Fort. Unknown unit. First century AD - ? (Baatz and Herrmann 1982: 455).

10. Arzbach. Germany. Auxiliary Fort. Unknown unit. Early 2nd century AD - ? (Cuppers 1990: 91).

11. Ems. Germany. Auxiliary Fort. Unknown unit. Early 2nd century AD - ? (Cuppers 1990: 92).

12. Hunzel. Germany. Auxiliary Fort. Unknown unit. Mid-2nd century - ? (Cuppers 1990: 92).

13. Marienfels. Germany. Auxiliary Fort. Unknown unit. Mid-2nd century - ? (Cuppers 1990: 92).

14. Kemel. Germany. Auxiliary Fort. Unknown units (two forts constructed on the site). Mid-2nd century AD – mid-3rd century (Baatz and Herrmann 1982: 327-73).

15. Feldberg (Kleine). Germany. *Numerus* fort. *Numerus Alexandriana*. Mid-2nd century AD – mid-3rd century (Baatz and Herrmann 1982: 266-9; Baatz 1975).

16. Butzbach. Germany. Auxiliary Fort. *Cohors II Raetiorum Civium Romanorum, Cohors II Augusta Cyrenaica equitata*. Mid-1st century AD – c. 233 (von Elbe 1974: 104).

17. Arnsburg. Germany. Auxiliary Fort. *Cohors I Aquitanorum veterana equitatae*. Mid-1st century AD –3rd century (Baatz and Herrmann 1982: 230).

18. Hungen-Inheiden. Germany. Auxiliary Fort. Unknown unit. Trajanic - mid-3rd century (Baatz and Herrmann 1982: 363).

19. Echzell. Germany. Auxiliary Fort. *Ala Indiana Gallorum, ala Moesica Felix Torquata, the Ala I Flavia Gemina, Cohors III voluntariorum civium Romanorum*. Mid-1st century AD – mid-3rd century (Baatz and Herrmann 1982: 264).

20. Bad Nauheim. Germany. Auxiliary Fort. A garrison of the *Legio XIV Gemina*. AD 83 - ? (von Elbe 1974: 49-50).

21. Friedburg. Germany. Auxiliary Fort. *Cohors I Flavia Damascenorum*. Tiberian – mid-3rd century (von Elbe 1974: 133-4).

22. Altenstadt. Germany. Auxiliary Fort. Unknown unit. Trajanic – mid-3rd century (Schönberger 1969).

23. Nidderau-Heldenbergen. Germany. Auxiliary Fort. Unknown unit. Trajanic – mid-3rd century (Baatz and Herrmann 1982: 450-1).

24. Marköbel. Germany. Auxiliary Fort. *Cohors XXX Voluntariorum civium Romanorum*. Trajanic - ? (Baatz and Herrmann 1982: 429-30).

25. Heidkringen. Germany. Auxiliary Fort. Unknown unit and date (Baatz and Herrmann 1982: 346).

26. Frankfurt am Main. Germany. Auxiliary Fort. Unknown unit. Flavian – late 1st century (von Elbe 1974: 127).

27. Hannau-Kesselstadt. Germany. Auxiliary Fort. Unknown unit. Flavian - ? (Baatz and Herrmann 1982: 334-6).

28. Rückingen. Germany. Auxiliary Fort. *Cohors III Dalmatorum pia fidelis*. Early-2nd century AD – 3rd century (von Elbe 1974: 145; Baatz and Herrmann 1982: 468).

29. Hainburg-Hainstadt. Germany. Auxiliary Fort. Unknown unit. AD 90 – c. 260 (Baatz and Herrmann 1982: 333-4).

30. Seligenstadt. Germany. Auxiliary Fort. *Cohors I civium Romanorum Equitata*. Trajanic – 3rd century (Baatz and Herrmann 1982: 477-78).

31. Niedernberg. Germany. Auxiliary Fort. Unknown unit and date (Baatz and Herrmann 1982: 455).

32. Seckmauern. Germany. Auxiliary Fort. *Cohors I civium Romanorum equitata.* Trajanic – mid- 3rd century (Baatz and Herrmann 1982: 477-8).

33. Lützelbach. Germany. Auxiliary Fort. Unknown unit. Mid- 2nd century (Baatz and Herrmann 1982: 424-5).

34. Michaelstadt-Vielbrunn. Germany. Auxiliary Fort. Unknown *numerus* unit. c. AD 100 – c. AD 150 (Baatz and Herrmann 1982: 436-37).

35. Michaelstadt-Eulbach. Germany. *Numerus* fort. Unknown *numerus* unit. AD 70 – mid- 2nd century (Baatz and Herrmann 1982: 432).

36. Würzberg. Germany. *Numerus* fort. Unknown *numerus* unit. AD 100 - mid-2nd century (Baatz and Herrmann 1982: 498-500).

37. Hesseneck-Hesselbach. Germany. *Numerus* fort. *Numerus Brittonum.* c.AD 100 – 150 (Baatz and Herrmann 1982: 348-49).

38. Schlossau. Germany. Auxiliary Fort. Unknown unit. c.AD 100 – mid-2nd century (Baatz and Herrmann 1982: 410).

39. Oberscheidental. Germany. Auxiliary Fort. *Cohors I Sequanorum et Rauracorum equitata.* c.AD 100 – mid-2nd century (Filtzinger et al. 1986: 444-6).

40. Heilbronn-Böckingen. Germany. Auxiliary Fort. *Cohors V Delmatarum, Cohors I Helvetiorum.* Mid-1st century AD – mid- 2nd century (Filtzinger et al. 1986: 332-3).

41. Walheim. Germany. Auxiliary Fort. *Cohors I Asturum equitata.* Mid-1st century AD – mid-2nd century (Filtzinger et al. 1986: 596-9).

42. Benningen. Germany. Auxiliary Fort. Unknown unit. c. AD 85/90 - the reign of Pius. (Filtzinger et al. 1986: 239).

43. Sulz. Germany. Auxiliary Fort. *Cohors XXIV voluntarium civium Romanorum.* Mid-1st century AD - ? (Filtzinger et al. 1986: 597-8).

44. Rottweil. Germany. Auxiliary Fort. *Cohors I Biturgium, cohors I Flavia, cohors II Aquitanorum, cohors III Dalmatorum, ala I Flavia Gemina Milliaria.* Vespasianic - Domitianic (von Elbe 1974: 336-7; Filtzinger et al. 1986: 521-3).

45. Alb-Stadt-Lautlingen. Germany. Auxiliary Fort. Unknown unit. Mid-1st century AD - ? (Filtzinger et. al. 1986: 212-3).

46. Seckmauern. Germany. Auxiliary Fort. Unknown unit. Hadrianic – mid-3rd century (Baatz and Herrmann 1982: 476).

47. Trennfurt. Germany. Auxiliary Fort. Vexillation of the twenty-second legion from Mainz. Mid-2nd century AD – mid-3rd century (Baatz and Herrmann 1982: 482-3).

48. Miltenberg-Altstadt. Germany. Auxiliary Fort. *Cohors I Sequani et Raurici.* Mid-2nd century AD – mid-3rd century (von Elbe 1974: 271-2).

49. Walldürn. Germany. Auxiliary Fort. Vexillation of the 22nd legion. Mid-2nd century AD – c. AD 259/60 (von Elbe 1974: 439-40; Filtzinger et al. 1986: 604-6).

50. Jagsthausen. Germany. Auxiliary Fort. *Cohors I Germanorum civium Romanorum.* Mid-2nd century AD – mid-3rd century (von Elbe 1974: 163; Filtzinger et al. 1986: 351-2).

51. Murrhardt. Germany. Auxiliary Fort. *Cohors XXI Voluntariorum civium Romanorum.* Mid-2nd century AD – mid-3rd century (von Elbe 1974: 280; Filtzinger et al. 1986: 448-51).

52. Welzheim and Welzheim Ost. Germany. Auxiliary Fort. *Ala I Scubulorum, numerus Brittonum.* AD 165 – mid-3rd century (Filtzinger et al. 1986: 611-7).

53. Lorch. Germany. Auxiliary Fort. *Cohors quingenaria equitata.* AD 150 – mid-3rd century (von Elbe 1974: 250; Filtzinger et al. 1986: 433-4).

54. Tuttlingen. Germany. Auxiliary Fort. Unknown unit. Claudian – Flavian (Czysz et al. 1995: 75; Filtzinger et al. 1986: 584).

55. Heddernheim. Germany. Auxiliary Fort. Late 1st to mid-2nd century occupation. *Ala II Flavia milliaria* (von Elbe 1974: 128).

Raetia

1. Eislingen. Germany. Auxiliary Fort. Unknown unit. Flavian (Filtzinger et al. 1986: 276-7).

2. Schwabisch-Gmünd. Germany. Auxiliary Fort. *Cohors I Raetorum.* Mid-2nd century AD – mid-3rd century (Filtzinger et al. 1986: 546-9).

3. Aalen. Germany. Auxiliary Fort. The *Ala II Flavia milliaria.* Mid-2nd century AD – 259/60 (von Elbe 1974: 5-6; Filtzinger et al. 1986: 203-8).

4. Buch. Germany. Auxiliary Fort. Unknown unit. Mid-2nd century AD – 259/60 (Filtzinger et al. 1986: 492-5).

5. Ruffenhofen. Germany. Auxiliary Fort. *Cohors IX Batavorum equitata milliaria exploratum.* Mid-2nd century AD – mid-3rd century (Czysz et al. 1995: 509).

6. Aufkirchen. Germany. Auxiliary Fort. Unknown unit. Mid-1st century AD – mid-3rd century (Filtzinger et al. 1986: 54, 74).

7. Unterschwaningen. Germany. Auxiliary Fort. Unknown unit. Mid-1st century AD – mid-3rd century (Czysz et al. 1995: 527).

8. Gunzenhausen. Germany. *Numerus* fort. Unknown *numerus* fort. Mid-2nd century AD – c. AD 243 (Czysz et al. 1995: 456).

9. Theilenhofen. Germany. Auxiliary Fort. *The Cohors III Bracaraugustanorum equitata* (von Elbe 1974: 388 and Czysz et al. 1995: 522-23).

10. Böhming. Germany. Auxiliary Fort. *Cohors I Breucorum civium Romanorum.* Late-2nd century AD - ? (Czysz et al. 1995: 429).

11. Kösching. Germany. Auxiliary Fort. *Ala I Flavia Gemelliana.* AD 80 – 259/60 (Czysz et al. 1995: 469).

12. Pförring. *Celeusum.* Germany. Auxiliary Fort. *Ala I Singularium pia fidelis civium Romanorum.* Trajanic – mid-3rd century (Czysz et al. 1995: 499).

13. Burladingen-Hausen. Germany. Auxiliary Fort. Unknown unit. AD 80 – early-2nd century (Filtzinger et al. 1986: 265-7).

14. Gomadingen. Germany. Auxiliary Fort. Unknown unit. c.AD 85/90 – mid-3rd century (Filtzinger et al. 1986: 299).

15. Romerstein-Donstetten. Germany. Auxiliary Fort. Unknown unit. c.AD 85/90 – mid-2nd century (Filtzinger et al. 1986: 508-9).

16. Bobfingen-Oberdorf. Germany. Auxiliary Fort. Unknown unit. Late-1st century AD – mid-3rd century (Filtzinger et al. 1986: 253-4).

17. Emerkingen. Germany. Auxiliary Fort. Unknown unit. Claudian - ? (Filtzinger et al. 1986: 285).

18. Unterkirchberg. Germany. Auxiliary Fort. Unknown unit. Claudian – Domitianic (Czysz et al. 1995: 75, 209).

19. Aislingen. Germany. Auxiliary Fort. Unknown unit. Claudian – Domitianic (Czysz et al. 1995: 415-6).

20. Burghöfe. Germany. Auxiliary Fort. Unknown unit. Claudian – early-2nd century (Czysz et al. 1995: 429-30).

21. Neuburg. Germany. Auxiliary Fort. Unknown unit. Claudian - Flavian (Czysz et al. 1995: 485).

22. Weltenburg. Germany. Auxiliary Fort. Unknown unit. Claudian - ? (Czysz et al. 1995: 536-7).

23. Passau. *Castra Batavia.* Germany. Auxiliary Fort. *Cohors IX Batavorum milliaria equitata.* Second century AD (von Elbe 1974: 311).

24. Eining. *Abusina.* Germany. Auxiliary Fort. The fort was constructed c. AD 80 and remained in use for nearly 300 years. *Cohors IIII Gallorum* and *Cohors III Britannorum equitatae* (von Elbe 1974: 114-5).

Noricum

1. Passau-Innstadt. *Boiodurum.* Austria. Auxiliary Fort. *Cohors V Breucorum.* Flavian - ? (Alföldy 1974: 58, 104, 147; Genser 1986: 11).

2. Oberanna. *Stanacum*? Austria. Auxiliary Fort. Unknown unit and date (Alföldy 1974: 147, 167).

3. Schlögen. *Ioviacum?* Austria. Auxiliary Fort. *Cohors V Breucorum.* Hadrianic – early-4th century (Alföldy 1974: 144, 147, 167, 171; Genser 1986: 64).

4. Eferding. *Ad Mauros*? Austria. Auxiliary Fort. *Cohors Maurorum.* Hadrianic- ? (Alföldy 1974: 144, 147; Genser 1986: 88).

5. Linz. *Lentia.* Austria. Auxiliary Fort. *Ala I Pannoniorum Tampiana.* Claudian - ? (Alföldy: 1974: 75, 104, 144, 146, 167).

6. Albing. Austria. Auxiliary Fort. First legionary fortress for the *Legio II Italica.* AD 174 – 177 (Alföldy 1974: 155-6. 165).

7. Wallsee. *Adiuvense?* Austria. Auxiliary Fort. Unknown unit. Hadrianic - ? (Alföldy 1974:144, 167, 202).

8. Mauer ad Url. *Locus Felicis?* Austria. Auxiliary Fort. *Vexillation of the Legio II Italica.* Hadrianic - ? (Alföldy 1974: 144, 147, 167, 200, 202; Genser 1986: 213).

9. Ybbs. Austria. Naval fort. A detachment for a river fleet. Vespasicanic? – late-2nd century (Alföldy 1974: 144, 148, 167, 202; 203; Genser 1986: 213).

10. Neumark an der Ybbs. *Ad Pontum Ises.* River fleet. Unknown date (Genser 1986: 227).

11. Pöchlarn. *Arelape.* Austria. Auxiliary Fort. *Cohors I Flavia Brittonum.* First century AD – 4th century (Alföldy 1974: 148, 150, 167, 202, 259; Genser 1986: 233).

12. Mautern an der Donau. *Favianis.* Austria. Auxiliary Fort. *Cohors I Ubiorum, Cohors I Aelia Brittonum milliaria.* First century AD – 4th century (Alföldy 1974: 144, 148, 150, 153, 167, 202, 209, 259; Genser 1986: 271).

13. Traismauer. *Augustiana.* Austria. Auxiliary Fort. *Ala I Augusta Thracum.* Claudian – late-Roman period (Alföldy 1974: 104, 145, 148, 150, 153, 167, 202; Genser 1986: 305, 312).

14. Zwentdorf. Austria. Auxiliary Fort. *Cohors V Breucorum equitata.* Claudian – 4th century (Alföldy 1974: 104, 148, 149, 153, 168, 200, 259; Genser 1986: 350).

15. Tulln. *Commagena.* Austria. Auxiliary Fort. *Ala I Commagenorum, Cohors Flavia Commagenorum.* Flavian – 4th century (Alföldy 1974: 150; Genser 1986: 357).

16. Zeiselmauer. *Austuris? Cannabiaca?* Austria. Auxiliary Fort. *Cohors I Asturum.* Late-1st century AD – 5th century (Alföldy 1974: 61, 144, 153, 167, 222, 258).

Pannonia Superior

1. Klosterneuburg. *Cannabiaca*? Austria. Auxiliary Fort. Unknown unit. Claudian – mid-3rd century (Mócsy 1974: 88).

2. Schwechat. *Ala Nova.* Austria. Auxiliary Fort. Unknown unit and date (Genser 1986: 533).

3. Fischamend. *Aequinoctium.* Austria. Auxiliary Fort. Unknown unit and date (Genser 1986: 549).

4. Rusovce. *Gerulata.* Hungary. Auxiliary Fort. Unknown unit and date.

5. Magyaróvár. *Ad Flexum.* Hungary. Auxiliary Fort. Unknown unit. Flavian – 4th century (Mócsy 1974: 88).

6. Lébény. *Quadrata.* Hungary. Auxiliary Fort. Unknown unit. Hadrianic – 4th century (Mócsy 1974: 107).

7. Gyór. *Arrabona.* Hungary. Auxiliary Fort. *Ala I Pannoniorum.* Pre-Flavian - ? (Mócsy 1974: 49-50).

Pannonia Inferior

1. Szazhalombath. *Matrica.* Hungary. Auxiliary Fort. Unknown unit and date (Mócsy 1974: 106).

2. Adóny. *Vetus Salina.* Hungary. Auxiliary Fort. *Cohors I Brittonum milliaria, Cohors I Alpinorum equitata.* Mid-1st century – 4th century (Mócsy 1974: 49, 106; Visy 1988: 97-8).

3. Baracs. *Annamatia.* Hungary. Auxiliary Fort. *Cohors I Thracum Germanica.* Second century AD - ? (Visy 1988: 108-9).

4. Dunakömlod. *Lussonium.* Hungary. Auxiliary Fort. *Cohors I Alpinorum peditata.* Flavian – 4th century (Visy 1988: 113-4).

5. Tolna. *Alta Ripa.* Hungary. Auxiliary Fort. *Ala Siliana Civium Romanorum, ala I Brittonum civium Romanorum.* Early-2nd century AD - ? (Visy 1988: 117).

6. Ocseny. *Ad Latus.* Hungary. Auxiliary Fort. *Cohors I Noricum, cohors II milliaria Brittonum.* Unknown dates (Visy 1988: 117).

7. Vardomb. *Ad Status.* Hungary. Auxiliary Fort. *Cohors III Lusitanorum, cohors II Asturum et Callaecorum.* Unknown dates (Visy 1988: 120).

8. Dunaszekcsö. *Lugio.* Hungary. Auxiliary Fort. *Cohors VII Breucorum.* Second century AD – 3rd century (Visy 1988: 123-4).

9. Kölked. *Altinum.* Hungary. Auxiliary Fort. *Cohors I Lusitanorum.* First century AD – 3rd century (Visy 1988: 125-6).

10. Zmajevac/ Vorosmart. *Ad Novas.* Serbia. Auxiliary Fort. Unknown unit and date (Visy 1988: 126).

11. Mursa. Serbia. Auxiliary Fort. *Ala II Hispanorum, cohors II Alpinorum equitata.* First century AD - ? (Visy 1988: 126).

12. Dalj. *Teutoburgium.* Serbia. Auxiliary Fort. *Ala II Hispanorum Arvacorum, ala I civium Romanorum, ala Praetoria civium Romanorum.* First century AD - ? (Visy 1988: 127).

13. Sotin. *Cornacum.* Serbia. Auxiliary Fort. *Cohors I Montanorum.* Unknown dates (Visy 1988: 127).

14. Banostar. *Bononia.* Serbia. Auxiliary Fort. *Ala I Britannica milliaria civium Romanorum.* Second centuery AD – 3rd century (Visy 1988: 128).

15. Surduk. *Rittium.* Serbia. Auxiliary Fort. *Ala I Augusta Ituriaeorum.* Second century AD – 3rd century (Visy 1988: 130).

16. Novi Banovic. *Burgenae.* Serbia. Auxiliary Fort. *Cohors I Thracum civium Romanorum equitata.* Second century AD – 3rd century (Visy 1988: 130).

Britannia

1. Newcastle. *Pons Aelius.* Auxiliary Fort. *Cohors I Traiana Cugernorum civium Romanorum, cohors prima Cornoviorum.* Second century AD – 4th century (Breeze and Dobson 1991: 59, 142, 243, 271).

2. Rudchester. *Vindovala.* Auxiliary Fort. *Cohors prima Frixagorum.* Second century AD – 4th century (Breeze and Dobson 1991: 211, 212, 244, 271).

3. Carrawburgh. *Brocolita.* Auxiliary Fort. *Cohors I Batavorum.* Second century AD – 4th century (Breeze and Dobson 1991: 244, 271).

4. Great Chesters. *Aesica.* Auxiliary Fort. *Cohors VI Nerviorum, cohors Raetorum, cohors II Asturum.* Second century AD – 4th century (Breeze and Dobson 1991: 54, 245, 271).

5. Castlesteads. *Camboglans* (Rudge Cup), *Gabaglanda* (Ravenna Cosmography) and *Amboglanna.* Auxiliary Fort. *Cohors IV Gallorum equitata, cohors II Tungrorum equitata.* Second century AD – 4th century (Breeze and Dobson 1991: 54, 246, 271).

6. Stanwix. *Uxelludamo, Petrianis* . Auxiliary Fort. *Ala Petriana; ala Augusta Petriana bis torquata civium Romanorum.* Second century AD – 4th century (Breeze and Dobson 1991: 54, 246, 271).

7. Burgh-by-Sands. *Aballaba.* Auxiliary Fort. *Cohors I Nervana Germanorum milliaria equitata, numerus Maurorum Aurelianorum and the cuneus Frisionum Aballavensium.* Second century AD – 4th century (Breeze and Dobson 1991: 54, 241, 246).

8. Drumburgh. Auxiliary Fort. Unknown unit. Second century AD – 4th century.

APPENDIX TWO
The Inscriptions

This appendix provides the inscriptions mentioning medical personnel. Each province is divided into a separate table, and each entry has information on the fortification, place of publication, date of the inscription if known, and the location of the inscription.

Table One: Germania Inferior

1. Bonna/Bonn CIL XIII 8011; Wilmanns 1995b: 186, nr. 39 Date second half of the 2nd or first half of the 3rd. PR. Found in the Ruins of the Dietkirchen (church) in Bonn. ***Herculi/ Victori Cl(audius)/ Edistrus o/ptio valet/udinari(i) et /Aurel(ius) Phil/etus b(ene) f(iciarius) le[g(ati)]/ ex stipibus***	2. Iversheim/ Bonn Kiln Works CIL XIII 7943; Wilmanns 1995b: 185, nr. 38 Date c. AD 145 PR. Kiln Works. ***Genio/ vexilatio/nis l(egionis) I M(inerviae) p(iae) f(idelis) / M(arcus). Sabinian/ius Quietu,s miles medicus, /Antonino IIII et Vero / II co(n)s(ulibus)***
3. Valkenburg AE 1975, 634; Wilmanns 1995b: 187, nr. 40 Date Possibly Claudian PR. Exact spot unknown. ***Tul(l)o Loucor(u)m / Albano medico.***	4. Vetera/ Xanten CIL XIII 8606=ILS 4739 Gummerus 95 Date Late Augustan PR. Civil Settlement Might not be military, but it is in close proximity to the fortress. ***Alateiviae ex iussu Divo medicus***

Table Two: Germania Superior

5. Mogontiacum/ Mainz CIL XIII 6778; Wilmanns 1995b: 255, nr. 95 This is controversial, as Wilmanns believes it is not medical. Others believe it is medical (R.S.O. Tomlin pers. com.) Date Vespasianic PR. Uncertain ***Voto su[s]/cepto / L(ucius). Vireius / Dexter se/plesiar(ius) in/ leg(ione) I Ad(iutrice) / v(otum) s(olvit) l(ibens) l(aetus) m(erito).***	6. Mogontiacum/ Mainz CIL XIII 6700; Wilmanns 1995b: 188, nr. 41 Date Between AD 39/43-70/1 PR. In the city wall. ***D(is) M(anibus)/ [..).nius Vale(n)s / [me]dicus leg(ionis) IIII / Mac(edonicae)***	7. Niederbieber CIL XIII 11979; ILS 9182; Wilmanns 1995b: 192, nr. 45 Date 3rd Century PR. Exact spot unknown, ***In h(onorum) d(omus) d(ivinae) Genio Capsari/orum n(umeri) Divitiensium/ Gordianorum T(itus) F(lavius) Proces/sus, medicus hordina/rius,sub S(exto) Vibio Vita/le Pr(a)ef(ecto) n(umeri) s(upra) s(cripto) d(e) p(ecunia) s(ua)***
8. Gross-Krotzenburg CIL XIII 7415; Wilmanns 1995b: 196, nr. 47	9. Osterburken CIL XIII 11767; Wilmanns 1995b: 199, nr. 49	10. Nemaninga/ Obernburg CIL XIII 6621=ILS 2602; Wilmanns 1995b: 197, nr. 48

Date Trajanic PR. Mithraeum ***D(eo) Inv(icto)/ L(ucius) Fabi(us)/ Anthi(mus?)/ v(otum) s(olvit) l(aetus) l(ibens) m(erito), / med(icus) [coh(ortis)] IIII (sc. Vindelicorum)***	Date AD 198 PR. Next to the Porta Decumana. ***[-]/ [pr]o salu[t]e coh(ortis) III A(quitanorum),/ [Ul]pius Iulianus medicus/ [c]oh(ortis) s(upra) s(cripta), bene merentib[us]/ [d]e suo pos(u)it, Saturn[ino]/ [et] Gal(l)o co(n)s(ulibus) l(ibens) [m(erito)].***	Date Middle or end of the 2nd century PR. Inside the fort. ***I(ovi) O(ptimo) M(aximo),/Apolloni et Aes/culapio, Saluti, / Fortunae, sacr(um)/ pro salute L(ucii) Pe/troni(i) Florenti/ni, praef(ecti) coh(ortis) IIII/ Aq(uitanorum) eq(uitatae) c(ivium) R(omanorum), M(arcus) Ru/brius Zosimus, medicus coh(ortis) s(upra)s(criptae),/ domu Ostia/ v(otum) s(olvit) l(ibens) l(aetus) m(erito)***
11. Vindonissa/ Windisch AE 1953 246b; Wilmanns 1995a: 191, nr. 44 Date 1st century PR. Schutthugel ***Prisco medico (A letter)***	12. Vindonissa/ Windisch CIL XIII (252) 5208; Wilmanns 1995a: 190, nr. 43. Date AD 45/6 PR. Found east of the fortress. Tomb inscription. ***Ti(berio) Claudio Hymno,/medico leg(ionis) XXI,/ Claudiae Quietae (uxori) eius,/ Atticus patronus***	13. Strausburg/ Tilena/Thil Chatel CIL XIII 5623; Wilmanns 1995a: 189, nr. 42 Date 3rd century PR. Exact spot unknown. ***[In] h(onorem) d(omus) d(ivinae)/ [d]eabus Mair[ab(us)]/[--]ius Regulus m[i]/les legionis VI[II]/ [An]to[n]i[ni]an(a)e A[ug(ustae)]/ [c]absarius ex vo[to]/ pro se et suis/ v(otum) s(olvit) l(ibens) m(erito)***
14. Uncertain CIL XI 3007=ILS 2542; Wilmanns 1995b: 194, nr. 46 Perhaps Upper Germany according to Wilmanns and Africa Date 2nd century? PR. Viterbo, Italy. ***D(is) M(anibus)/ M(arco) Ulpio/ [Tele]sporo,/ medico alar(um) / Indianae et tertiae Astorum/ et saliario / civitatis splendidissimae/ Ferentiensium, /Ulpius Protog[e]nes/ lib(ertus) pat(rono) b(ene) m(erenti) f(ecit)***	15. Galen Kühn XIII 604 ***Quemadodum nec medici bello Germanico, barbarorum corporum infectionis potestatem habentes amplius quippiam didicerunt iis quae coqui intelligunt***	16. Bingen Rowland 1977: 175, nr. 407 No Date PR. Unknown. This inscription does not mention a military unit; however, since it was found in the area of Bingen it might be military. ***D(is) M(anibus)/ [p]erpetuae secur[ri]/tati Q(uinto) Avitio He[rme] ti medico con[iux]***

Table Three: Raetia

17. Uncertain Castra Regina/ Regensburg CIL III 6532; Wilmanns 1995b: 201, nr. 51 Date 178/9 PR. Uncertain; Wilmanns argues it is a doctor, however there is very little of the	18. Castra Regina/ Regensburg CIL III 5959; Wilmanns 1995b: 200, nr. 50 Date 165/6 PR. Found in the South Tower of the city. ***Have mihi/ Luciliane!/ Ulp(io)***

inscription surviving to make any specific statements. The underlined portions are all that remain. ***[-medico or] dinar(io)/ [leg(ionis) III It]alicae/[-]***	***Lucilia/no medico ordinario/ [leg. III Ital./-]***

Table Four: Noricum

19. Enns/ Lauriacum CIL V 4367; Wilmanns 1995b: 201, nr. 52 Date 165-191 PR. Brescia, Italy ***D(is) M(anibus)/ L(ucii) Caeli(i) Arriani, /medico legionis/ II Italic(ae), qui vix(it) ann(os)/ XXXXVIIII menses VII. /Scribonia Faustina/ co(n)iugi karissimo***

Table Five: Pannonia Superior

20. Carnuntum/ Bad Deutsch-Altenberg ILS 9095; Wilmanns 1995b: 203, nr. 54; Bormann, 1906: 133-6 Date Trajanic? PR. Original location unknown; *spolia* in wall of the building identified as the *valetudinarium.* ***Capsa/riorum /[leg(ionis) X]IIII G(eminae) [-?-]***	21. Carnuntum/ Bad Deutsch-Altenburg AE 1929 (215) No Date PR. The Provincial settlement. This might not be a military doctor. ***Eucratus Medicus/L Iu[l]i Euthemi/medici Servus An/ XXV H S E/ L. Iulius Euthemis dominus ob/Meritis eius posuit***
22. Adium (West of Brigetio) CIL III 4279; Wilmanns 1995b: 204, nr. 55 Date Late 1st or early 2nd century PR. Gravefield ***D(is) M(anibus)/ Victoriae Verinae, coniugi pientissimae,/ domu Foro Hadrianensi provincia/ Germania Inferiori, vix(it) ann(is) XXX,/ Aemilius Deciminus medicus ordi/ narius leg(ionis) I Adi(utricis)/ martius bene meritae/ fac(iendum) cur(avit)***	23. Poetovio CIL XIII 4061 Gummerus 385 No Date PR. Unknown. Poetovio is not strictly a military site; however this inscription mentions a military doctor. ***Vex(illum) eq(uitum) C/. Rufius C F(ilius) (Tribu) Ouf(entina) Vex(illum) eq(uitum) C/. Rufius C F(ilius) (Tribu) Ouf(entina) med(icus) mile[s]/ leg(ionis) XIII Gem(inae) an(norum)/ XXXVI stip(endierum) XVI /fratre (sic)/ pos(uit) H S E) /fratre (sic)/ pos(uit)***

Table Six: Pannonia Inferior

24. Aquincum/ Budapest AE 1937: 180; Wilmanns 1995b: 207, nr. 57; Kuzsinszky 1934: 7-8, 161 Date-144-147 PR. Central area of the fortress. Wilmanns says it is in the area of the *valetudinarium* based on Kuszinszky; however no such building has been identified. ***Aesculapio/ Ti(berius) Martius / Castrensis/ med(icus) leg(ionis) II A(diutricis)/ sub Q(uinto) Fufici/o Cornu/to co(n)s(ule) de(signato)***	25. Aquincum/ Budapest AE 1937: 181; Wilmanns 1995b: 214, nr. 62; Kuzsinszky 1934: 7-8, 161 Date 2nd Century PR. Central area of the fortress. Wilmanns says it is in the area of the *valetudinarium* based on Kuszinszky; however no such building has been identified. ***Asculapio et Hygi/ae Aug(ustis) sacrum/ T(itus) Venusius T(iti) f(ilius) Mene(nia tribu) Aper/ [P]raene(ste), opt(io) valetudi(narii), v(otum) s(olvit) l(ibens) l(aetus) m(erito),/[a.d.?]V Kal(endas) Octob(res) posuit.***	26. Aquincum/ Budapest Wilmanns 1995b: 217, nr. 65 Date 2nd or 3rd century PR. Obuda ***Telesphoro/ sacrum/ T(itus) Fl(avius) Priscus/ vet(eranus) leg(ionis) IIII Fl(aviae)/ex opt(ione) val(etudinarii)/ d(ono) d(edit).***
27. Aquincum/ Budapest Cod Iustinianus 10, 53 (52); 1; Wilmanns 1995b: 208, nr. 58 Date mid-2nd century PR. Unknown	28. Aquincum/ Budapest CIL III 3537; Wilamanns 1995b: 216, nr. 64 Date Mid Second Century PR. Obuda	29. Aquincum/ Budapest CIL III 3413; Wilmanns 1995b: 211, nr. 60 Date mid-2nd century PR. Exact spot uncertain

Imp(erator) Antoninus A(ugustus) Numisio: Cum te medicum legionis Secundae Adiutrix esse dicas,…	***[- - Cum]/ miae medic[o]/leg(ionis) IIII Fl(avia) m[a]/rito pientis [si]/mo Aur(elia) Ma.[..]/ uxor infe[lic(issima)].***	***Asclepio et/ Hygiae Mar(cius) Marcel/lus med(icus), sub c(ura) a(gens)/ P(ublii) Va[l(erii)] Preasent(is)/ euok(ati), v(otum) s(olvit) l(ibens) m(erito).***
30. Aquincum/ Budapest CIL III 3583; Wilmanns 1995b: 213, nr. 61 Date 2nd or 3rd century PR. Obuda ***D(is) M(anibus)/ C(aio) Iul(io) Filetoni{s}, domo/ Africa, medico, qui vi/xit ann(os) XXXV, C(aius) Iul(ius) Filet/us et Iul(ia) Euthenia, parentis,/ filo karrisimo f(aciendum) c(uraverunt)/ et Iul(io) Athenodoro fratri eius,/ qui vixit ann(os) XXXV Euthe/nia. Is ad quem sepultura(m)/ coll(egium) cent(onariorum) (denarios) CCC contulit***	31. Aquincum/ Budapest AE 1986; Wilmanns 1995b: 215, nr. 63 Date Hadrianic PR. South of the legionary fortress in the vicus. ***I(ovi) O(ptimo) M(aximo) D(olicheno)/ Ulpi[us Flo]/ren[t]in/us mi(les) ca/ps(arius) leg(ionis) II/ Ad(iutricis) v(otum) s(olvit) l(ibens) m(erito).***	32. Aquincum/ Budapest CIL III 14347, 5; Wilmanns 1995b: 217, nr. 66 Date 3rd century PR. Obuda ***D(is) M(anibus)/ T(ito) Aur(elio)/ Numeri(o)/ militi/medico/ leg(ionis) XXII/ Pr(imigeniae) p(iae) f(idelis),/ et G(aio) Iul(io)/Me<r>catori,/ militi leg(ionis)/eiiu[sdem-].***
33. Aquincum/ Budapest AE 1923, 14; Wilmanns 1995b: 209, nr. 59 Date 146-150 PR. Carthage ***D(is) M(anibus)/ Marcius Calli/nicus pat(er). medi[c(us)]/ leg(ionis) II Adi(utricis), et Tette/dia Hygia mater fili(o)/ b(ene) m(erenti) peregr(e) posue(runt), /qui vix(it) ann(um) (unum) mene(es) V***	34. Ulcisia Castra/ Szent-Endre CIL III 13386; Wilmanns 1995b: 219, nr. 67 Date Severan? PR. Exact spot is unknown ***[I(ovi)] O(ptimo) M(aximo)/ dis deab/usque Sep(timius)/ Bauleus eq(ues)/ caps(arius) v(otum) s(olvit) l(ibens) m(erito).***	35. Intercisia/ Dunaújváros ILS 9169; Wilmanns 1995b: 220, nr. 68 Date 3rd century PR. Exact spot unknown ***D(is) M(anibus)/Ael(io) Munatio/ caps(ario) coh(ortis) (milliariae) Hem[e]s(enorum)/ stup(endiorum) XXVIII, dom(o)/ Sam(osata) Aur(elia) Cansa/una con Ant(onio)/ Basso vex(illario), sec(undo) her(ede),/ sanctiss(imo) coniug[i]/ con se natib(us)q(ue) suis /fecit m(onumentum) m(emoriae)***

Table Seven: Britannia

36. Deva/ Chester CIL VII p. 48; RIB 461; IG XIV; Wilmanns 1995b: 175 nr. 30 No Date PR. Found in possible area of the Principia; however Wilmanns argues for the *valetudinarium*, but one has not been identified with any certainty (Mason 2000: 410). *[Θεο͂ις/ σωτ] ῆρσιν / ὑπερμενέσιν/ Ερμογένης/ ἰατρ ὸς βωμὸν/ Τόνδ᾽ ἀνέθηκα.*	37. Deva/ Chester AE 1969/70: 291; Wilmanns 1995b: 176, nr. 31; Nutton 1970: 7-13; Wright: 1969: 235, Nr. 3. No Date PR. Found in possible area of the principia; however Wilmanns argues for the *valetudinarium*, but one has not been identified with any certainty (Mason 2000: 410). *Πανυπειρόχα/ς Ἀνθρώπων /σωτῆρας ἐν ἀθα/ νατο͂ισιν / Ἀσκληπίον ἠ/ πιοχεῖρα*	38. Binchester RIB 1028; Wilmanns 1995b: 178, nr. 33 Date 2nd or 3rd AD PR. Exact spot unknown. ***[Aesc]ulapio / [et?] Saluti,/ [pro salu]te alae Vet/[tonum] c(ivium) R(omanorum) M(arcus) Aure/[lius- - -] ocomas me/[dicus v(otum) s(oluti)] l[ibens m(erito).***

	Ὑγεί/ην Πάνακει/ αν *<u>ἐιητρὸς</u>/ [Ἀ]ντί [ο]χος/*	
39. Housesteads CIL VII 690=RIB 1618; Wilmanns 1995b: 178, nr. 32; Glison 1978: 162-5. 3rd Century PR. Exact spot unknown. ***D(is) M(anibus)/ Anicio/ Ingenuo,/ <u>medico ord(inario)</u> coh(ortis) / I Tungr(orum), /vix(it) an(nos) XXV***	40. Britain Galen (K) 786 XII 12 De compositione medicamentorum 4; Wilmanns 1995b: 181, nr. 35 No Date Before or during Galen's lifetime. Late 1st or early 2nd century AD. PR. Unknown, Wilmanns suggests Gallia Belgica, but this is uncertain. *Κιννάβαριον ἄξιου* *<u>ὀφθαλμικοῦ</u> σεολοῦ* *Βρεττανιοῦ, ...*	

Table Eight: Dacia

41. Drobetae CIL III 14216, 9=ILS 7150a; Wilamanns 1995b: 222, nr. 70 No Date PR. Exact spot within the fortress is uncertain. ***D(is) M(anibus)/ M(arcus) Val(erius) M(arci) F(filus) /Longinu[s]/ med(icus) leg(ionis)/ VII Cl(audiae), / ornat(us) orna/ment(is) decu[r(io-nalibus)] / a splendid(issimo)/ordin(e) m(unicipii) H(adriani) D(robetae), /vix(it) an(nos) XXIII, M(arcus) Victorius/ [L]anio et Victoria/ [Ge]mina fil(io) pien[t(issimo)]/ p(osuerunt).***

Table Nine: Moesia Superior

42. Mantissa Addendorum/ Stojnik CIL III 14537=ILS 9147 Date AD 179 PR. Uncertain ***Valetu/dinarium/ Coh(ortis) II Aur(aliana)/Nov Equit(ata)/ CRT Beben/us Iustus praef(ectus)/Imp(erato). Co[mmodo]***

APPENDIX THREE
Modern Descriptions of medical tools

The following descriptions of medical implements are arranged in alphabetical order. They are based on those provided by a number of scholars who have written on the functions of medical tools (e.g. Bliquez 1981, 1988; Braadbaart 1994b; Jackson 1990, 1994b, 1990; Künzl 1983, 1996; Milne 1907). It must be remembered that these tools might have had other purposes not related to medicine, but the descriptions provided are only specifically related to their medical uses, and not even all of those are mentioned because most of the tools could be used in many surgical and pharmaceutical procedures. Normally the tools are divided into two groups by scholars: those that are strictly surgical and those that had the dual function of being both surgical and toilet instruments. The Romans made no such categories when discussing the tools, and neither shall this thesis. This is because many of the tools placed in the specific categories have dual medical and pharmaceutical functions as well as non-medical functions. This is not the complete list of instrument types, as other instruments are known of in the archaeological and literary record, but they are rare and have not been found in the areas in question and are, therefore, not described in the text. Furthermore, this section does not take into consideration other tools that might have been used for healing that are not mentioned in the more 'rational' medical texts (e.g. amulets, charms, divining rods, etc.). The reason for only examining the instruments that are considered rational and described in the standard texts on Roman medical tools, was because these tools are known to have had a medical function, whilst so little study has been made on the possibility of other tools, it was difficult to examine other material in museums that are more uncertain to have had a medical function. Illustrations are given of the basic instrument form because there was not financial support to spend months drawing all of the instruments and it defeats the point of the thesis as it is not intended to be a large catalogue of tools, but rather a means of demonstrating how instrument types can be used to ask questions about medical care. All instruments are slightly different from one another, either through size, decoration, material and/or design and the catalogue of instruments examined (Appendix 4) has descriptions of the more unusual ones. Overall, however, the instruments conform to the types described below.

Cauteries (*ferrum cadens, καυτήριον, καυτήρ*). Very few cauteries are known in the archaeological record because, according to Jackson, few probably would have been purpose made since they were simply a vehicle for transferring heat (1994b: 177-8). Most were probably made of iron as their Latin name suggests, many would have corroded, explaining the small numbers in the archaeological record. A special implement was developed for cauterisation of areas that were difficult to reach. A tube was placed over the hot cautery so that the skin of a non-infected area would not be burnt and the cautery would only be used on the infected area: "*Apud quosdam tamen positum est vel fictilem fistulam vel enodem scriptorium calamum in narem esse coiciendum, donec susum ad os perveniat*" (Cels. 7. 11). There are a few general reasons for the use of a cautery. It was used for haemostasis, or the stoppage of bleeding, and to remove unhealthy tissue or bone. The cauterisation of unhealthy tissue was done to allow for the healthy tissue to remain undamaged whilst the unhealthy area was being treated (Jackson 1994b: 178). Finally it could be used on boils and gangrene (Albucasis 1. 51-52). Since there were many shapes and sizes referred to in the written sources it is likely that doctors could have used a variety of instruments, such as double ended probes, and double simple probes as well as the spatula from a spatula probe to fit the size and shape of the area in need of treatment (Braadbaart 1994b: 54; Künzl 1983: 25-6; Milne 1907: 116-20).

Cupping Vessels (*cucurbitula, σικύα, κυάθος*). (Fig. 9) Celsus says that there is scarcely any malady in which blood may not be let, "*Sanguinem incisa vena mitti novum non est: sed nullem paene esse morbum, in quo non mittatur, novum est*" (2. 10. 1). Cupping vessels were made of a few materials. Those made of horn had a hole on the top that was used for creating a vacuum effect. Others were solid and a piece of burning lint was placed inside them to create a vacuum. Milne quotes Oribasius, who says that they could also be made of glass to measure the amount of blood that was removed from the body (1907: 102-3). Oribasius said that sometimes the lips of the vessel were flat, "*επιπεδα τα χειλεα*" and other times concave, "*σεσιμωμένα τὰ χείλεα*" (7. 16 in Milne 1907: 102). These instruments were used for both wet and dry cupping. For wet cupping a knife was used to make a small incision and then the vessel was placed over it, drawing out the tainted blood or infected matter. Wet cupping was also suggested for a prolapsed intestine by letting blood from the arm, "*Sanguis mitti ex brachio debet*" (Cels. 7. 20. 2). Dry cupping was used in the release of bad humours, and was suggested for headache and painful joints (Jackson 1994b: 182-4). According to Albucasis the vessels came in different sizes: large, medium and small depending on the specific areas of the body that might have required different shapes and sizes of the vessels (Spink and Lewis 1973: 46).

Forceps (*vulsella τριχολαβίς)* This instrument has many functions and basically acts as an extension of the fingers. They could have been used for personal hygiene and depilation. In Roman times their use was recommended only if the fingers were too big or weak to perform certain procedures because there was a fear that the forceps could scratch or damage healthy tissue, thereby causing or aggravating an infection (Jackson 1994b: 174). A variety of forceps have been found in the archaeological record and are mentioned in the literature. Most of the simple tweezers were made of a single strip of metal bent in the middle with straight edges (Fig. 10) or slightly turned-in edges, come of them are cast with finial decorations (Figs. 11-12). These could be used for both surgical and toilet purposes. Those with smooth jaws were recommended for epilation in granular conjunctivitis (Paul Aeg. 6. 13; Milne 1907: 91). They could also be used in the removal of bone splinters (Jackson 1994b: 174). They could also be used in the seizure of an ulcerated foreskin, "*Quae si cutem occupavit, protinus specillum subiciendum, eaque incidenda est; deinde orae vulsella prendendae*" (Cels. 6. 18. 3). With the exception of size, they are similar to many that have been found on chatelaines. Bliquez (1988: 50-1) believes that the size of the instrument is the key to its function whether it is surgical or toilet. In general anything under six centimetres was personal and anything over was surgical; however, this is not set in stone so to speak, and one really cannot say, unless the tool was obviously part of a chatelaine. Another problem with this is that forceps did not necessarily always have medical purposes, and some of the longer ones could have been tools for other purposes.

Toothed edges with fixation clamps are found on some types of forceps (myzon, vulsella, *μύδιον, σαρκολάβις*). The teeth were designed to make traction on an object (Figs. 13-14). They were applied to the removal of warts and partial excision of the uvula, or on tumours found on other areas of the body, "*tum vulsella tuberculum adprehensum iuxta radices praeciditur*" (Celsus *de med* 7. 30. 2; Künzl 1983: 18-19).

Some forceps have jaws that come out at an angle, rather than being placed straight on the end of the forcep handles (Fig. 14). These usually have concave jaws on the interior of the instrument and convex jaws on the exterior. Sometimes there are fine teeth at the end of the jaws. Although Paul of Aegina does not provide a separate name for these forceps, it is suggested by Milne that these were the type used when Paul of Aegina was discussing the plastic operation for an eyelid with trichiasis.

"*βλεφαροκατόχῳ μυδιῷ, τουτ' ἔστι πρὸς τὴν περιφέρειαν τοῦ βλεφάρου ἐσχατισμένῳ ἀνατείναντες τὸ περιττὸν δέρμα, σμιλίῳ ἀποκόπτουσι*" (Paul Aeg. 6. 8; Milne 1907: 97).

Dental forceps (*forfex, ὀδοντάγρα, ῥιζάγρα*) are designed more specifically for the task of tooth removal. They have powerful jaws sometimes with an indentation for the tooth, so the tooth would not be crushed during removal, which would have caused greater problems (Fig. 15). To create a stronger hold on the tooth the arms of the dental forceps were crossed in the centre and attached with a bolt (Jackson 1994b: 175-6).

For the removal of bone and missiles, such as arrow and spearheads, forceps were made with strong arms crossed in the centre and for an even greater grip the head of the forceps had serrated teeth (Fig. 16). In some cases the utility end of the tool was curved (Fig. 17)

The removal of the uvula was a common operation in the Roman period, so a specific type of forceps was designed to aid in its removal, called the *staphylagra*. These could also be used in a haemorrhoidectomy (Jackson 1994a: 168). The *staphylagra* (Fig. 18) were made of two arms joined in the centre and the jaws of the instrument were toothed in order to crush the uvula and clamp it down while another set of forceps was employed to twist the uvula off the soft pallet of the throat. If a patient was unable to handle the pain of the forceps, *staphylocaustes* (Fig. 19) were suggested for both the removal of the uvula (Paul Aeg. 6. 31) and for haemorrhoids, "ἣ τῷ σταφυλοκαύστῃ πρὸς τὰ χείλη περιθέντες ἑκάστην αἱμορροΐδα διὰ τοῦ βρόχου ἀποσφίγξομεν καταλείψαντες μίαν διὰ τὴν τοῦ περιττοῦ αἵματος ἐξοχέτευσιν" (Paul Aeg. 6. 79). These forceps were similar in design to the *staphylagra*, but rather than having toothed forceps they had ends with hollowed out centres in which to place a caustic medicament, used to burn the uvula or haemorrhoid. The uvula would die and eventually come off the back of the throat (Jackson 1994a: 169-70). The extant varieties of these have both straight and bowed arms; the straight arms are suggested for the throat and the bowed for external haemorrhoids (Jackson 1994b: 172).

Gynaecological and Gender specific instruments. As mentioned there were some instruments specifically designed for the male and female bodies. The catheter, discussed under syringes and tubes, was designed specifically for each sex. Soranus mentioned a number of implements developed specifically for gynaecological treatments and childbirth: vaginal specula (Fig. 20), uterine dilator, decapitating knife and a foetal hook (Fig. 21), that was used to remove the foetus from the body of the mother, to name a few. These tools were looked for by the author on the frontiers to see if the military doctors were prepared to care for the civilians or at least the soldiers' wives. These instruments, however, could be used to treat both the male and female bodies, as seen with the rectal speculum (ἐδοδιαστολεύς) (Braadbaart 1994a: 164; 1994b: 52). The design of the instrument had a handle and two prongs that would separate when the handle was squeezed (Fig. 22). This tool may have been used for the removal of weapons, to treat problems in the rectum, and it was also recommended for small women and girls as a vaginal specula.

Hooks. These were used for seizing and holding tissue, boils and tonsils (Milne 1907: 85-7). The two most common hooks were sharp and blunt forms. The sharp hooks (Fig. 23) (*hamulus acuti, uncus*, ἄγκιστρον) were made of a copper-alloy and used to hold open the margins of a wound, giving the surgeon room to operate (Jackson 1994b: 172; Milne 1907: 87). Blunt hooks (*hamus retusus*, τυφλάγκιστρον) were used in more delicate operations such as raising veins (Figs 24-25). In some instances the instrument has been found to have hooks on both ends (Fig. 26). The lithotomy hook (*uncus)* was a blunt hooked spoon or scoop roughened on one side and designed for removing stones from the bladder or urethra. The hook (Fig. 27) was rough on one side so that it could grab the calculus and a smooth side that would not harm the body. Some handles had slotted sockets for a knife that could be used for the first incision (Jackson 1994b: 173). Forked, or bifurcated, hooks (Fig. 28) were also used for this purpose because they have blunt ends, rather than sharp ones. For stone extraction Oribasius mentions two hooks: the *Λιθούλκος* (45.6.2 and 6 in Bliquez 1984: 120) was used like a miniature crow-bar, and the *Κιρσούλκος* (45.18.5 in Bliquez 1984: 121) was shaped like the Greek letter gamma, "ἄγκιστα τῶν σφόδρα μικροκαμπῶν, καλουμένων δὲ κιρσουλκῶν γαμμοειδῆ κατὰ τὴν καμπήν." These also show that a number of shapes were made to help aid in surgical procedures, but generally one must question whether all of these more specialised instruments were necessary for the doctor's kit, or if they could have functioned adequately with a sharp and blunt hook.

Medical Boxes (Fig. 29). The boxes used by doctors to carry medicaments are sometimes found in fortifications. It is difficult to say whether these were all meant for a doctor's use, as they could also have been used as paint cases, or for cosmetics and jewellery, for example. They were made out of a number of materials such as copper-alloy, ivory and wood. The wood ones were probably the least expensive to make, but also quite perishable, so very few remain. They were rectangular in shape ranging from seven to eight centimetres in length and about five centimetres wide and two centimetres deep. They had separate compartments covered with individual tops (Milne 1907: 170; Sobel 1991: 121-2). Another doctor's case was the cylindrical instrument case, about 20 centimetres long and one to two centimetres wide. These could only contain small number of instruments (Milne 1907: 168-9). There are representations of folding boxes used for containing surgical knives and scalpels. One example is on an inscription from the temple of Aesculapius from the Acropolis in Athens. The relief has an open box with scalpels and bone lifters carved on it (Milne 1907: 170).

Needles. Needles are important in a number of surgical procedures. There are two types mentioned, those with eyes, used for sewing bandages and suturing wounds and lacerations, and those with cylindrical handles that are made of copper-alloy with a hole in one end for a steel needle. Only the latter was examined in the study because it would be too difficult to make an identification between the surgical eyed-needles and those used for domestic purposes. Suturing needles would need a cutting edge, so they would have been made of steel. Many would have corroded, making it even more difficult to determine what they looked like (Braadbaart 1994b: 54; Jackson 1994b: 177). The handled needle (Fig. 30) was examined in this study because it is more substantial in design and easier to identify, and it was used for more varied procedures than suturing. There were a number of proposed uses for the handled needle: puncturing skin, perforating pustules and raising the skin off the eyeball (Cels. 5. 28. 19C; 5. 28. 4D; 6. 18. 9C).

The cataract needle (*acus*) (Fig. 31), was said to be pointed sufficiently to penetrate the eye, but not so narrow as to be unable to break up the cataract: "*Tum acus admovenda est, sic acuta, ut foret, non nimium tenuis*" (Cels. 7. 7. 14D; Jackson 1994b: 177; Künzl: 1983:

26-7; Milne 1907: 74-5). The operation seems to have been common, or at least known about, as Martial accuses one doctor of being very careless by stating that a gladiator had formally been an eye doctor, but technically he was still performing the same job, "*Oplomachus nunc es, fueras opthalmicus ante. Fecisti medicus quod facis oplomachus*" (8. 74).

Oculist Stamps (Fig. 32). These stamps are found in a number of sites throughout the empire, though the majority come from the north-western provinces. They are made of stone and have the name of the doctor and the ointment inscribed on the sides. As for their size and shape, the oculist stamps are generally square and about one or two centimetres wide and a few millimetres in depth. They were used more for pharmaceutical procedures, as a stamp to mark medicines for eye diseases (Jackson 1996: 2,240-3).

Ointment Pallet (Fig. 33) Although this is not a surgical instrument, it does have associations with pharmaceutical procedures and is found frequently in the archaeological record. The pallet is made of stone and often found with rubbing marks on one side (Milne 1907: 171). It is also possible that they were used for make-up and paints.

Probes. These instruments, also referred to as sounds, are the most common type of instruments overall. The probes were fabricated as a multi-purpose instrument that could be utilised in a number of surgical procedures, minor operations, pharmaceutical preparations, personal hygiene as well as non-medical procedures such as mixing paints.

Double Olivary End Probe (*διπύρηνος μήλη ἀμφίσμιλος*). This was also a simple instrument that had an olivary end placed on both terminations of its thin handle (Fig. 34).

The olivary ends could be used in pharmaceutical procedures to mix ointments. It was also possible to use it to create a drip effect much like a modern eye-dropper by placing a piece of cloth soaked in a liquid medicament above the olivary end, and squeezing the cloth so that the ointment would slide down over the termination and drip onto the area in need of the medicine. As a surgical implement the olivary end could be used to explore fistula, "*Ante omnia autem demitti specillum in fistulam convenit*" (Cels. 5. 28. 12 C), and for examining carious bone, "..*in carie quidem expedita cognito est. Specillum tenue in foramina demittitur, quod magis minusve intrando vel in summo cariem esse vel altius descendisse testatur*" (Cels. 8. 2. 3). Many (Fig. 34) have been found with a hole drilled through one of the olivary probes (in some cases both). The probe was used in the removal of anal fistula whereby an incision was made beneath the fistula. The probe with a drilled hole was used for holding string, much like the eye of a sewing needle. This probe was drawn up to its end in the incision, and the string was drawn through the incision when the probe was being removed (Jackson 1994b: 180; Künzl 1983: 27-8; Milne 1907: 55). "*Propriam etiamnum animadversionem desiderant eae, quae in ano sunt. In has demisso specillo ad ultimum eius caput incidi cutis debet, dein novo foramine specillum educi lino sequente, quod in aliam eius partem ob id ipsum perforatam coniectum sit*" (Cels. 7. 4. 4A). Few of these were found in the examination, but a number of probes have been found broken where only the olivary end survives; perhaps some of these were actually part of double olivary probes rather than spatula or spoon probes. The probe could also serve the same function as the single olivary end of the other probes.

<u>Double Simple Probe</u> (*specillum, ἀπυρηνομήλη*). This instrument is not recognised often in the archaeological record possibly because its simple design, consisting of a thin rod with two blunt ends (Fig. 35), can have easily been transfigured or mistaken for

another object. They were used in delicate probing and may even have served as a tiny cautery. Paul of Aegina suggests using the olivary end of a probe to cauterise eyelashes in the treatment of trichiasis or granular conjunctivitis, where the eyelid turns in upon itself and the lashes then scratch the eyeball (6. 14; Milne 1907: 57). It is possible that an olivary end to a probe might have been too large in certain instances for probing, so perhaps the double simple probe was employed. Furthermore, the pointed end of an ear probe could probably serve the same function, perhaps being another reason these are not found often in the archaeological record. Similar to this is the dipyrene, which looks like a double-ended olivary probe, but without the eye for thread (Fig. 36). It too was multi-functional acting as an ointment drip, cautery and even probe.

<u>Ear Probe</u> (*oricularium speculum, μηλωτίς*). (Fig.) These instruments are generally called ligulae; however, many museums also label spoon probes as ligulae, as do some writers (e. g. de la Bédoyère 1989: 67), so to be more specific they shall be referred to as ear probes in this thesis. There are two types those with flat ends (Fig. 37) and those with small round spoon-scoped ends (Fig. 38), and they are differentiated in their descriptions in Appendix 4. The ones that were studied were single instruments, without the round hooks for attachment onto chatelaines (Braadbaart 1994b: 54; Jackson 1994b: 181; Künzl 1983: 27-8; Milne 1907: 63). They have thin handles that terminate in blunt points one end, whilst the utility end has a small, flat slanted circular head which is generally quite small, but does sometimes measure to five or six millimetres in width, but can still fit into the ear. For medical purposes they were dipped in resin and could have been used to remove foreign bodies from the ear such as maggots, "*Ubi vero vermes orti sunt, si iuxta sunt, protrahendi oriculario specillo sunt*" (Cels. 6. 7. 5). They were suggested to aid in the

removal of linen placed in the incision of a haemorrhoid removal operation, "*Interpositis quinque aut sex diebus oriculario specillo linamenta educenda*" (Cels. 7. 30. 3D).

Spatula probe (*spathomele, σπαθομήλη*). The instrument consists of a long thin handle, the sizes are various, but they tend to range from roughly 6 to 15 centimetres with a spatula on one end of its handle and an olivary probe on its other end, indicating its multi-functionality. The spatula is usually leaf-shaped and tends to be flat on one side and slightly rounded on the other (Fig. 39). Some spatula ends are quite thin, perhaps five or six millimetres in width, whilst others are short and blunt. Some have more of a rectangular shape to them (Fig. 40) and others have a spatulat blade on both ends (Fig. 41). It could be used for spreading medicaments on infected areas of the body as well as mixing medicines on an ointment pallet. Sometimes the spatula could be used as a cautery, as Soranus mentions using it on the umbilical cord "*τοῦ πλάτεος τῆς μήλης*" (*Gyn* 3. 27, Milne 1907: 60). It could also be used as a tongue depressor (Aetius 6 in Milne 1907: 59) and as a blunt dissector (Milne 1907: 60). The olivary end could be used in the same way as many already suggested for the double-ended olivary probe. These are only some of the medical uses for the tool, and they are also known to have been found with painting and writing materials (Allison 1997: 80-1).

Spoon Probe (*cyathiscomele)*. This is similar to the spatula probe, but has a narrow leaf shaped spoon in place of the spatula (Fig. 42). They also have the same olivary end as spatula probes. For pharmaceutical purposes the spoon was used to remove medicines from their flasks, explaining the many different sizes of the spoon and handle. It might have been used to mix ointments as well. For surgery Milne suggests it might have been used as a curette (1907: 62). There is also the possibility that it was applied in lithotomy operations to help remove stones from the urethra; although there were special spoons made for this procedure which did not have an olivary end and had a deeper more rounded and sharper spoon already discussed (Jackson 1994b: 181; Milne 1907: 62).

Scalpel (*scalpelus, σμίλη*). This is one of the tools recommended most often in Roman surgical procedures (Braadbaart 1994b: 52; Jackson 1994b: 169-71; Künzl 1983: 15-16; Milne 1907: 27). The remains of the instrument, usually just the handle, are found throughout the empire (Figs. 43-46). The handles are usually rectangular, with a blunt leaf shaped blade on one end that was recommended in operations requiring blunt dissections. The opposite end had a slot for a steel blade, or perhaps iron, archaeological record not certain. The steel from Noricum was said to be of the highest quality for blades, "*ἐκ σιδήρου δὲ ἔστω τοῦτο τοῦ καλλίστου, οἷον περ τὸ Νωρικόν ἐστιν*" (Galen 2. 682 K). There were a number of different shapes to the blade but the most common seems to have been the bellied or convex form (Jackson 1994b: 170). Amongst numerous applications, it could be used to incise skin that had become badly infected: "*Luxata igitur, in quacumque parte corporis sunt, quam primum sic curari debent, ut, qua dolor est, ea scalpello cutis crebro incidatur*" (Cels. 7. 1. 1). With anything that needed a sharp incision the scalpel was recommended. The instrument could also have other non-medical purposes, such as the possibility of leather working.

Shears (*forfex,* ψαλίς) (Braadbaart 1994b: 55). Overall these were not dealt with in this study because they could also have served a non-surgical function, even when they are found in relation to doctor's kits, as doctors would have needed them for cutting bandages and hair (Fig. 47). Celsus says that they could be used in a surgical manner for cutting mortified omentum in an abdominal wound: "*His conditis, omentum quoque* *considerandum est, ex quo, si quid iam nigri [emortui] est, forfice excidi debet* (7. 16. 3); *Fuerunt etiam qui omentum forfice praeciderent"* (Cels. 7. 21. 1C; Jackson 1994b: 171).

Surgical Knives (Fig. 32). Along with scalpels these are mentioned frequently through the medical literature, but very few survive in the archaeological record. One knife that has been identified is the lithotomy knife, a form with a hook on one end and a sharp knife on the other (Jackson 1994b: 170-1). Nonetheless, Celsus states that a scalpel could also be used for removing a stone (Cels. 7, 26, 2 N-O). Overall, however, there is a smaller number of surgical knives in the archaeological record and this might be because the scalpel had a number of blades and could have been used in the same capacity as the knife. Another knife that had a distinct function was the lancet (*phlebatom*) that was used in scarification during wet cupping (Fig. 48).

Syringes and Tubes. These are not commonly found because they are hollow and could quite easily have been misshapen, making them difficult to identify in the archaeological record. Celsus says that the tube either had upturned lips on one end or a collar around the middle so that the instrument would not become lost within the body: "*vel recurvatis in exteriorem partem labris, vel in media circumsurgente quandam mora ne tota intus delabi possit*" (7. 15. 2). This might have been a problem with a dropsical patient who had tubes placed in his abdomen for draining water. Catheters are also found within the confines of military sites; these are important for helping aid urination when the bladder was blocked by a calculus. The catheters were designed for both the male and the female body, thereby making them gender specific instruments. The males' were more "S" shaped and long (Fig. 49), whilst the females' (Fig. 50) were shorter and straighter (Jackson 1994b: 185). Three sizes were recommended for men and two for women. For men they were 15, 12 and nine fingerbreadths, while women were nine and six fingerbreadths in length. The differences in the male and female body designated the need for a gender specific design for the catheters. The instruments are basically hollow tubes with one end open like a straw and the other, which is to be inserted in the urinary tract, had a small hole on the side of the tube, rather than on the top, because this would allow for the top to have been rounded and inserted with more care.

The tube could also have been used as a clyster or syringe by attaching a bag or pouch to one end and squeezing it to introduce medicines into the body (Figs. 51-52). Sometimes an ear syringe is mentioned or *clyster oricularis*. It seems that this may have been worked by a plunger rather than a bladder. The medicament would have been placed in the tube in this instance and then a solid plunger would push the medicament through a small hole at the opposite end (Jackson 1994b: 187; Milne 1907: 105). There was a *pyoilkos* mentioned by Heron in his *Pneumatica* (2. 18). It was a hollow injection pipe that was attached to a reservoir tube equipped with a close fitting plunger, itself a plugged tube. It was recommended for inserting liquids into an orifice of the body and also for drawing out infectious liquids from the body. It seems, however, that the *cannula* (hollow tube) with a stopper was more commonly used (Bliquez and Oleson 1994: 83-103).

Tools for battle wounds. There were special instruments designed for the removal of missiles and arrowheads, but these too are not very common because other instruments, knives, probes and forceps, are also recommended for battle wound operations. The trepan with straps was developed for trepanation (Fig. 53); however, the instruments could also be used for the removal of missiles from the bone. If the weapon had become lodged in a bone, the bone was drilled around the outer edges of the missile to make a larger area around the weapon, which could be removed without damaging or splintering the bone, something that posed a threat if the weapon was pulled directly out of the bone. Furthermore, a bone cut with smooth edges would heal more easily. Another suggestion for avoiding further tissue damage was to place reeds around the barbed edges of the missile head, thereby protecting the tissue from being damaged even further when the missile was removed. Two other instruments developed for the removal of implements were mentioned by Celsus. The spoon of Diocles is a much discussed instrument but no positively identifiable example is extant. No examples exist in the archaeological record. Celsus says this instrument was developed to remove wide barbed missiles. According to Celsus the tool was constructed in two parts; one side had a long narrow scoop with a hole in the bottom to catch the pointed end of the missile and the sides of the instrument were turned inwards to keep the barbed ends of the arrow or spear from damaging the flesh upon removal of the weapon. The second part was a smooth blade basically placed behind the unprotected side of the spoon: "*Evellendum est ergo genere quodam ferramenti, quod Diocleum cyathiscum Graeci vocant, quonicam auctorem Dioclen habet*" (Cels. 7. 5. 3 A-B). The second instrument mentioned by Celsus is said to have been shaped like a Greek letter; however there is a lacuna in the text that states which Greek letter it is. However, it is possible that the letter Celsus was describing was an upsilon because the description of how the instrument functioned sounds as if it might have been a speculum. The tool was supposed to spread the skin so the doctor could extract the weapon with greater ease: "*Sed inde aperta via, caro diduci debet ferramento ad similitudinem facto Graecae litterae ... deinde*" (Cels. 7. 5. 2 B; Jackson 1994b: 189-90). He also suggests pushing missiles through the rest of their course or through a counter-opening, rather than pulling the missile out through the place where it entered the body: "*Saepius itaque ab altera parte, quam ex qua venit, recipienda et praecipue quia fere spiculis cingitur, quae magis laniant,* *si retrorsus quam si contra eximatur"* (Cels. 7. 5. 2 A-B). This, he felt, might cause less damage, but how often this procedure was practised cannot be said (Jackson 1994b: 189). It may be expected that these more intricate tools would be found on military sites; however, with the exception of a rectal specula from Vechten, no other has been found, implying that surgeons could probably rely on their standard kit for more procedures.

Tools for bone operations. These operations were treated like a craft such as carpentry rather than completely surgical. Book Eight of Celsus' *de Medicina* described the tools used for bone surgery and he describes it like a craft. The tools recommended are often like carpentry tools and Jackson says that there may have been tools for bone surgery made to order, carpentry tools acquired by medical personnel, or carpentry tools used by doctors to make splints (Jackson 1994b: 190-5; Milne 1907: 121-36). The only tool that was found in a military context was the crown trephine, already mentioned for missile removal, from Bingen (Como 1925), and some tools to lift bones (Fig. 54). The crown trephine was used to saw out small discs of carious bone. There were also a few others from the tomb at Bingen four bone levers and an elevator rasp.

The saw was a necessary tool used in amputations, but this practice was only recommended as the final choice in medical emergencies. Overall the tools for bone work are hard to identify because they were more likely to have been made of iron and mistaken for carpentry tools.

APPENDICES FOUR-TEN
Tables of medical instruments from each of the relevant provinces

The following six appendices are lists of medical tools gathered through field-work and publications. The appendices are divided by province. Each is sub-divided into tables according to fortification, and each instrument has its own entry. The instrument entry provides information about its inventory number, followed by a museum symbol (list of abbreviations). This is followed by its size and material. An illustration number is given, provenance if known, and a plan of the fortification showing its location. Additional publication information and descriptions are provided when necessary.

APPENDIX FOUR
Medical Instruments from Germania Inferior

TABLE ONE
Neuss, Novaesium
Legionary Fortress

1. Scalpel Inv. No. 6024, GI 1, L NA, CA Il. 43-45 PR. South Section of the camp Lehner 1904: 401, Nr. 11-Tab. 25 Fig. 31	2. Scalpel Inv. No. 10952, GI 1 L NA, CA Il. 43-45 PR Hospital, Fig. 68, Nr. 1 Lehner 1904: 401, Nr. 11-Tab 25 Fig. 32	3. Scalpel Inv. No. 11846, GI 1 L NA, CA Il. 43-45 PR. NA Lehner 1904: 401, Nr. 11-Tab. 25 Fig. 33
4. Scalpel Inv. No 12660, GI 1 L. NA, CA Il. 43-45 PR. Hospital, Fig. 68, Nr. 1 Lehner 1904: 401	5. Scalpel Inv. No 1365, GI 1 L. 8.5, CA Il. 43-45 PR. Hospital, Fig. 68, Nr. 1 Watermann 1978: Nr. 1 -Tab. 3 Nr. 33	6. Scalpel Inv. No. 1366, GI 1 L. 7.5, CA Il. 43-45 PR. Hospital, Fig. 68, Nr. 1 Watermann 1978: Nr. 2-Tab. 3 Nr. 31
7. Surgical Knife Inv. No. NA, GI 1 L. 12.5, CA Il. 46 PR. NA Watermann 1978: Nr. 20	8. Pterygotom Inv. No. 1383. GI 1 L. NA, CA Il. 60 PR. NA Watermann 1978: Nr. 18-Fig. 7	9. Spatula Probe Inv. No. 8037, GI 1 L. 7.7, CA Il. 39-40 PR. Barrack 30, Fig. 68, Nr. 7 Lehner 1904: 400, Nr. 1-Tab. 25 Fig. 1
10. Spatula Probe Inv. No. 12607, GI 1 L. NA, CA Il. 39-40 PR. Building 125, Fig. 68, Nr. 8	11. Spatula Probe Inv. No. 12608, GI 1 L. NA, CA Il. 39-40 PR. Building 125, Fig. 68, Nr. 8	12 Spatula Probe Inv. No. 12497, GI 1 L. NA, CA Il. 39-40 PR. Hospital, Fig. 68, Nr. 1

Lehner 1904: 400, Nr. 2-Tab. 25 Fig. 2	Lehner 1904: 400, Nr. 2-Tab. 25 Fig. 2	Lehner 1904: 400, Nr. 2-Tab. 25 Fig. 3
13 Spatula Probe Inv. No. 12498, GI 1 L. NA, CA Il. 39-40 PR. Hospital, Fig. 68, Nr. 1 Lehner 1904: 400, Nr. 2-Tab. 25 Fig. 4	14 Spatula Probe Inv. No. 12500, GI 1 L. NA, CA Il. 39-40 PR. Hospital, Fig. 68, Nr. 1 Lehner 1904: 400, Nr. 2 –Tab. 25 Fig. 5	15 Spatula Probe Inv. No. 12502, GI. 1 L. NA, CA Il. 39-40 PR. Hospital, Fig. 68, Nr. 1 Lehner 1904: 400, Nr. 2-Tab. 25 Fig. 6
16. Spatula Probe Inv. No. 12503, GI 1 L. NA, CA Il. 39-40 PR. Hospital, Fig. 68, Nr. 1 Lehner 1904: 400, Nr. 2 –Tab. 25 Fig. 7	17. Spatula Probe Inv. No. 10992, GI 1 L. 33.5, CA Il. 39-40 PR. Hospital, Fig. 68, Nr. 1 Lehner 1904: 400, Nr. 5-Tab. 25 Fig. 11	18 Spatula Probe Inv. No. 13272, GI 1 L. NA, CA Il. 39-40 PR. Hackenberg, outside the fortress Lehner 1904: 400
19. Spatula Probe Inv. No. 6020, GI 1 L. NA, CA Il. 39-40 PR. NA Lehner 1904: 400	20 Spatula Probe Inv. No. 6610, GI 1 L. NA, CA Il. 39-40 PR. NA Lehner 1904: 400	21 Spatula Probe Inv. No 9969, GI 1 L. NA, CA Il. 39-40 PR. NA Lehner 1904: 400
22. Spatula Probe Inv. No 1368, GI 1 L 14.1, CA Il. 39-40 PR. NA Watermann 1978: Nr. 13	23. Spatula Probe Inv. No. 1367, GI 1 L 15.4, CA Il. 39-40 PR. NA Watermann 1978: Nr. 14	24 Spatula Probe Inv. No. 1364, GI 1 L. 14.3, CA Il. 39-40 PR. NA Watermann 1978: Nr. 15
25 Spoon Scoop Inv. No. 13749, GI 1 L. 18.3, CA Il. NA PR. Tribune's House Nr 54, Fig. 68, Nr. 9 Lehner 1904: 400, Nr. 4-Tab. 25 Fig. 10	26. Spoon Probe Inv. No. 5308, GI 1 L. NA, CA Il. 42 PR. NA Lehner 1904: 400, Nr. 5-Tab. 25	27. Spoon Probe Inv. No. 5405, GI 1 L. NA, CA Il. 42 PR. NA Lehner 1904: 400, Nr. 5
28. Spoon Probe Inv. No. 6021, GI 1 L. NA, CA Il. 42 PR. NA Lehner 1904: 400, Nr. 5	29. Spoon Probe Inv. No. 6022, GI 1 L. NA, CA Il. 42 PR. NA Lehner 1904: 400, Nr. 5	30 Spoon Probe Inv. No 6934, GI 1 L. NA, CA Il. 42 PR. Building 41?, Fig. 68, Nr. 5? Lehner 1904: 400, Nr. 5
31 Spoon Probe Inv. No. 6936, GI 1 L. NA, CA Il. 42 PR. Building 41?, Fig. 68, Nr. 5 Lehner 1904: 400, Nr. 5	32 Spoon Probe Inv. No. 7837, GI I L. NA, CA Il. 42 PR. Barracks 46-52, Fig. 68, Nr. 2 Lehner 1904: 400, Nr. 5	33. Spoon Probe Inv. No. 9670, GI 1 L. NA, CA Il. 42 PR. Provincial Settlement Lehner 1904: 400, Nr. 5
34 Spoon Probe Inv. No. 9671, GI 1 L. NA, CA Il. 42 PR. Provincial Settlement Lehner 1904: 400, Nr. 5	35. Spoon Probe Inv. No. 9968, GI 1 L. NA, CA Il. 42 PR. NA Lehner 1904: 400, Nr. 5	36 Spoon Probe Inv. No. 10627, GI 1 L. NA, CA Il. 42 PR. Hospital, Fig. 68, Nr. 1 Lehner 1904: 400, Nr. 5
37 Spoon Probe Inv. No. 12499, GI 1 L. NA, CA	38. Spoon Probe Inv. No. 12274, GI 1 L. NA, CA	39 Spoon Probe Inv. No. 13813, GI 1 L. NA, CA

Il. 42 PR. Hospital, Fig. 68, Nr. 1 Lehner 1904: 400, Nr. 5	Il. 42 PR. Building 90 Principia, Fig. 68, Nr. 3 Lehner 1904: 400, Nr. 5	Il. 42 PR. N-W Barracks, Fig. 68, Nr. 10 Lehner 1904: 400, Nr. 5
40. Spoon Probe Inv. No. 1412, GI I L. 7.0, CA Il. 42 PR. NA Watermann 1978: Nr. 16	41. Spoon Probe Inv. No. NA, GI 1 L. 6.8, CA Il. 42 PR. NA Watermann 1978: Nr. 17	42 Forceps Inv. No. 7929, GI 1 L. 6.4, CA Il. 11-12 PR. Building 46-52, Fig. 68, Nr. 2 Lehner 1904: 400, Nr. 8-Tab. 25 Fig. 18
43 Forceps Inv. No. 6919, GI 1 L. NA, CA Il. 11-12 PR. NA Lehner 1904: 400	44. Forceps Inv. No. 10611. GI 1 L. 12.0, CA Il. 11-12 PR. Building 44, Fig. 68, Nr. 11 Lehner 1904: 400, Nr. 8-Tab. 25 Fig. 19	45. Forceps Inv. No. 1999, GI 1 L. 8.6, CA Il. 11-12 PR. NA Watermann 1978: Nr. 3
46. Forceps Inv. No. NA, GI 1 L. 8.0, CA Il. 11-12 PR. NA Watermann 1978: Nr. 4	47. Forceps Inv. No. 1397, GI 1 L. 12 CA Il. 11-12 PR. NA Watermann 1978: Nr. 5	48. Forceps Inv. No. NA, GI I L. 10.0, CA Il. 11-12 PR. NA Watermann 1978: Nr. 6
49. Ear Probe Inv. No. 5379, GI 1 L. NA, CA Il. 37 PR. South Section, 1888 Lehner 1904: 400, Nr. 9	50. Ear Probe Inv. No. 5403, GI 1 L. NA, CA Il. 37 PR. South Section, 1888 Lehner 1904: 400, Nr. 9	51 Ear Probe Inv. No. 5404, GI 1 L. NA, CA Il. 37 PR. South Section, 1888 Lehner 1904: 400, Nr. 9
52 Ear Probe Inv. No. 6023, GI 1 L. NA, CA Il. 37 PR. Principia, Fig. 68, Nr. 3 Lehner 1904: 400, Nr. 9	53. Ear Probe Inv. No. 6226, GI 1 L. NA, CA Il. 37 PR. Principia, Fig. 68, Nr. 3 Lehner 1904: 400, Nr. 9	54 Ear Probe Inv. No. 6229, GI 1 L. NA, CA Il. 37 PR. Principia, Fig. 68, Nr. 3 Lehner 1904: 400, Nr. 9
55. Ear Probe Inv. No. 6612, GI 1 L. NA, CA Il. 37 PR. Principia, Fig. 68, Nr. 3 Lehner 1904: 400, Nr. 9	56 Ear Probe Inv. No. 6613, GI 1 L. NA, CA Il. 37 PR. Principia, Fig. 68, Nr. 3 Lehner 1904: 400, Nr. 9	57 Ear Probe Inv. No. 6935, GI 1 L. NA, CA Il. 37 PR. Principia, Fig. 68, Nr. 3 Lehner 1904: 400, Nr. 9
58 Ear Probe Inv. No. 7836, GI 1 L. NA, CA Il. 37 PR. Building 46-52, Fig. 68, Nr. 2 Lehner 1904: 400, Nr. 9	59. Ear Probe Inv. No. 7837, GI 1 L. NA, CA Il. 37 PR. Building 46-52, Fig. 68, Nr. 2 Lehner 1904: 400, Nr. 9	60. Ear Probe Inv. No. 8172, GI 1 L. NA, CA Il. 37 PR. Building 46-52, Fig. 68, Nr. 2 Lehner 1904: 400, Nr. 9
61 Ear Probe Inv. No. 8298, GI 1 L. NA, CA Il. 37 PR. NA Lehner 1904: 400, Nr. 9	62. Ear Probe Inv. No. 9275, GI 1 L. NA, CA Il. 37 PR. Building 55, Fig. 68, Nr. 12 Lehner 1904: 400, Nr. 9	63. Ear Probe Inv. No. 9903, GI 1 L. NA, CA Il. 37 PR. Building 88, Fig. 68, Nr. 6 Lehner 1904: 400, Nr. 9
64. Ear Probe Inv. No. 9907, GI 1 L. NA, CA	65 Ear Probe Inv. No. 10622, GI 1 L. NA, CA	66. Ear Probe Inv. No. 10623, GI 1 L. NA, CA

Il. 37 PR. Building 88, Fig. 68, Nr. 6 Lehner 1904: 400, Nr. 9	Il. 37 PR. Hospital, Fig. 68, Nr. 1 Lehner 1904: 400, Nr. 9	Il. 37 PR. Hospital, Fig. 68, Nr. 1 Lehner 1904: 400, Nr. 9
67 Ear Probe Inv. No. 11778, GI 1 L. NA, CA Il. 37 PR. NA Lehner 1904: 400, Nr. 9	68. Ear Probe Inv. No. 11845, GI 1 L. NA, CA Il. 37 PR. NA Lehner 1904: 400, Nr. 9	69. Ear Probe Inv. No. 12275, GI 1 L. NA, CA Il. 37 PR. Building 60, Fig. 68, Nr. 13 Lehner 1904: 400, Nr. 9
70. Scratcher Inv. No. 1402, GI 1 L. 32.0, CA Il. NA PR. NA Watermann 1978: Nr. 19	71. Olivary End Probe Inv. No. 1396, GI 1 L. 9.0, CA Il. NA PR. NA Watermann 1978: Nr. 7	72. Olivary End Probe Inv. No. 1370, GI 1 L. 12.2, CA Il. NA PR. NA Watermann 1978: Nr. 8
73. Olivary End Probe Inv. No. 1369, GI 1 L. 13.4, CA Il. NA PR. NA Watermann 1978: Nr. 9	74. Olivary End Probe Inv. No. 1371, GI 1 L. 12.4, CA Il. NA PR. NA Watermann 1978: Nr. 10	75 Olivary End Probe Inv. No. 1361, GI 1 L. 10.4, CA Il. NA PR. NA Watermann 1978: Nr. 11
76. Olivary End Probe Inv. No. 1363, GI 1 L. 14.2, CA Il. NA PR. NA Watermann 1978: Nr. 12	77. Olivary End Probe Inv. No. 7838, GI 1 L. 11.1, CA Il. NA PR. Building 46-52, Fig. 68, Nr. 2 Lehner 1904: 400, Nr. 7-Tab. 25 Fig. 17	78 Olivary End Probe Inv. No. 6524, GI 1 L. NA, CA Il. NA PR. NA Lehner 1904: 400, Nr. 3-Tab. 25 Fig. 8
79 Olivary End Probe Inv. No. 11335, GI 1 L. NA, CA Il. NA PR. NA Lehner 1904: 400, Nr. 3-Tab. 25 Fig. 9	80. Ointment Pallet Inv. No. 5344, GI 1 7.0 x 6.0, Stone Il. 33 PR. NA Lehner 1904: 402, Nr. 13-Tab. 25 Fig. 35 and Watermann 1978: Nr. 21-Fig. 3 Nr. 36	81. Ointment Pallet Inv. No. 6237, GI 1 8.0x5.5, Stone Il. 33 PR. Building 143, Fig. 68, Nr. 14 Lehner 1904: 402, Nr. 13-Tab. 25 Fig. 35 and Watermann 1978: Nr. 22-Fig. 3 Nr. 37
82 Ointment Pallet Inv. No. 6705, GI 1 L. NA, Stone Il. 33 PR. NA Lehner 1904: 402, Nr. 13	83 Ointment Pallet Inv. No. 7736, GI 1 L. NA, Stone Il. 33 PR. Buildings 46-52, Fig. 68, Nr. 2 Lehner 1904: 402, Nr. 13	84 Ointment Pallet Inv. No. 11857, GI 1 8.0 x 6.0 Stone Il. 33 PR. Buildings 18-20, Fig. 68, Nr. 15 Lehner 1904: 402, Nr. 13 and Watermann 1978: Nr. 23-Fig. 3 Fig. 3 Nr. 38

TABLE TWO
Nijmegen, Noviomagus
Legionary Fortress

1. Scalpel Inv. No. Nr 2452, NA L. 25.0, CA Il. 42-45 PR. Hunnerberg Grave Field Grave 4	2. Scalpel Inv. No. Nha 14a, GI 2 L. 10.7, CA Il. 42-45 PR. Hunnerberg Sarcophagus 1 Künzl 1983: 93, Fig. 74-75	3. Scalpel Inv. No. NHa 14b, GI 2 L. NA, CA Il. 42-45 PR. Hunnerberg Sarcophagus 1 Künzl 1983: 93, Fig. 74-75

Vermeulen 1932: 134-144		
4. Scalpel with Iron Blade Inv. No. Nr 16, GI 2 L. NA, CA Il. 42-45 PR. Nijmegen Sarcophagus Grave 1 Künzl 1983: 93, Fig. 74-75	5. Scalpel with Iron Blade Inv. No. Nr. 17, GI 2 L. NA, CA Il. 42-45 PR. Nijmegen Sarcophagus Grave 1 Künzl 1983: 93, Fig, 74-75	6. Sharp Hook Inv. No. Nr 11, GI 2 L. NA, CA Il. 23 PR. Nijmegen Sarcophagus Grave 1 Künzl 1983: 93, Fig. 74-75
7. Bifurcated Hook Inv. No. Nr 12, GI 2 L. NA, CA Il. 28 PR. Nijmegen Sarcophagus Grave 1 Künzl 1983: 93, Fig. 74-75	8. Handle for a Double Needle Inv. No. Nr 13, GI 2 L. NA, CA Il. NA PR. Nijmegen Sarcophagus Grave 1 Künzl 1983: 93, Fig. 74-75	9. Oculist Stamp Inv. No. ID 3, GI 2 3.7 x 3.4, Slate Il. 32 PR. Environs of Nijmegen Braadbaart 1994: 165, Nr, 1-Pl. 3; Feugère et al 1986: 479, Nr. 9
10. Oculist Stamp Inv. No. NA L. NA Il. 32 PR. NA Feugère, et al 1986: 479, Nr. 10	11. Forceps Inv. No. Nha 10, GI 2 L. NA, CA Il. 11-12 PR. Hunnerberg 1840, Sarcophagus 1 Künzl 1983: 93, Fig. 74-75	12. Spoon Probe Inv. No. Nr. 367, GI 2 L. NA, CA Il. 42 PR. Hunnerberg, Grave Field Grave 60 Vermeulen 1932: 134
13. Spoon Probe Inv. No. 235, GI 3 L. NA, CA Il. 42 PR. Nijmegen Sarcophagus Grave 1 Künzl 1983: 97	14. Spoon Probe Broken Inv. No. Nr 14, GI 2 L. 10.7, CA Il. 42 PR. Nijmegen Sarcophagus Künzl 1983: 93, Fig. 74-75	15 Spatula Probe Inv. No. NA, NA L. 11.1, CA Il. 39-40 PR. Hunnerberg, Grave Field Grave 8 Vermeulen 1932: 146
16. Spatula Probe Inv. No. NS 273, GI 3 L. 15.8, CA Il. 39-40 PR. River Waal Braadbaart 1994a: 165. Nr.1-Pl. 4	17. Spatula Probe Inv. No. NAVVY 6, GI 2 L. 15.5, CA Il. 39-40 PR. Environs of Nijmegen Braadbaart 1994a: 165	18. Medical Box Inv. No. Nr 21, GI 2 L. NA, wood Il. 29 PR. Nijmegen Sarcophagus Grave 1 Künzl 1983: 93, Fig, 74-75
19. Ointment Pallet Inv. No. 235, GI 3 L. NA, Stone Il. 33 PR. Nijmegen Sarcophagus Künzl 1983: 97		

TABLE THREE
Bonn, Bonna
Legionary Fortress

1. Scalpel Inv. No. 20840, GI 4 L. 9.5, CA Il. 43-45 PR. Fabrica Bonner Berg outside fortress van Driel-Murray and Gechter 1984: 62, Nr. 69, Tab. 17	2. Oculist Stamp Inv. No. 2345 a-c, GI 4 3.5x 2.9 Stone Il. 32 PR. Grave on the Heerstrassel Künzl 1983: 86, Pl. 61-62	3. Uvula Forceps Inv. No. NA, GI 4 L. 18.6, CA Il. 18 PR. NA Lindenschmit 1889: Tab. 22 Nr. 7
4. Forceps Inv. No. 22039, GI 4 L. 10.0, CA	5. Spatula Probe Inv. No. 7291, GI 4 L. 17.75	6. Spoon Probe Inv. No. 20837, GI 4 L. 16.0, CA

Il. 11-12 PR. Stiftplatz Künzl 1986b: 507, C 10	Il. 39-40 PR. Bonn Künzl 1986b: 507, C 9	Il. 42 PR. Fabrica Bonner Berg outside fortress van Driel-Murray and Gechter 1984: 62, Nr. 70, Tab. 17
7. Ear Probe Inv. Nr. 20841, GI. 4 L. 11.8, CA Il. 37 PR. Fabrica Bonner Berg outside fortress van Driel-Murray and Gechter 1984: 62, Nr. 71, Tab. 18	8. Ear Probe Inv. No. 20842, GI 4 L. 15.7, CA Il. 37 PR. Fabrica Bonner Berg outside fortress van Driel-Murray and Gechter 1984: 62, Nr. 72, Tab. 18	9. Medical box Inv. No. 4786, GI 4 13.9x 7.8x 2.2 Il. 29 PR. Bonn Künzl 1986b: 506, C5

TABLE FOUR
Vechten
Auxiliary Fort

1. Rectal Speculum Inv. No. VF 735, GI 2 15.5 x 8.2, CA Il. 22 PR. Vechten 1870 Braadbaart 1994a: 164, Nr. 1-Pl. 1	2. Scalpel Inv. No. f 1940/5, 11, GI 2 L. 8.8, CA Il. 43-45 PR. NA Braadbaart 1994a: 164	3. Shears Inv. No. VF 687, GI 2 L. 7.2, CA Il. 47 PR. NA Braadbaart 1994a: 165
4. Spatula Probe Inv. No. VF 674, GI 2 L. 12.4, CA Il. 39-40 PR. NA Braadbaart 1994a: 165	5. Spatula Probe Inv. No. VF 722, GI 2 L. 17.0, CA Il. 39-40 PR. NA Braadbaart 1994a: 165	6. Spatula Probe Inv. No. VF 725, GI 2 L. 16.8, CA Il. 39-40 PR. NA Braadbaart 1994a: 165
7. Spoon Probe Inv. No. VF 679, GI 2 L 16.1, CA Il. 42 PR. Vechten, 1869 Braadbaart 1994a: 166	8. Spoon Probe Inv. No. VF 730, GI 2 L. 13.5, CA Il. 42 PR. Vechten 1870 Braadbaart 1994a: 166	9. Spoon Probe Inv. No. VF 731, GI 2 L. 12.3, CA Il. 42 PR. Vechten 1870 Braadbaart 1994a: 166
10 Spoon Probe Inv. No. VF 732, GI 2 L. 13.4, CA Il. 42 PR. Vechten 1870 Braadbaart 1994a: 166	11 Spoon Probe Inv. No. VF 738, GI 2 L 16.7, CA Il. 42 PR. Vechten 1871 Braadbaart 1994a: 166	12 Ear Probe Inv. No. VF 677, GI 2 L. 12.0, CA Il. 37 PR. Vechten 1869 Braadbaart 1994a: 167
13. Ear Probe Inv. No. VF 678, GI 2 L 7.4, CA Il. 37 PR. Vechten 1869 Braadbaart 1994a: 167	14. Ear Probe Inv. No. VF 737, GI 2 L 7.2, CA Il. 37 PR. Vechten 1870 Braadbaart 1994a: 167	15. Ear Probe Inv. No. f 1940/5 134, GI 2 L. 13.9, CA Il. 37 PR. Vechten 1937 Braadbaart 1994a: 167
16. Ear Probe Inv. No. f 1940/5. 142, GI 2 L. 14.3, CA	17 Olivary End Probe Inv. No. VF 670, GI 2 L. 15.9. CA	

Il. 37 PR. Vechten 1937 Braadbaart 1994a: 167, There is a small perpendicular hook on the opposite end of the probe, rather than the typical straight blunt point.	Il. NA PR. Vechten 1869 Braadbaart 1994a: 166

TABLE FIVE
Valkenburg
Auxiliary Fort

1. Spatula Probe Inv. No. h 1991/9. 6086, GI 2 L 22.0, CA Il. 39-40 PR. NA Braadbaart 1994a: 166	2. Spoon Probe Inv. No. h1991/9.4888, GI 2 L. 18.5, CA Il. 42 PR. NA Braadbaart 1994a: 166
3. Olivary End Probe Inv. No. h 1991/9.5217, GI 2 L. 16.0, CA Il. NA PR. NA Braadbaart 1994a: 166	4. Ointment Pallet Inv. No. h 1991/9.3686, GI 2 8.9 x 5.7, Lydite Il. 33 PR. NA Braadbaart 1994a: 165

TABLE SIX
Rossum, Grinnes
Auxiliary Fort

1. Spoon Probe Inv. No. RM 252, GI 2 L 17.4, CA Il. 42 PR. Rossum 1881 Braadbaart 1994a: 165	2. Ear Probe Inv. No. RM 253, GI 2 L 11.0, CA Il. 37 PR. NA Braadbaart 1994a: 166

TABLE SEVEN
Alphen aan de Rijn, Albaniana
Auxiliary Fort

1. Spatula Probe Inv. No. h 1991/ 5.808, GI 2 L 17.0, CA Il. 39-40 PR. NA Braadbaart 1994a: 165

TABLE EIGHT
Kesteren, Carvo
Auxiliary Fort

1. Double Simple Probe Inv. No. e 1892/5.8, GI 2 L. 7.7, CA Il. 35

PR. NA Braadbaart 1994a: 166

TABLE NINE
Xanten
Civilian Settlement

1. Bone Knife Inv. No. NA, GI 5 L. 13.4, Iron and CA Il. NA PR. Room in the bath Künzl 1986: 494, 4; Künzl 1989/90: 147	2. Bone Knife Inv. No. NA, GI 5 L. 13.4, Iron and CA Il. NA PR. Room in the bath Künzl 1986: 494, 5; Künzl 1989/90 147	3. Scalpel Handle Inv. No. NA, GI 5 L. 9.9 Il. 43-45 PR. Room in the Bath Künzl 1986: 493, 1; Künzl 1989/90: 147. Instrument has silver inlay
4. Scalpel Handle Inv. No. NA, GI 5 L. 9.2 Il. 43-45 PR. Room in the Bath Künzl 1986: 493, 2; Künzl 1989/90: 147	5. Scalpel Handle Inv. No. NA, GI 5 L. 9.8 Il. 43-45 PR. Room in the Bath Künzl 1986: 493, 3; Künzl 1989/90: 147. Instrument has silver inlay	6. Spoon Probe Inv. No. 8561, GI 4 L. 17.5, CA Il. 42 PR. Room in the Civilian Bath Kunzl 1986: 507, C8. The spoon has *Corpirtus fec(it)* inscribed on it.

APPENDIX FIVE
Medical Instruments from Germania Superior

TABLE ONE
Mainz, Mogontiacum
Legionary Fortress

1. Scalpel Inv. No. NA, GS 1 L. 11.7, CA Il. 43-45 PR. NA	2. Scalpel Inv. No. 1, GS 1 L. 9.0, CA Il. 43-45 PR. NA	3. Surgical Knife Inv. No. NA, GS 2 L. 8.2, CA Il. 46 PR. NA Lindenschmit 1889: Nr. 12-Tab. 22
4. Bifurcated Hook Inv. No. NA, GS 1 L. 19.8, CA Il. 28 PR. NA	5. Foetal Hook Inv. No. NA, GS 2 L. 7.8, CA Il. 43 PR. 59 Lindenschmit 1889: Nr. 13-Tab. 22	6. Forceps Inv. No. NA, GS 2 L. 12.8, CA Il. 11-12 PR. NA Lindenschmit 1889: Nr. 16-Tab. 22
7. Spoon Probe Inv. No. D-339-AV-SLG, GS 1 L. NA, CA Il. 42 PR. NA	8. Spoon Probe Inv. No. NA, GS 1 L. 11.6, Bone Il. 42 PR. NA	9. Spoon Probe Inv. No. D-337-AV-SLG, GS 1 L. NA, CA Il. 42 PR. NA
10. Spoon Probe Inv. No. N 298 D 333, GS 1 L. 15.0, CA Il. 42 PR. NA	11. Spoon Probe Inv. No. NA, GS 2 L. 16.0, CA Il. 42 PR. NA Lindenschmit (1889) Nr. 10-Tab. 22	12. Spatula Probe Inv. No. D-334-AV-SLG, GS 1 L. 7.61, CA Il. 39-40 PR. NA
13. Spatula Probe Inv. No. 11530 (27), GS 1 L. 16.5, CA Il. 39-40 PR. NA	14. Spatula Probe Inv. No. 50, D-338, GS 1 L. 17.8, CA Il. 39-40 PR. NA	15. Spatula Probe Inv. No. NA, GS 1 L. 14.9, CA Il. 39-40 PR. NA
16. Spatula Probe Inv. No. NA, GS 2 L. 18.6, CA Il. 39-40 PR. NA Lindenschmit 1889: Nr. 15-Tab. 22	17. Needle Inv. No. DI 159, GS 1 L. 17.2, CA Il. 30 PR. NA	18. Needle Inv. No. D 385-AV-SLG, GS 1 L. 15.9, CA Il. 30 PR. NA
19. Needle Inv. No. D 384-AV-SLG, GS 1 L. 14.2, CA Il. 30 PR. NA	20. Needle Inv. No. D 386-AV-SLG, GS 1 L. 8.9, CA Il. 30 PR. NA	21. Needle Inv. No. D-381, GS 2 L. 11.0, CA Il. 30 PR. NA
22. Ear Probe Inv. No. NA, GS 2 L. 8.7, CA Il. 37 PR. NA Lindenschmit 1889: Nr. 8-Tab. 22	23. Oculist Stamp Inv. No. NA L. NA Il. 32 PR. NA Feugère et al 1986: 479, Nr. 18; E. 163; V. 8	24. Oculist Stamp Inv. No. NA L. NA Il. 32 PR. NA Feugère et al 1986: 479, Nr. 19; E. 32; V. 72

25. Oculist Stamp Inv. No. NA L. NA Il. 32 PR. NA Feugère et al 1986: 479, Nr. 20; E. 150; V. 164	26. Oculist Stamp Inv. No. NA L. NA Il. 32 PR. NA Feugère et al 1986: 479, Nr. 21; V. 226	27. Oculist Stamp Inv. No. NA L. NA Il. 32 PR. NA Feugère et al 1986: 479, Nr. 22; V. 278
28. Oculist Stamp Inv. No. NA L. NA Il. 32 PR. NA Feugère et al 1986: 479, Nr. 23; V. 279	29. Oculist Stamp Inv. No. NA L. NA Il. 32 PR. NA Feugère et al 1986: 481, Nr. 264	30. Broken Olivary End Probe Inv. No. NA L. 11.0, CA Il. NA PR. NA Behrens and Brenner 1911: 110 Nr. 119
31. Broken Olivary End Probe Inv. No. NA L. 8.2, CA Il. NA PR. NA Behrens and Brenner 1911: 110 Nr. 123	32. Handle of a Probe Inv. No. NA L. 5.5, CA Il. NA PR. NA Behrens and Brenner 1911: 110 Nr. 124	33. Broken Spoon Probe Inv. No. NA L. 9.4, CA Il. 32 PR. NA Behrens and Brenner 1911: 110 Nr. 125
34. Broken Forceps Inv. No. NA L. 8.0, CA Il. PR. NA Behrens and Brenner 1911: 110 Nr. 129		

TABLE TWO
Windisch, Vindonissa
Legionary Fortress

1. Forceps Inv. No. 3853, GS 3 L. 15.5, Iron Il. 15 PR. Schutthügel, Fig. 72, Nr. 1 Forceps joined together with one screw placed below the forceps' jaws. Döderlein 1973: 410, Pl. 4	2. Forceps Inv. No. 4196, GS 3 L. 17.0, Iron Il. 15 PR. Schutthügel, Fig. 72, Nr. 1 Forceps joined together with one screw placed below the forceps' jaws. Frolich 1910: 127, Fig. 17	3. Surgical Knife Inv. No. 31:1341, GS 3 L. 5.0, CA Il. 46 PR. Dätweiler, Fig. 72, Nr. 15
4. Scalpel Inv. No. 36:493, GS 3 L. 10.4, CA Il. 43-45 PR. Breite Fig. 72, Nr. 6 The scalpel has a spoon on its handle, rather than a blunt dissector.	5. Scalpel Inv. No. 35:1121, GS 3 L. 10.0, CA Il. 43-45 PR. Breite, Fig. 72, Nr. 10 This has a small blunt dissector.	6. Scalpel Inv. No. 35:1313, GS 3 L. 7.5, CA Il. 43-45 PR. Breite, Fig. 72, Nr. 10
7. Scalpel Inv. No. 18:08, GS 3 L. 9.4, CA Il. 43-45 PR. Meier Excavation, NA	8. Scalpel Inv. No. 32:2738, GS 3 L. 7.8, CA Il. 43-45 PR. Breite, Fig. 72, Nr. 8	9. Scalpel Inv. No. 33:801, GS 3 L. 7.11, CA Il. 43-45 PR. NA
10. Scalpel Inv. No. 1938:64, GS 3 L. 7.0, CA	11. Forceps Inv. No. 28:1882, GS 3 L. 9.6, CA	12. Forceps Inv. No, 22:08, GS 3 L. 11.7, CA

Il. 43-45 PR. Breite, Fig. 72, NR. 5	Il. 10 PR. Breite, Spillmann, Fig. 72, NR. 24 There are jagged teeth on the forceps.	Il. 11-12 PR. Schutthügel, Fig. 72, Nr. 1
13. Forceps Inv. No. 36:433, GS 3 L. 14.6, CA Il. 11-12 PR. Breite, Fig. 72, Nr. 6	14. Forceps Inv. No. 2190 g, GS 3 L. NA, CA Il. 11-12 PR. Schutthügel, Fig. 72, Nr. 1	15. Forceps Inv. No. 13:810, GS 3 L. 13.0, CA Il. NA PR. Schutthügel, Fig. 72, Nr. 1 There is an ear probe attached to the top of the forceps
16. Forceps Inv. No. 3369, GS 3 L. 12.5, CA Il. NA PR. Schutthügel, Fig. 72, Nr. 1 There is an ear probe attached to the top of the forceps	17. Forceps Inv. No. KAA 369.1, GS 3 L. NA, CA Il. 11-12 PR. NA	18. Forceps Inv. No. KAA 369.4, GS 3 L. NA, CA Il. 11-12 PR. NA
19. Forceps Inv. No. 23:365, GS 3 L. 12.6, CA Il. 11-12 PR. Schutthügel (west), Fig. 72, Nr. 1 There is a clamp to hold the ends together, plus it has jagged teeth that are turned inwards.	20. Spoon Probe Inv. No. 2183, GS 3 L. 18.2, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1	21. Spoon Probe Inv. No. 1937:3087, GS 3 L. 14.6, CA Il. 42 PR. Breite, Fig. 72, Nr. 4
22. Spoon Probe Inv. No. 34:1910, GS 3 L. 17.4, CA Il. 42 PR. Breite, Fig. 72, Nr. 11	23. Spoon Probe Inv. No. 35:600, GS 3 L. 17.8, CA Il. 42 PR. Breite, Fig. 72, Nr. 10	24. Spoon Probe Inv. No. 33:5945, GS 3 L. 14.2, CA Il. 42 PR. Breite, Fig. 72, Nr. 9
25. Spoon Probe Inv. No. NA, GS 3 L. 18.4, CA Il. 42 PR. NA	26. Spoon Probe Inv. No. NA, GS 3 L. 17.0, CA Il. 42 PR. NA	27. Spoon Probe Broken Inv. No. 23:529, GS 3 L. NA, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1
28. Spoon Probe Broken Inv. No. 2183, GS 3 L. NA, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1	29. Spoon Probe Broken Inv. No. 2183.41, GS 3 L. NA, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1	30. Spoon Probe Broken Inv. No. 2183.39, GS 3 L. NA, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1
31. Spoon Probe Broken Inv. No. 23:1145, GS 3 L. NA, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1	32. Spoon Probe Broken Inv. No. 23:361, GS 3 L. NA, CA Il. 42 PR. NA	33. Spoon Probe Broken Inv. No. 23:433, GS 3 L. 17.2, CA Il. 42 PR. Schutthügel (west), Fig. 72, Nr. 1
34. Spoon Probe Broken Inv. No. 23:407, GS 3 L. 14.3, CA Il. 42 PR. Schutthügel (east), Fig. 72, Nr. 1	35. Spoon Probe Broken Inv. No. 23:399, GS 3 L. 15.9, CA Il. 42 PR. Schutthügel (west), Fig. 72, Nr. 1	36. Spoon Probe Broken Inv. No. 23.395, GS 3 L. 15.3, CA Il. 42 PR. Schutthügel (east), Fig. 72, Nr. 1
37. Spoon Probe Broken Inv. No. 23.395, GS 3 L. NA, CA Il. 42	38. Spoon Probe Broken Inv. No. 23.5, GS 3 L. 12.9, CA Il. 42	39. Spoon Probe Broken Inv. No. 36.479, GS 3 L. NA, CA Il. 42

PR. Schutthügel (east), Fig. 72, Nr. 1	PR. Schutthügel, Fig. 72, Nr. 1	PR. Breite, Fig. 72, Nr. 6
40. Spoon Probe Broken Inv. No. 38.459, GS 3 L. NA, CA Il. 42 PR. NA	41. Spoon Probe Broken Inv. No. 35.511, GS 3 L. NA, CA Il. 42 PR. NA	42. Spoon Probe Broken Inv. No. 17.553, GS 3 L. NA, CA Il. 42 PR. NA
43. Spoon Probe Broken Inv. No. 21.78, GS 3 L. NA, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1	44. Spoon Probe Broken Inv. No. 19670, GS 3 L. NA, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1	45. Spoon Probe Broken Inv. No. 21:79, GS 3 Il. NA, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1
46. Spoon Probe Broken Inv. No. 13.831, GS 3 L. NA, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1	47. Spoon Probe Broken Inv. No. 14.81, GS 3 L. NA, CA Il. 42 PR. NA	48. Spoon Probe Broken Inv. No. 16.361, GS 3 L. NA, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1
49. Spoon Probe Broken Inv. No. 2193b, GS 3 L. 15.9, CA Il. 42 PR. NA	50. Spoon Probe Broken Inv. No. 2193c, GS 3 L. 14.1, CA Il. 42 PR. NA	51. Spoon Probe Broken Inv. No. 2193I, GS 3 L. NA, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1
52. Spoon Probe Broken Inv. No. 2193d, GS 3 L. 13.8, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1	53. Spoon Probe Broken Inv. No. 2193f, GS 3 L. NA, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1	54. Spoon Probe Broken Inv. No. 2193h, GS 3 L. NA, CA Il. 42 PR. NA
55. Spoon Probe Broken Inv. No. KAA 370.7, GS 3 L. NA, CA Il. 42 PR. NA	56. Spoon Probe Broken Inv. No. KAA 370.11, GS 3 L. NA, CA Il. 42 PR. NA	57. Spoon Probe Broken Inv. No. 2193g, GS 3 L. NA, CA Il. 42 PR. NA
58. Spoon Probe Broken Inv. No. 2193e, GS 3 L. NA, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1	59. Spoon Probe Broken Inv. No. 575, GS 3 L. NA, CA Il. 42 PR. NA	60. Spoon Probe Broken Inv. No. 61.1733, GS 3 L. NA, CA Il. 42 PR. Königsfelden, Fig. 72, Nr. 30
61. Spoon Probe Broken Inv. No. 61.2087, GS 3 L. NA, CA Il. 42 PR. Königsfelden, Fig. 72, Nr. 30	62. Spoon Probe Broken Inv. No. 63.1622, GS 3 L. NA, CA Il. 42 PR. Königsfelden, Fig. 72, Nr. 31	63. Spoon Probe Broken Inv. No. 66.522, GS 3 L. NA, CA Il. 42 PR. Breite, Fig. 72, Nr. 35-37
64. Spoon Probe Broken Inv. No. 67.5104, GS 3 L. NA, CA Il. 42 PR. NA	65. Spoon Probe Broken Inv. No. 27.25, GS 3 L. NA, CA Il. 42 PR. NA	66. Spoon Probe Broken Inv. No. 28:2302, GS 3 L. NA, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1
67. Spoon Probe Broken Inv. No. 29:979, GS 3 L. NA, CA Il. 42 PR. Breite, Spillmann, Fig. 72, Nr. 29	68. Spoon Probe Broken Inv. No. 25:240, GS 3 L. NA, CA Il. 42 PR. Breite, Spillmann, Fig. 72, Nr. 23	69. Spoon Probe Broken Inv. No. 31:1587, GS 3 L. NA, CA Il. 42 PR. Dätweiler, Fig. 72, Nr. 15
70. Spoon Probe Broken Inv. No. 52.63, GS 3 L. NA, CA Il. 42	71. Spoon Probe Broken Inv. No. 52.78, GS 3 L. NA, CA Il. 42	72. Spoon Probe Broken Inv. No. 52.92, GS 3 L. NA, CA Il. 42

PR. Schutthügel, Fig. 72, Nr. 1	PR. Schutthügel, Fig. 72, Nr. 1	PR. Schutthügel, Fig. 72, Nr. 1
73. Spoon Probe Broken Inv. No. 52.99, GS 3 L. NA, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1	74. Spoon Probe Broken Inv. No. 55.9, GS 3 L. NA, CA L. 42 PR. Schutthügel, Fig. 72, Nr. 1	75. Spoon Probe Broken Inv. No. 55.105, GS 3 L. NA, CA Il. 42 PR. Schutthügel, Fig. 72, Nr. 1
76. Spoon Probe Broken Inv. No. 59.8, GS 3 L. NA, CA Il. 42 PR. NA	77. Spoon Probe Broken Inv. No. 59.1867, GS 3 L. NA, CA Il. 42 PR. NA	78. Spoon Probe Bent Inv. No. 1879, GS 3 L. NA, CA Il. 42 PR. Portier Haus I, NA
79. Spoon Probe Bent Inv. No. 995, GS 3 L. NA, CA Il. 42 PR. NA	80. Spoon Probe Bent Inv. No. 507, GS 3 L. 13.1, CA Il. 42 PR. NA	81. Spoon Probe Bent Inv. No. 13.809, GS 3 L. NA, CA Il. 42 PR. NA
82. Spatula Probe Inv. No. 23:307, GS 3 L. 19.5, CA Il. 39-40 PR. Schutthügel (east), Fig. 72, Nr. 1	83. Spatula Probe Inv. No. 36:1038, GS 3 L. 18.2, CA Il. 39-40 PR. Breite, Fig. 72, Nr. 6	84. Spatula Probe Inv. No. 2345, GS 3 L. 18.5, CA Il. 39-40 PR. Schutthügel, Fig. 72, Nr. 1
85. Spatula Probe Inv. No. 52.102, GS 3 L. 17.9, CA Il. 39-40 PR. Schutthügel, Fig. 72, Nr. 1	86. Spatula Probe Inv. No. 4176, GS 3 L. 14.4, CA Il. 39-40 PR. Schutthügel, Fig. 72, Nr. 1	87. Spatula Probe Inv. No. 1940.4, GS 3 L. 16.9, CA Il. 39-40 PR. NA
88. Spatula Probe Inv. No. 36.49.4, GS 3 L. 18.7, CA Il. 39-40 PR. Breite, Fig. 72, Nr. 6	89. Spatula Probe Inv. No. 2945, GS 3 L. 18.5, CA Il. 39-40 PR. NA	90. Spatula Probe Inv. No. 260E, GS 3 L. 13.9, CA Il. 39-40 PR. Wernly-Acker Windisch, NA
91. Spatula Probe Inv. No. 23:324, GS 3 L. 19.9, CA Il. 39-40 PR. Schutthügel (west), Fig. 72, Nr. 1	92. Spatula Probe Inv. No. 56:204, GS 3 L. 19.8, CA Il. 39-40 PR. Breite, Fig. 72, Nr. 14 The handle is hollow and has a circular opening (4 mm wide) instead of an olivary probe.	93. Spatula Probe Inv. No. 23:427, GS 3 L. 14.6, CA Il. 39-40 PR. Schutthügel (west), Fig. 72, Nr. 1
94. Spatula Probe Inv. No. 35:1063, GS 3 L. 11.0, CA Il. 39-40 PR. Breite, Fig. 72, Nr. 10	95. Spatula Probe Inv. No. 996, GS 3 L. 12.3, CA Il. 39-40 PR. NA	96. Spatula Probe Inv. No. 23:2894, GS 3 L. 16.4, CA Il. 39-40 PR. NA
97. Spatula Probe Broken Inv. No. 36:530, GS 3 L. 10.9, CA Il. 39-40 PR. Breite, Fig. 72, Nr. 6	98. Spatula Probe Broken Inv. No. 55.83, GS 3 L. NA, CA Il. 39-40 PR. Schutthügel, Fig. 72, Nr. 1	99. Spatula Probe Broken Inv. No. 55.85, GS 3 L. NA, CA Il. 39-40 PR. Schutthügel, Fig. 72, Nr. 1
100. Spatula Probe Broken Inv. No. 52:297, GS 3 L. 3.0, CA Il. 39-40 PR. Schutthügel, Fig. 72, Nr. 1	101. Spatula Probe Broken Inv. No. 1376, GS 3 L. 5.0, CA Il. 39-40 PR. NA	102. Spatula Probe Broken Inv. No. 1373, GS 3 L. 6.0, CA Il. 39-40 PR. NA
103. Spatula Probe Broken Inv. No. 1370, GS 3 L. 4.9, CA	104. Spatula Probe Broken Inv. No. 1377, GS 3 L. NA, CA	105. Spatula Probe Broken Inv. No. 1374, GS 3 L. 4.5, CA

Il. 39-40 PR. NA	Il. 39-40 PR. NA	Il. 39-40 PR. NA
106. Spatula Probe Broken Inv. No. 1375, GS 3 L. NA, CA Il. 39-40 PR. NA	107. Spatula Probe Broken Inv. No. 263 g, GS 3 L. 5.9, CA Il. 39-40 PR. NA	108. Spatula Probe Broken Inv. No. 262 g, GS 3 L. 5.0, CA Il. 39-40 PR. NA
109. Spatula Probe Broken Inv. No. NA, GS 3 L. 13.5, CA Il. 39-40 PR. NA	110. Spatula Probe Broken Inv. No. 55.51, GS 3 L. 23.2, CA Il. 39-40 PR. Schutthügel, Fig. 72, Nr. 1	111. Spatula Probe Broken Inv. No. 69.221, GS 3 L. 13.9, CA Il. 39-40 PR. Windisch, Friedhof, Fig. 72, Nr. 43 It has *AeICO FECIT* inscribed on it.
112. Spatula Probe Broken Inv. No. 62.1006, GS 3 L. NA, CA Il. 39-40 PR. NA	113. Spatula Probe Broken Inv. No. 31:1687, GS 3 L. 14.4, CA Il. 39-40 PR. Dätweiler, Fig. 72, Nr. 14	114. Spatula Probe Broken Inv. No. 61.2737, GS 3 L. NA, CA Il. 39-40 PR. Königsfelden, Fig. 72, Nr. 30
115. Spatula Probe Broken Inv. No. 35:1101, GS 3 L. 5.0, CA Il. 39-40 PR. Breite, Fig. 72, Nr. 10	116. Spatula Probe Broken Inv. No. 35:669, GS 3 L. 6.0, CA Il. 39-40 PR. Breite, Fig. 72, Nr. 10	117. Spatula Probe Broken Inv. No. 35:819, GS 3 L. 7.6, CA Il. 39-40 PR. Breite, Fig. 72, Nr. 10
118. Spatula Probe Broken Inv. No. KAA 370.9, GS 3 L. NA, CA Il. 39-40 PR. NA	119. Spatula Probe Broken Inv. No. 27:209, GS 3 L. NA, CA Il. 39-40 PR. Breite, Spillmann, Fig. 72, Nr. 28	120. Spatula Probe Broken Inv. No. 23.361, GS 3 L. NA, CA Il. 39-40 PR. Schutthügel, Fig. 72, Nr. 1
121. Spatula Probe Broken Inv. No. 28:3646, GS 3 L. NA, CA Il. 39-40 PR. Breite, Spillmann, Fig. 72, Nr. 24	122. Spatula Probe Broken Inv. No. 5455, GS 3 L. NA, CA Il. 39-40 PR. Schutthügel, Fig. 72, Nr. 1	123. Spatula Probe Broken Inv. No. 6846, GS 3 L. NA, CA Il. 39-40 PR. Schutthügel, Fig. 72, Nr. 1
124. Spatula Probe Bent Inv. No. 35:765, GS 3 L. 16.5, CA Il. 39-40 PR. Breite, Fig. 72, Nr. 10	125. Spatula Probe Bent Inv. No. 52.563, GS 3 L. 16.8, CA Il. 39-40 PR. Schutthügel, Fig. 72, Nr. 1	126. Ear Probe Inv. No. KAA 365.5, GS 3 L. 15.9, CA Il. 37 PR. NA
127. Ear Probe Inv. No. KAA 365.7, GS 3 L. 15.5, CA Il. 37 PR. NA	128. Ear Probe Inv. No. KAA 365.6, GS 3 L. 15.6, CA Il. 37 PR. NA	129. Ear Probe Inv. No. KAA 367.1, GS 3 L. NA, CA Il. 37 PR. NA
130. Ear Probe Inv. No. KAA 367.2, GS 3 L. NA, CA Il. 37 PR. NA	131. Ear Probe Inv. No. KAA 367.8, GS 3 L. NA, CA Il. 37 PR, NA	132. Ear Probe Inv. No. KAA 367.4, GS 3 L. NA, CA Il. 37 PR. NA
133. Ear Probe Inv. No. KAA 367.5, GS 3 L. NA, CA Il. 37 PR. NA	134. Ear Probe Inv. No. KAA 367.9, GS 3 L. NA, CA Il. 37 PR. NA	135. Ear Probe Inv. No. KAA 367.10, GS 3 L. NA, CA Il. 37 PR. NA
136. Ear Probe	137. Ear Probe	138. Ear Probe

Inv. No. KAA 367.11, GS 3 L. NA, CA Il. 37 PR. NA	Inv. No. KAA 367.7, GS 3 L. NA, CA Il. 37 PR. NA	Inv. No. 55:100, GS 3 L. NA, CA Il. 37 PR. NA
139. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA	140. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA	141. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA
142. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA	143. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA	144. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA
145. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA	146. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA	147. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA
148. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA	149. Ear Probe Inv. No. 34:2844, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 11	150. Ear Probe Inv. No. 33:1667, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 9
151. Ear Probe Inv. No. 35:1333, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 10	152. Ear Probe Inv. No. 35:672, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 10	153. Ear Probe Inv. No. 35:327, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 10
154. Ear Probe Inv. No. 35:1129, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 10 It has a hook on its end rather than a point.	155. Ear Probe Inv. No. 52:562, GS 3 L. NA, CA Il. 37 PR. NA	156. Ear Probe Inv. No. 38:44, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 3
157. Ear Probe Inv. No. 40.12, GS 3 L. NA, CA Il. 37 PR. NA	158. Ear Probe Inv. No. 42.193, GS 3 L. NA, CA Il. 37 PR. NA	159. Ear Probe Inv. No. 42.195, GS 3 L. NA, CA Il. 37 PR. NA
160. Ear Probe Inv. No. 42.196, GS 3 L. NA, CA Il. 37 PR. NA	161. Ear Probe Inv. No. 52.96, GS 3 L. NA, CA Il. 37 PR. NA	162. Ear Probe Inv. No. 52.87, GS 3 L. NA, CA Il. 37 PR. NA
163. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA	164. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA	165. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA
166. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA	167. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA	168. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA
169. Ear Probe Inv. No. NA, GS 3	170. Ear Probe Inv. No. NA, GS 3	171. Ear Probe Inv. No. NA, GS 3

L. NA, CA Il. 37 PR. NA	L. NA, CA Il. 37 PR. NA	L. NA, CA Il. 37 PR. NA
172. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA	173. Ear Probe Inv. No. NA, GS 3 L. NA, CA Il. 37 PR. NA	174. Ear Probe Inv. No. 5.101, GS 3 L. NA, CA Il. 37 PR. NA
175. Ear Probe Inv. No. 36.389, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 6	176. Ear Probe Inv. No. 36.39, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 6	177. Ear Probe Inv. No. 36.391, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 6
178. Ear Probe Inv. No. 36.395, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 6	179. Ear Probe Inv. No/ 36.397, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 6	180. Ear Probe Inv. No. 36.689, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 6
181. Ear Probe Inv. No. 37.3064, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 4	182. Ear Probe Inv. No. 37.3171, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 4	183. Ear Probe Inv. No. 28.1149, GS 3 L. NA, CA Il. 37 PR. Breite, Spillmann, Fig. 72, Nr. 24
184. Ear Probe Inv. No. 27.32, GS 3 L. NA, CA Il. 37 PR. Breite, Spillmann, Fig. 72, Nr. 28	185. Ear Probe Inv. No. 29.2583, GS 3 L. NA, CA Il. 37 PR. Breite, Spillmann, Fig. 72, Nr. 29	186. Ear Probe Inv. No. 29.2586, GS 3 L. NA, CA Il. 37 PR. Breite, Spillmann, Fig. 72, Nr. 29
187. Ear Probe Inv. No. 28.1829, GS 3 L. NA, CA Il. 37 PR. Breite, Spillmann, Fig. 72, Nr. 4	188. Ear Probe Inv. No. 29.1109, GS 3 L. NA, CA Il. 37 PR. Breite Spillmann, Fig. 72, Nr. 29	189. Ear Probe Inv. No. 29.2042, GS 3 L. NA, CA Il. 37 PR. Breite, Spillmann Fig. 72, Nr. 29
190. Ear Probe Inv. No. 29.111O, GS 3 L. NA, CA Il. 37 PR. Breite, Spillmann, Fig. 72, Nr. 29	191. Ear Probe Inv. No. 33.101, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 9	192. Ear Probe Inv. No. 33.289, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 9
193. Ear Probe Inv. No. 32.857, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 8	194. Ear Probe Inv. No. 31.1068, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 15	195. Ear Probe Inv. No. 31.1819, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 15
196. Ear Probe Inv. No. 31.1556, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 15	197. Ear Probe Inv. No. 33.31, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 9	198. Ear Probe Inv. No. 33.27, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 9
199. Ear Probe Inv. No. 55.138, GS 3 L. NA, Bone Il. 37 PR. Schutthügel, Fig. 72, Nr. 1	200. Ear Probe Inv. No. 51.276, GS 3 L. NA, CA Il. 37 PR. NA	201. Ear Probe Inv. No. 55.137, GS 3 L. NA, CA Il. 37 PR. NA
202. Ear Probe Inv. No. 2183.26, GS 3	203. Ear Probe Inv. No. 2183.42, GS 3	204. Ear Probe Inv. No. 2183.44, GS 3

L. NA, CA Il. 37 PR. NA	L. NA, CA Il. 37 PR. NA	L. NA, CA Il. 37 PR. NA
205. Ear Probe Inv. No. 2183.5O, GS 3 L. NA, CA Il. 37 PR. NA	206. Ear Probe Inv. No. 2183.51, GS 3 L. NA, CA Il. 37 PR. NA	207. Ear Probe Inv. No. 2183.52, GS 3 L. NA, CA Il. 37 PR. NA
208. Ear Probe Inv. No. 2183.53, GS 3 L. NA, CA Il. 37 PR. NA	209. Ear Probe Inv. No. 2183.54, GS 3 L. NA, CA Il. 37 PR. NA	210. Ear Probe Inv. No. 2183.45, GS 3 L. NA, CA Il. 37 PR. NA
211. Ear Probe Inv. No. 2183.46, GS 3 L. NA, CA Il. 37 PR. NA	212. Ear Probe Inv. No. 2183.47, GS 3 L. NA, CA Il. 37 PR. NA	213. Ear Probe Inv. No. 2183.48, GS 3 L. NA, CA Il. 37 PR. NA
214. Ear Probe Inv. No. 2183.49, GS 3 L. NA, CA Il. 37 PR. NA	215. Ear Probe Inv. No. 2183.12, GS 3 L. NA, CA Il. 37 PR. NA	216. Ear Probe Inv. No. 2183.3, GS 3 L. NA, CA Il. 37 PR. NA
217. Ear Probe Inv. No. 2183.4, GS 3 L. NA, CA Il. 37 PR. NA	218. Ear Probe Inv. No. 2183.5, GS 3 L. NA, CA Il. 37 PR. NA	219. Ear Probe Inv. No. 2183.6, GS 3 L. NA, CA Il. 37 PR. NA
220. Ear Probe Inv. No. 2183.7, GS 3 L. NA, CA Il. 37 PR. NA	221. Ear Probe Inv. No. 2183.8, GS 3 L. NA, CA Il. 37 PR. NA	222. Ear Probe Inv. No. 2183.9, GS 3 L. NA, CA Il. 37 PR. NA
223. Ear Probe Inv. No. 2183.10, GS 3 L. NA, CA Il. 37 PR. NA	224. Ear Probe Inv. No. 2183.11, GS 3 L. NA, CA Il. 37 PR. NA	225. Ear Probe Inv. No. 2183.13, GS 3 L. NA, CA Il. 37 PR. NA
226. Ear Probe Inv. No. 5121, GS 3 L. NA, CA Il. 37 PR. NA	227. Ear Probe Inv. No. 5393, GS 3 L. NA, CA L. 37 PR. NA	228. Ear Probe Inv. No. 4181, GS 3 L. NA, CA Il. 37 PR. NA
229. Ear Probe Inv. No. 5059, GS 3 L. NA, CA Il. 37 PR. NA	230. Ear Probe Inv. No. 5048, GS 3 L. NA, CA Il. 37 PR. NA	231. Ear Probe Inv. No. 2193.1, GS 3 L. NA, CA Il. 37 PR. NA
232. Ear Probe Inv. No. 2193.11, GS 3 L. NA, CA Il. 37 PR. NA	233. Ear Probe Inv. No. 2193.12, GS 3 L. NA, CA Il. 37 PR. NA	234. Ear Probe Inv. No. 2193.14, GS 3 L. NA, CA Il. 37 PR. NA
235. Ear Probe Inv. No. 2193.15, GS 3 L. NA, CA Il. 37 PR. NA	236. Ear Probe Inv. No. 2193.16, GS 3 L. NA, CA Il. 37 PR. NA	237. Ear Probe Inv. No. 2193.17, GS 3 L. NA, CA Il. 37 PR. NA

238. Ear Probe Inv. No. 2193.18, GS 3 L. NA, CA Il. 37 PR. NA	239. Ear Probe Inv. No. 2193.19, GS 3 L. NA, CA Il. 37 PR. NA	240. Ear Probe Inv. No. 2193.20, GS 3 L. NA, CA Il. 37 PR. NA
241. Ear Probe Inv. No. 1512, GS 3 L. NA, CA Il. 37 PR. NA	242. Ear Probe Inv. No. 1544, GS 3 L. NA, CA Il. 37 PR. NA	243. Ear Probe Inv. No. 1746, GS 3 L. NA, CA Il. 37 PR. NA
244. Ear Probe Inv. No. 2914.17, GS 3 L. NA, CA Il. 37 PR. NA	245. Ear Probe Inv. No. 3773, GS 3 L. NA, CA Il. 37 PR. NA	246. Ear Probe Inv. No. 5059, GS 3 L. NA, CA Il. 37 PR. NA
247. Ear Probe Inv. No. 5393, GS 3 L. NA, CA Il. 37 PR. NA	248. Ear Probe Inv. No. 9006, GS 3 L. NA, CA Il. 37 PR. NA	249. Ear Probe Inv. No. 5394, GS 3 L. NA, CA Il. 37 PR. Schutthügel, Fig. 72, Nr. 1
250. Ear Probe Inv. No. 6876, GS 3 L. NA, CA Il. 37 PR. NA	251. Ear Probe Inv. No. 25 IG, GS 3 L. NA, CA Il. 37 PR. NA	252. Ear Probe Inv. No. 260C, GS 3 L. NA, CA Il. 37 PR. NA
253. Ear Probe Inv. No. 2609, GS 3 L. NA, CA Il. 37 PR. NA	254. Ear Probe Inv. No. 263H, GS 3 L. NA, CA Il. 37 PR. NA	255. Ear Probe Inv. No. 569, GS 3 L. NA, CA Il. 37 PR. NA
256. Ear Probe Inv. No. 574, GS 3 L. NA, CA Il. 37 PR. NA	257. Ear Probe Inv. No. 928, GS 3 L. NA, CA Il. 37 PR. NA	258. Ear Probe Inv. No. 1200, GS 3 L. NA, CA Il. 37 PR. NA
259. Ear Probe Inv. No. 21.93, GS 3 L. NA, CA Il. 37 PR. Fig. 72, Nr. 19	260. Ear Probe Inv. No. 3772, GS 3 L. NA, CA Il. 37 PR. NA	261. Ear Probe Inv. No. 4181, GS 3 L. NA, CA Il. 37 PR. NA
262. Ear Probe Inv. No. 5048, GS 3 L. NA, CA Il. 37 PR. Schutthügel, Fig. 72, Nr. 1	263. Ear Probe Inv. No. 4271, GS 3 L. NA, CA Il. 37 PR. NA	264. Ear Probe Inv. No. 4272, GS 3 L. NA, CA Il. 37 PR. NA
265. Ear Probe Inv. No. 4505, GS 3 L. NA, CA Il. 37 PR. NA	266. Ear Probe Inv. No. 5055, GS 3 L. NA, CA Il. 37 PR. Schutthügel, Fig. 72, Nr. 1	267. Ear Probe Inv. No. 5056, GS 3 L. NA, CA Il. 37 PR. Schutthügel, Fig. 72, Nr. 1
268. Ear Probe Inv. No. 5057, GS 3 L. NA, CA Il. 37 PR. Schutthügel, Fig. 72, Nr. 1	269. Ear Probe Inv. No. 5058, GS 3 L. NA, CA Il. 37 PR. NA	270. Ear Probe Inv. No. 5395, GS 3 L. NA, CA Il. 37 PR. NA
271. Ear Probe Inv. No. 5396, GS 3 L. NA, CA Il. 37	272. Ear Probe Inv. No. 5121, GS 3 L. NA, CA Il. 37	273. Ear Probe Inv. No. ST 2, GS 3 L. NA, CA Il. 37

PR. NA	PR. NA	PR. NA
274. Ear Probe Inv. No. ST 3, GS 3 L. NA, CA Il. 37 PR. NA	275. Ear Probe Inv. No. ST 4, GS 3 L. NA, CA Il. 37 PR. NA	276. Ear Probe Inv. No. ST 5, GS 3 L. NA, CA Il. 37 PR. NA
277. Ear Probe Inv. No. ST 6, GS 3 L. NA, CA Il. 37 PR. NA	278. Ear Probe Inv. No. ST 7, GS 3 L. NA, CA Il. 37 PR. NA	279. Ear Probe Inv. No. ST 8, GS 3 L. NA, CA Il. 37 PR. NA
280. Ear Probe Inv. No. ST 9, GS 3 L. NA, CA Il. 37 PR. NA	281. Ear Probe Inv. No. 13.548, GS 3 L. NA, CA Il. 37 PR. Dätweiler 1913, Fig. 72, Nr. 3	282. Ear Probe Inv. No. 20.86, GS 3 L. NA, CA Il. 37 PR. NA
283. Ear Probe Inv. No. 6842, GS 3 L. NA, CA Il. 37 PR. NA	284. Ear Probe Inv. No. 12841, GS 3 L. NA, CA Il. 37 PR. NA	285. Ear Probe Inv. No. 13104, GS 3 L. NA, CA Il. 37 PR. NA
286. Ear Probe Inv. No. 13.548, GS 3 L. NA, CA Il. 37 PR. Fig. 72, Nr. 3	287. Ear Probe Inv. No. 5120, GS 3 L. NA, CA Il. 37 PR. NA	288. Ear Probe Inv. No. 6843, GS 3 L. NA, CA Il. 37 PR. NA
289. Ear Probe Inv. No. 25:76, GS 3 L. NA, CA Il 37 PR. Breite, Spillmann, Fig. 72, Nr. 23	290. Ear Probe Inv. No. 25:218, GS 3 L. NA, CA Il. 37 PR. Breite, Spillmann, Fig. 72, Nr. 23	291. Ear Probe Inv. No. 25:2355, GS 3 L. NA, CA Il. 37 PR. Breite, Spillmann, Fig. 72, Nr. 23
292. Ear Probe Inv. No. 19.435, GS 3 L. NA, CA Il. 37 PR. NA	293. Ear Probe Inv. No. 19.669, GS 3 L. NA, CA Il. 37 PR. NA	294. Ear Probe Inv. No. 21.388, GS 3 L. NA, CA Il. 37 PR. Südtor, Fig. 72, Nr. 19
295. Ear Probe Inv. No. 22.18O, GS 3 L. NA, CA Il. 37 PR. NA	296. Ear Probe Inv. No. 18.2OO, GS 3 L. NA, CA Il. 37 PR. NA	297. Ear Probe Inv. No. 23.28O, GS 3 L. NA, CA Il. 37 PR. NA
298. Ear Probe Inv. No. 23.33O, GS 3 L. NA, CA Il. 37 PR. NA	299. Ear Probe Inv. No. 23.429, GS 3 L. NA, CA Il. 37 PR. NA	300. Ear Probe Inv. No. 23.534, GS 3 L. NA, CA Il. 37 PR. NA
301. Ear Probe Inv. No. 23.434, GS 3 L. NA, CA Il. 37 PR. NA	302. Ear Probe Inv. No. 20.86, GS 3 L. NA, CA Il. 37 PR. NA	303. Ear Probe Inv. No. 23.527, GS 3 L. NA, CA Il. 37 PR. NA
304. Ear Probe Inv. No. 23.528, GS 3 L. NA, CA Il. 37 PR. NA	305. Ear Probe Inv. No. 17.101, GS 3 L. NA, CA Il. 37 PR. NA	306. Ear Probe Inv. No. 13.1511, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 3

307. Ear Probe Inv. No. 13.1521, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 13	308. Ear Probe Inv. No. 13.1513, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 13	309. Ear Probe Inv. No. 14.96, GS 3 L. NA, CA Il. 37 PR. NA
310. Ear Probe Inv. No. 16.78O, GS 3 L. NA, CA Il. 37 PR. NA	311. Ear Probe Inv. No. 17.313, GS 3 L. NA, CA Il. 37 PR. NA	312. Ear Probe Inv. No. 13.803, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 13
313. Ear Probe Inv. No. 13.804, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 13	314. Ear Probe Inv. No. 13.805, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 13	315. Ear Probe Inv. No. 13.806, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 13
316. Ear Probe Inv. No. 13.807, GS 3 L. NA, CA Il. 37 PR. Breite, Fig. 72, Nr. 13	317. Double Ended Olivary Probe Inv. No. 1414, GS 3 L. 41.0, CA Il. 34 PR. NA It has holes drilled through both olivary, one end also has a slit 1.3 cm long and 2 mm wide. The holes do not match in direction.	318. Double Ended Olivary Probe Inv. No. 23.4, GS 3 L. 27.4, CA Il. 34 PR. Schutthügel, Fig. 72, Nr. 1 It has holes drilled though both olivary ends and the holes do not match in their direction.
319. Double Ended Olivary Probe Inv. No. 4275, GS 3 L. 15.4, CA Il. 34 PR. Schutthügel, Fig. 72, Nr. 1 There are two sets of holes drilled through one of the olivary ends. The holes are not in the same direction.	320. Dipyrene Inv. No. 4273, GS 3 L. 16.3, CA Il. 36 PR. Schutthügel, Fig. 72, Nr. 1 It is very simple without holes and may have been an ointment dropper.	321. Needle Inv. No. 13.811, GS 3 L. 14.7, CA Il. 30 PR. Schutthügel, Fig. 72, Nr. 1 The needle ends in a point and the cylindrical handle terminates in a slight hook.
322. Needle Inv. No. 23.353, GS 3 L. 14.8, CA Il. 30 PR. Schutthügel (west), Fig. 72, Nr. 1 The handle terminates in an olivary end.	323. Needle Inv. No. 2193, GS 3 L. 14.8, CA Il. 30 PR. Schutthügel, Fig. 72, Nr. 1 The cylindrical handle terminates in a point.	324. Needle Inv. No. 32:565, GS 3 L. 5.4, CA Il. 30 PR. Breite, Fig. 72, Nr. 8 The cylindrical handle terminates in a knob, and there is a hole in the bottom centre for a needle
325. Needle Inv. No. 36.495, GS 3 L. 6.7, CA Il. 30 PR. Breite, Fig. 72, Nr. 6 The cylindrical handle is decorated above the needle, and a bit of the needle survives (1.2 cm long)	326. Oculist Stamp Inv. No. NA, GS 3 L. NA Il. 32 PR. NA Feugère et al 1986: 479, Nr. 44; V. 267	

TABLE THREE
Ladenburg, Lopodunum
Auxiliary Fort

1. Scalpel Inv. No. NA, GS 4 L. NA, CA Il. 43-45 PR. Bath von Elbe 1974: 240	2. Scalpel Inv. No. NA, GS 5 L. NA, CA Il. 43-45 PR. Grave Künzl 1983: 79, Early third	3. Bone Scraper Inv. No. NA, GS 4 L. NA, CA Il. NA PR. Bath von Elbe 1974: 240
4. Sharp Hook Inv. No. NA, GS 5 L. NA, CA, silver inlay Il. 23 PR. Grave Künzl 1983: 79, Early third	5. Sharp Hook Inv. No. NA, GS 5 L. NA, CA Il. 23 PR. Grave Künzl 1983: 79, early third	6. Spoon Scoop Inv. No. NA, GS 4 L. NA, CA Il. NA PR. Bath von Elbe 1974: 240
7. Spatula Probe Inv. No. NA, GS 5 L. NA, CA Il. 39-40 PR. Grave Künzl 1982: 79, Early third	8. Spatula Probe Inv. No. NA, GS 4 L. NA, Bone Il. 39-40 PR. Bath von Elbe 1974: 240	9. Spoon Probe Inv. No. NA, GS 5 L. NA, CA Il. 42 PR. Grave Künzl 1983: 79, Early third
10. Ointment Pallet Inv. No. NA, GS 4 L. NA, Stone Il. 33 PR. Bath von Elbe 1974: 240	11. Medical Box Inv. No. NA, GS 4 L. NA, Wood Il. 29 PR. Bath von Elbe 1974: 240	

TABLE FOUR
Holzhausen
Auxiliary Fort

1. Ear Probe Inv. No. NA L. 7.0, CA Il. 37 PR. West Corner of the Fort Pallat 1904: 31	2. Olivary End Probe Inv. No. NA L. NA, CA Il. NA PR. West Corner of the Fort Pallat 1904: 31, Nr. 21-Tab. 7 Nr. 18

TABLE FIVE
Zugmantel
Auxiliary Fort

1. Scalpel Inv. No. NA L. 10.0, CA Il. 43-45 PR. NA Fabricius 1936: 184, 17 Nr.-Tab. 26	2. Scalpel Inv. No. NA L. NA, CA Il. 43-45 PR. NA Jacobi 1909: 90, Nr. 2-Tab. 11 Nr. 44	3. Scalpel Inv. No. NA L. NA, CA Il. 43-45 PR. NA Jacobi 1909: 90, Nr. 2-Tab. 11 Nr. 64
4. Spatula Probe Inv. No. NA L. NA, CA Il. 39-40 PR. NA	5. Spatula Probe Inv. No. NA L. NA, CA Il. 39-40 PR. NA	6. Spoon Probe Inv. No. NA L. NA, CA Il. 42 PR. NA

Jacobi 1909: 90, Nr. 5-Tab. 11 Nr. 36	Jacobi 1909: 90, Nr. 5-Tab. 11 Nr. 37	Jacobi 1909: 90, Nr. 6-Tab. 11 Nr. 38
7. Spoon Probe Inv. No. NA L. NA, CA Il. 42 PR. NA Jacobi 1909: 90, Nr. 6-Tab. 11 Nr. 39	8. Spoon Probe Inv. No. NA L. NA, CA Il. 42 PR. NA Jacobi 1909: 90, Nr. 6-Tab. 11 Nr. 40	9. Spoon Probe Inv. No. NA L. NA. CA Il. 42 PR. NA Jacobi 1909: 90, Nr. 6-Tab. 11 Nr. 42
10. Spoon Probe Inv. No. NA L. NA, CA Il. 42 PR. NA Jacobi 1909: 90, Nr. 6-Tab. 11 Nr. 43	11. Spoon Probe Inv. No. NA L. NA, CA Il. 37 PR. NA Anonymous 1930: 47, Nr. 9- Tab. 11	12. Ear Probe Inv. No. NA L. NA, CA Il. 37 PR. NA Jacobi 1909: 91, Nr. 9-Tab. 11 Nr. 60
13. Ear Probe Inv. No. NA L. NA, CA Il. 37 PR. NA Jacobi 1909: 91, Nr. 9-Tab. 11 Nr. 61	14. Ear Probe Inv. No. NA L. NA, CA Il. 37 PR. NA Jacobi 1909: 91, Nr. 9-Tab. 11 Nr. 62	15. Ear Probe Inv. No. NA L. NA, CA Il. 37 PR. NA Jacobi 1909: 91, Nr. 9-Tab. 11 Nr. 63
16. Ear Probe Inv. No. NA L. NA, Silver Il. 37 PR. NA Anonymous 1930: 47, Nr. 5- Tab. 11	17. Spoon Scoop Inv. No. NA L. NA, CA Il. NA PR. NA Anonymous 1930: 47, Nr. 10- Tab. 11.	18. Double Ended Olivary Probe Inv. No. NA L. NA, CA Il. 34 PR. NA Jacobi 1909: 91, Nr. 8-Tab. 11 Nr. 35
19. Olivary End Probe Inv. No. NA L. NA, CA Il. NA PR. NA Jacobi 1909: 90, Nr. 7-Tab. 11 Nr. 41		

TABLE SIX
Heftrich
Numerus Fort

1. Spoon Probe Inv. No. NA L. NA, CA Il. 42 PR. NA Jacobi 1904: 8, Nr. 19	2. Olivary End Probe Inv. No. NA L. NA, CA Il. NA PR. NA Jacobi 1904: 8, Nr. 20

TABLE SEVEN
Staden
Numerus Fort

1. Spatula Probe Inv. No. NA L. 18.7, CA

Il. 39-40 PR. NA Fabricius 1936: 200, Nr. 23-Tab. 17 Nr. 20

TABLE EIGHT
Saalburg
Auxiliary Fort

1. Scalpel Inv. No. NA, GS 6 L. NA, CA Il. 43-45 PR. NA Jacobi 1897: Nr. 2-Tab. 67	2. Forceps Inv. No. NA, GS 6 L. NA, CA Il. 11-12 PR. NA Jacobi 1897: 452, Nr. 10-Tab. 62	3. Button Probe Inv. No. NA, GS 6 L. NA, CA PR. NA von Elbe 1974: 347
4. Spoon Probe Inv. No. NA, GS 6 L. NA, CA Il. 42 PR. NA Jacobi 1897: 452, Nr. 1-Tab. 62	5. Spoon Probe Broken Inv. No. NA, GS 6 L. NA, CA Il. 42 PR. NA Jacobi 1897: 452, Nr. 6-Tab. 62	6. Spatula Probe Inv. No. NA, GS 6 L. NA, CA Il. 39-40 PR. NA Jacobi 1897: 452, Nr. 2-Tab. 62
7. Ointment Pallet Inv. No. NA, GS 6 L. NA, CA Il. 33 PR. NA Jacobi 1897: 453, Nr. 22-Tab. 71	8. Oculist Stamp Inv. NA L. NA Il. 32 PR. NA Feugère et al 1986: 479, Nr. 25, E. 122, V. 195	9. Oculist Stamp Inv. NA L. NA Il. 32 PR. NA Feugère et al 1986: 479, Nr. 26, E. 25, V. 224

TABLE NINE
Kapersburg
Auxiliary Fort

1. Spoon Probe Inv. No. NA L. NA, CA Il. 42 PR. NA Jacobi and Hofmann 1906: 27, Nr. 36	2. Forceps Inv. No. NA L. 5.8, CA Il. 11-12 PR. NA Jacobi and Hofmann 1906: 27, Nr. 38

TABLE TEN
Oberflorstadt
Auxiliary Fort

1. Olivary End Probe Inv. No. NA L. 5.9, CA Il. NA PR. NA Kofler & Jacobs 1903: 22, Nr. 12	2. Olivary End Probe Inv. No. NA L. 4.3, CA Il. NA PR. NA Kofler & Jacobs 1903: 22, Nr. 12

TABLE ELEVEN
Groß-Krotzenburg
Auxiliary Fort

1. Spoon Probe Inv. No. NA L. NA, CA Il. 42 PR. Principia Wolff & Jacobs 1903: 23, Nr. 9-Tab. 8 Nr. 18

TABLE TWELVE
Okarben
Auxiliary Fort

1. Spatula Probe Inv. No. NA L. 18.0, CA Il. 39-40 PR. Bath Wolff 1902: 17, Nr. 9	2. Forceps Inv. No. NA L. 9.5, CA Il. 11-12 PR. Bath Wolff 1902: 17, Nr. 10

TABLE THIRTEEN
Wiesbaden
Auxiliary Fort

1. Ear Probe Inv. No. 7134, GS 7 L. NA, CA Il. 37 PR. NA Ritterling 1909: 99, Nr. 93	2. Olivary End Probe Inv. No. 17417, GS 7 L. NA, CA Il. NA PR. NA Ritterling 1909: 98. Nr. 94	3. Ointment Pallet Inv. No. NA, GS 7 L. NA, CA Il. 33 PR. NA von Elbe 1974: 455
4. Oculist Stamp Inv. No. NA L. NA Il. 32 PR. NA Feugère et al 1986: 479, Nr. 24, E. 123, V. 108		

TABLE FOURTEEN
Hofheim
Auxiliary Fort

1. Scalpel Inv. No. NA L. NA, CA Il. 43-45 PR. Old Baths Wolff 1897: 23, Nr. 5-Tab. 8 Nr. 12

TABLE FIFTEEN
Neckarburken
Auxiliary Fort

1. Spatula Probe Inv. No. NA L. NA, CA Il. 39-40 PR. NA Schumacher 1898: 35, Nr. 2

TABLE SIXTEEN
Bad Wimpfen
Auxiliary Fort

1. Forceps Inv. No. NA, GS 8 L. 13.3, CA Il. 11-12 PR. NA Schumacher 1900: 10	2. Forceps Inv., No. NA, GS 8 L. 11.0, CA Il. 11-12 PR. NA Schumacher 1900: 10

TABLE SEVENTEEN
Stockstadt am Main
Auxiliary Fort

1. Spoon Probe Inv. No. NA L. 16.3, CA Il. 42 PR. NA Conrady et al 1910: 52, Nr. 3-Tab. 7 Nr. 77

TABLE EIGHTEEN
Hüfingen
Auxiliary Fort

1. Spoon Probe Inv. No. NA L. NA, CA Il. 42 PR. NA Revellio 1937: 40, Nr. 64-Tab. 10

TABLE NINETEEN
Degenfeld
Auxiliary Fort

1. Scalpel Inv. No. NA L. 10.0, CA Il. 43-45 PR. NA Anthes 1936: 184

TABLE TWENTY
Bad Canstatt
Auxiliary Fort

1. Surgical Knife Inv. No. NA L. NA, CA Il. 46 PR. NA Barthel 1907: 28, Nr. 45-Tab. 8 Nr. 45	2. Forceps with Olivary Probe Inv. No. NA L. NA, CA Il. NA PR. Cemetery Barthel 1907: 28, Nr. 58

TABLE TWENTY-ONE
Köngen, Grinario
Auxiliary Fort

1. Spatula Probe Inv. No. NA L. 14.2, CA Il. 39-40 PR. NA Mettler & Barthel 1907: 35, Nr. 15	2. Olivary End Probe Inv. No. NA L. 13.5, CA Il. NA PR. NA Mettler & Barthel 1907: 35, Nr. 16

TABLE TWENTY-TWO
Langenhain
Auxiliary Fort

1. Olivary End Probe Inv. No. NA L. NA, CA Il. NA PR. NA Kofler 1897: 8, Nr. 7

TABLE TWENTY-THREE
Öhringen
Auxiliary Fort

1. Spoon Probe Broken Inv. No. NA L. NA, CA Il. 42 PR. NA Herzog 1897: 17, Nr. 4

TABLE TWENTY-FOUR
Mainhardt
Auxiliary Fort

1. Spatula Probe Broken Inv. No. NA L. 14.5, CA Il. 39-40 PR. East Tower Mettler & Drexel 1909: 12, Nr. 10

TABLE TWENTY-FIVE
Bingen
Auxiliary Fort

1. Cupping Vessel Inv. No. Como 1-7, GS 9 L. 12.0, CA Il. 9 PR. NA Como 1925: 153, Nr. 7-Fig. 1; Künzl 1983: 80, Nr. 7-Fig. 55, AD 150	2. Cupping Vessel Inv. No. Como 1-8, GS 9 L. 16.0, CA Il. 9 PR. NA Como 1925: 153, Nr. 8-Fig. 1; Künzl 1983: 80, Nr. 8-Fig. 55, AD 150	3. Cupping Vessel Inv. No. Como 1-9, GS 9 L. 12.0, CA Il. 9 PR. NA Como 1925: 153, Nr. 8-Fig. 1; Künzl 1983: 80, Nr. 8-Fig. 55, AD 150
4. Scalpel with Iron Blade Inv. No. Como 2-1, GS 9 L. 15.5, CA 32 Il. 43-45 PR. NA Como 1925: 155, Nr. 1-Fig. 2; Künzl 1983: 80, Nr. 1-Fig. 56, AD 150	5. Scalpel with Iron Blade Inv. No. Como 2-2, GS 9 L. 16.0, CA Il. 43-45 PR. NA Como 1925: 155, Nr. 2-Fig. 2; Künzl 1983: 80, Nr. 2-Fig. 56, AD 150	6. Scalpel with Iron Blade Inv. No. Como 2-3, GS 9 L. 16.0, CA Il. 43-45 PR. NA Como 1925: 155, Nr. 3-Fig. 2; Künzl 1983: 80, Nr. 3-Fig. 56, AD 150
7. Scalpel with Iron Blade Inv. No. Como 2-4, GS 9 L. 16.5, CA Il. 43-45 PR. NA Como 1925: 155, Nr. 4-Fig. 2; Künzl 1983: 80, Nr. 4-Fig. 56, AD 150	8. Scalpel with Iron Blade Inv. No. Como 2-5, GS 9 L. 14.0, CA Il. 43-45 PR. NA Como 1925: 155, Nr. 5-Fig. 2; Künzl 1983: 80, Nr. 5-Fig. 56, AD 150	9. Scalpel with Iron Blade Inv. No. Como 2-6, GS 9 L. 15.0, CA Il. 43-45 PR. NA Como 1925: 155, Nr. 6-Fig. 2; Künzl 1983: 80, Nr. 6-Fig. 56, AD 150
10. Scalpel with Iron Blade Inv. No. Como 2-7, GS 9 L. 14.0, CA Il. 43-45 PR. NA Como 1925: 155, Nr. 7-Fig. 2; Künzl 1983: 80, Nr. 7-Fig. 56, AD 150	11. Scalpel Inv. No. Como 2-8, GS 9 L. 9.0, CA Il. 43-45 PR. NA Como 1925: 155, Nr. 8-Fig. 2; Künzl 1983: 80, Nr. 8-Fig. 56, AD 150	12. Scalpel Inv. No. Como 2-9, GS 9 L. 10.0, CA Il. 43-45 PR. NA Como 1925: 155, Nr. 9-Fig. 2; Künzl 1983: 80, Nr. 9-Fig. 56, AD 150
13. Bone Lever Inv. No. Como 2-10, GS 9 L. 11.0, CA Il. 54 PR. NA Como 1925: 155, Nr. 10-Fig. 2; Künzl 1983: 80, Nr. 10-Fig. 56, AD 150	14. Bone Lever Como 2-11, GS 9 L. 11.5, CA Il. 54 PR. NA Como 1925: 155, Nr. 11-Fig. 2; Künzl 1983: 80, Nr. 11-Fig. 56, AD 150	15. Bone Lever Inv. No. Como 2-12, GS 9 L. 12.5, CA Il. 54 PR. NA Como 1925: 155, Nr. 12-Fig. 2; Künzl 1983: 80, Nr. 12-Fig. 56, AD 150
16. Bone Lever Inv. No. Como 2-13, GS 9 L. 17.5, CA Il. 54 PR. NA Como 1925: 155, Nr. 13-Fig. 2; Künzl 1983: 80, Nr. 13-Fig. 56, AD 150	17. Bone Lever Inv. No. Como 2-18, GS 9 L. 15.0, CA Il. 54 PR. NA Como 1925: 157, Nr. 18-Fig. 2; Künzl 1983: 80, Nr. 18-Fig. 56, AD 150	18. Sharp Hook Inv. No. Como 3-15, GS 9 L. 16.8, CA Il. 23 PR. NA Como 1925: 159, Nr. 15-Fig. 3; Künzl 1983: 80, Nr. 15 Fig. 57, AD 150
19. Sharp Hook Inv. No. Como 3-16, GS 9 L. 14.4, CA Il. 23 PR. NA Como 1925: 159, Nr. 16-Fig. 3;	20. Sharp Hook Inv. No. Como 3-17, GS 9 L. 12.2, CA Il. 23 PR. NA Como 1925: 159, Nr. 17-Fig. 3;	21. Sharp Hook Inv. No. Como 3-18, GS 9 L. 16.5, CA Il. 23 PR. NA Como 1925 159, Nr. 18-Fig. 3;

Künzl 1983: 80, Nr. 16-Fig. 57, AD 150	Künzl 1983: 80, Nr. 17-Fig. 57, AD 150	Künzl 1983: 80, Nr. 18 Fig. 57, AD 150
22. Sharp Hook Inv. No. Como 2-17, GS 9 L. 21.0, CA Il. 23 PR. NA Como 1925: 157, Nr. 17-Fig. 2; Künzl 1983: 80, Nr. 17-Fig. 56, AD 150	23. Needle Inv. No. Como 3-20, GS 9 L. 13.8, CA Il. 30 PR. NA Como 1925: 160, Nr. 20-Fig. 3; Künzl 1983: 80, Nr. 20 Fig. 57, AD 150	24. Trepanning Saw Inv. No. Como 2-19, GS 9 L. 18.5, CA Il. 53 PR. NA Como 1925: 157, Nr. 19-Fig. 2; Künzl 1983: 80, Nr. 19-Fig. 56, AD 150; Behrens 1939: 4-5, Figs. 1 and 2
25. Bone Borer Inv. No. Como 6-1, GS 9 L. 5.5, CA Il. NA PR. NA Como 1925: 160, Nr. 1-Fig. 6; Künzl 1983: 80, Nr. 1 Fig. 58, AD 150	26. Bone Borer Inv. No. Como 6-2, GS 9 L. 4.5, CA Il. NA PR. NA Como 1925 160, Nr. 2-Fig. 6; Künzl 1983: 80, Nr. 2 Fig. 58, AD 150	27. Cautery Inv. No. Como 2-16, GS 9 L. 9.0, CA Il. NA PR. NA Como 1925: 157, Nr. 16-Fig. 2; Künzl 1983: 80, Nr. 16-Fig. 56; Bliquez 1981: 220. the end is missing, AD 150
28. Double Sided Spatula Inv. No. Como 3-10a, GS 9 L. 20.5, CA Il. 41 PR. NA Como 1925: 159, Nr. 10a-Fig. 3; Künzl 1983: 80, Nr. 10a-Fig. 57, AD 150	29. Double Sided Spatula Inv. No. Como 3-10b, GS 9 L. 19.9, CA Il. 41 PR. NA Como 1925: 159, Nr. 10b-Fig. 3; Künzl 1983: 80, Nr. 10b-Fig. 57, AD 150	30. Spatula Probe Inv. No. Como 3-11, GS 9 L. 16.7, CA Il. 39-40 PR. NA Como 1925: 159, Nr. 11-Fig. 3; Künzl 1983: 80, Nr. 11-Fig. 57, AD 150
31. Spoon Scoop Inv. Como 2-14, GS 9 L. 11.5, CA Il. 42 PR. NA Como 1925: 155, Nr. 14-Fig. 2; Künzl 1983 80, Nr. 14-Fig. 56, AD 150	32. Spoon Scoop Inv. No. Como 2-15, GS 9 L. 4.5, Iron Il. 42 PR. NA Como 1925: 157, Nr. 15-Fig. 2; Künzl 1983: 80, Nr. 15-Fig. 56, the handle is broken, AD 150	33. Forceps Inv. No. Como 3-12, GS 9 L. 16.3, CA Il. 11-12 PR. NA Como 1925: 159, Nr. 12-Fig. 3; Künzl 1983: 80, Nr. 12-Fig. 57, AD 150
34. Forceps Inv. No. Como 3-13, GS 9 L. 15.3, CA Il. 11-12 PR. NA Como 1925: 159, Nr. 13-Fig. 3; Künzl 1983: 80, Nr. 13-Fig. 57, AD 150	35. Forceps Inv. No. Como 3-14, GS 9 L. 15.0, CA Il. 11-12 PR. NA Como 1925: 159, Nr. 14-Fig. 3; Künzl 1983: 80, Nr. 14-Fig. 57, AD 150	

TABLE TWENTY-SIX
Worms, Borbetomagus
Auxiliary Fort

1. Scalpel (S) Inv. No. R 214, GS 10 L. 12.0, Iron Il. 43-45 PR. Grave Field Maria Münster, Found in a Child's Grave Künzl 1979/81: 53, Nr. 3-Tab. 3, Künzl 1983: 78, Pl 53, The scalpel has bronze and silver	2. Scalpel Inv. No. NA, GS 10 L. 10.7, CA Il. 43-45 PR. NA Künzl 1979/81: 53, Nr. 4-Tab. 3. The scalpel has bronze and silver inlay	3. Bifurcated hook Inv. No. R 208, GS 10 L. 19.9, CA Il. 28 PR. Grave field Maria Münster Künzl 1979/81: 59, Nr. 31-Tab. 6, The exact find spot is not known

inlay		
4. Needle with a Hook Inv. No. R 4120, GS 10 L. 14.0, CA Il. NA PR. Weinsheimer Zollhaus Künzl 1979/81: 60, Nr. 63-Tab. 8	5. Needle Inv. No. R 581, GS 10 L. 15.5, CA Il. 30 PR. Mainzer Strasse Künzl 1979/81: 60, Nr. 62-Tab. 8	6. Ear Probe Inv. No. R 213, GS 10 L. 12, CA Il. 37 PR. Grave field Maria Münster, 1886 Künzl 1979/81: 60, Nr. 64-Tab. 8
7. Ear Probe Inv. No. R4523, GS 10 L. 11.5, CA Il. 37 PR. Pfeddersheim Künzl 1979/81: 60, Nr. 65-Tab. 8	8. Ear Probe Inv. No. R 635, GS 10 L. 14.5, Silver Il. 37 PR. Mainzer Strasse Künzl 1979/81: 60, Nr. 66-Tab. 8	9. Ointment Pallet Inv. No. 645, GS 10 13.8x8.6, Serpentine Il. 33 PR. Gas Works Künzl 1979/81: 53, Nr. 2-Tab. 1-2
10. Oculist Stamp Inv. No. NA L. NA Il. 32 PR.NA Feugère et al 1986: 479, Nr. 28; E. 69; V. 88		

APPENDIX SIX
Instruments from Raetia

TABLE ONE
Regensburg, Castra Regina
Legionary Fortress (Including an Auxiliary Fort)

1. Scalpel Inv. No. A 2227, R 1 L. 9.2, CA Il. 43-45 PR. NA Dietz et al. 1979: 152	2. Forceps Inv. No. A 1470, R 1 L. 13.0, CA Il. 12 PR. Auxiliary Cohort Fort, Bath Building Dietz et al. 1979: 152	3. Oculist Stamp Inv. No. A 1995, R 1 L. 5.66, Stone Il. 32 PR. Large Grave field, Grave 967 Dietz et al. 1979: 152
4. Spoon Probe Inv. No. A 3580, R 1 L. 10.4, CA Il. 42 PR. NA Dietz et al. 1979: 152	5. Oculist Stamp Inv. No. NA L. NA Il. 33 PR. NA Feugère et al 1986: 479, Nr. 29; E. 152; V. 145	

TABLE TWO
Weissenburg, Bricianis
Auxiliary Fort

1. Spoon Probe Inv. No. NA L. NA, CA Il. 42 PR. NA Kohl &Tröltsch 1906: 38, Nr.89-Tab. 7 Nr. 39	2. Spoon Probe Inv. No. NA L. NA, CA Il. 42 PR. NA Kohl & Tröltsch 1906: 38, Nr.89-Tab. 7 Nr. 40	3. Spoon Probe Inv. No. NA L. NA, CA Il. 42 PR. NA Kohl & Tröltsch 1906: 38, Nr..89-Tab.7 Nr. 41
4. Spatula Probe Inv. No. NA L. NA, CA Il. 39-40 PR. NA Kohl & Tröltsch 1906: 38, Nr. 89-Tab. 7 Nr. 38	5. Ear Probe Inv. No. NA L. NA, CA Il. 37 PR. East Building Kohl & Tröltsch 1906: 38, Nr. 90-Tab. 7 Nr. 47	6. Ear Probe Inv. No. NA L. NA, CA Il. 37 PR. NA Kohl & Tröltsch 1906: 38, Nr. 90-Tab. 7 Nr. 48

TABLE THREE
Munningen
Auxiliary Fort

1. Spoon Probe Inv. No. NA L. 15.0, CA Il. 42 PR. NA Eidam 1929: 22, Nr. 28-Tab. 5

TABLE FOUR
Ellingen
Auxiliary Fort

1. Sharp Hook Inv. No. 1991, 686 L. 3.6, CA Il. 23 PR. NA Zanier 1992: 183, Nr. 150-Tab. 19	2. Ear Probe Inv. No. 1983, 2740 L. 14.9, CA Il. 37 PR. Barrack Room 8 x 72/ y 67 Zanier 1992: 183, Nr. 144-Tab. 19	3. Ear Probe Inv. No. 1983, 2739 L. 12.4, CA Il. 37 PR. Via Sagularis North Building D x 35, 20/ y 89, 80 Zanier 1992: 183, Nr. 145-Tab. 19
4. Ear Probe Inv. No. 1983, 2741 L. 9.7, CA Il. 37 PR. Building C Middle part x 62, 40/ y 85, 10 Zanier 1992: 183, Nr. 146-Tab. 19	5. Olivary End Probe Inv. No. 1991, 346 L. 11.6, CA Il. NA PR. NA Zanier 1992: 183, Nr. 147-Tab. 19	6. Olivary End Probe Inv. No. 1991, 2426 L. 9.5, CA Il. NA PR. Schacht 6, x 16.50/ y 34 Zanier 1992: 183, Nr. 148-Tab. 19
7. Olivary End Probe Inv. No. 1991, 1151 L. 6.2, CA Il. NA PR. NA Zanier 1992: 183, Nr. 149-Tab. 19		

TABLE FIVE
Günzburg, Gontia
Auxiliary Fort

1. Spoon Probe Inv. No. NA, R 2 L. NA, CA Il. 42 PR. Grave 496, Necropolis Künzl 1983: 121, Middle Empire	2. Needle Inv. No. NA, R 2 L. NA, CA Il. 30 PR. Grave 496, Necropolis Künzl 1983: 121, Middle Empire	3. Medical box Inv. No. NA, R 2 7.2 x 5.4 x 1.8, CA Il. 29 PR. Grave 496, Necropolis Künzl 1983: 121; Sobel (1991) 128, Middle Empire

TABLE SIX
Pfünz, Vetoniana
Auxiliary Fort

1. Spatula Probe Inv. No. NA L. NA, CA Il. 39-40 PR. NA Winkelmann & Jacobs 1901: 24, Nr. 63-Tab. 12 Nr. 7	2. Spoon Probe Inv. No. NA L. NA, CA Il. 42 Pr. NA Winkelmann & Jacobs 1901: 24, Nr. 63-Tab. 12 Nr.	3. Spoon Probe Inv. No. NA L. NA, CA Il. 42 PR. NA Winkelmann & Jacobs 1901: 24, Nr. 63-Tab. 12 Nr. 9
4. Ear Probe Inv. No. NA L. NA, CA Il. 37 PR. NA	5. Ear Probe Inv. No. NA L. NA, CA Il. 37 PR. NA	6. Ear Probe Inv. No. NA L. NA, CA Il. 37 PR. NA

Winkelmann & Jacobs 1901: 24, Nr. 61-Tab. 12 Nr. 23	Winkelmann & Jacobs 1901: 24, Nr. 61-Tab. 12 Nr. 25	Winkelmann & Jacobs 1901: 24, Nr. 61-Tab. 12 Nr. 26

TABLE SEVEN
Gnotzheim
Auxiliary Fort

1. Spatula Probe Inv. No. NA L. 9.3, CA Il. 39-40 PR. NA Obermedizininalrat & Barthel 1907: 20

TABLE EIGHT
Dambach
Auxiliary Fort

1. Spoon Probe Inv. No. NA L. 5.5, CA Il. 42 PR. NA Kohl et al 1901: 20, Nr. 2

TABLE NINE
Faimingen
Auxiliary Fort

1. Ear Probe Inv. No. 1105 L. NA, CA Il. 37 PR. NA Scheller & Drexel 1911: 43, Nr. 8	2. Ear Probe Inv. No. 7195 L. NA, CA Il. 37 PR. Vicus Scheller & Drexel 1911: 43, Nr. 8
3. Ear Probe Inv. No. 997 L. NA, CA Il. 37 PR. NA Scheller & Drexel 1911: 43, Nr. 8	4. Olivary End Probe Inv. No. NA L. 16.0, CA Il. NA PR. Vicus Scheller & Drexel 1911: 43, Nr. 10

TABLE TEN
Heidenheim, Aquileia,
Auxiliary Fort

1. Spatula Probe Inv. No. NA L. 18.0, CA Il. 39-40 PR. Outside the fort Brenzstrasse Prescher & Jacobs 1900: 4, Nr. 9

TABLE ELEVEN
Lonsee Urspring
Auxiliary Fort

1. Spoon Probe Inv. No. NA L. 15.0, CA Il. 42 PR. Room K West Building Druck 1904: 36, Nr. 17	2. Spoon Probe Inv. No. NA L. 12.0, CA Il. 42 Room 5 Middle Building Druck 1904: 36, Nr. 17

TABLE TWELVE
Wallheim
Auxiliary Fort

1. Spoon Probe Inv. No. NA L. NA, CA Il. 42 PR. NA Swoboda 1967: Tab. 112- Fig. 2

TABLE THIRTEEN
Oberstimm
Auxiliary Fort

1. Double Simple Probe Inv. No. 1975, 57, R 3 L. 15.1, CA Il. 35 PR. NA Böhme 1978: 188, Tab. 31 B 450	2. Spatula Probe Inv. No. 1975, 314, R 3 L. 19.4, CA Il. 39-40 PR. Trench 29, Section a, Fig. 69, Nr, 1. Böhme 1978: 188, Tab. 31 B 447	3. Spatula Probe Inv. No. 1975, 189, R 3 L. 16.4, CA Il. 39-40 PR. NA Böhme 1978: 188, Tab. 31 B 448
4. Spatula Probe Inv. No. 1975, 189, R 3 L. 5.6, CA Il. 39-40 PR. Area 19, Fig. 69, Nr.2 Böhme 1978: 188, Tab. 31 B 449	5. Small Spatula Probe Inv. No. 1975, 289, R 3 L. 12.0, CA Il. NA PR. NA Böhme 1978: 188, Tab. 31 B 452	6. Ear Probe Inv. No. 1975, 225, R 3 L. 13.9, CA Il. 37 PR. Area 21, Fig. 69, Nr. 4 Böhme 1978: 188, Tab. 31 B 451
7. Olivary End Probe Inv. No. 1975, 224, R 3 L. 6.6, CA Il. NA PR. Area 21, Section b, Fig. 69, Nr. 4 Böhme 1978: 187, Tab. 30 B 443	8. Olivary End Probe Inv. No. 1975, 224, R 3 L. 4.5, CA Il. NA PR. Area 22, section b, Fig. 69, Nr. 3 Böhme 1978: 187, Tab. 30 B 443	9. Olivary End Probe Inv. No. 1975, 185, R 3 L. 7.7, CA Il. NA PR. Area 19, Fig. 69, Nr. 2 Böhme 1978: 187, Tab. 30 B 444
10. Olivary End Probe Inv. No. 1975, 207, R 3 L. 10. 8, CA Il. NA PR. Area19 west section cut 1-11, Fig. 69, Nr. 2 Böhme 1978: 187, Tab. 30 445	11. Olivary End Probe Inv. No. 1975, 66, R 3 L. 12.1, CA Il. NA PR. Area 4 southwest corner, Fig. 69, Nr. 5 Böhme 1978: 187, Tab. 30446	

TABLE FOURTEEN
Straubing, Soviodurum
Auxiliary Fort

1. Spoon Probe Inv. No. 3879, R 4 L. NA, CA Il. 42 PR. West Vicus Pl 1009/ 21-23 Walke 1965: 153, Nr. 2-Tab.109	2. Spoon Probe Inv. No. 3875, R 4 L. NA, CA Il. 42 PR. West Vicus Pl 1009/ 23-24 Walke 1965: 153, Nr. 3-Tab. 109	3. Spoon Probe Inv. No. 3878, R 4 L. NA, CA Il. 42 PR. South Vicus Pl 3602, Excavation 1896 Walke 1965: 153, Nr. 4-Tab. 109
4. Spoon Probe Inv. No. 3880, R 4 L. NA, CA Il. 42 Pr. NA Walke 1965: 153, Nr. 5-Tab. 109	5. Spoon Probe Inv. No. 3881, R 4 L. NA, CA Il. 42 PR. NA Walke 1965: 153, Nr. 6-Tab. 109	6. Spoon Probe Broken Inv. No. 3882, R 4 L. NA, CA Il. 42 PR. Fort West Pl. 3609/1109/0 1898 Walke 1965: 153, Nr. 8-Tab. 109
7. Spatula Probe Inv. No. 3889, R 4 L. NA, CA Il. 39-40 PR. NA Walke 1965: 153, Nr. 9-Tab. 109 Spatula has pointed end	8. Spatula Probe Inv. No. 3884, R 4 L. NA, CA Il. 39-40 PR. West Vicus Pl 1009/ 23, 1953 Walke 1965: 153, Nr. 10-Tab. 109	9. Spatula Probe Inv. No. 3886, R 4 L. NA, CA Il. 39-40 PR. West Vicus Walke 1965: 153, Nr. 11-Tab. 109
10 Spatula Probe Inv. No. 3888, R 4 L. NA, Ca Il. 39-40 PR. NA Walke 1965: 153. Nr. 12-Tab. 109	11. Small Spatula Probe Inv. No. 3890, R 4 L. NA, CA Il. NA north-east Vicus Pl 3634/ 7. 24 1930 Walke 1965: 153, Nr. 13-Tab. 109	12. Ear Probe Inv. No. 3896, R 4 L. NA, CA Il. 37 PR. North-East Vicus Pl 3634/ 0.8 1934 Walke 1965: 153, Nr. 14-Tab. 110
13. Ear Probe Inv. No. 3911, R 4 L. NA, CA Il. 37 PR. NA Walke 1965: 153, Nr. 15-Tab. 110	14. Ear Probe Inv. No. 3892, R 4 L. NA, Ca Il. 37 PR. South Vicus Pl 3516/ 2, 1950 Walke 1965: 153, Nr. 16-Tab. 110	15. Ear Probe Inv. No. 3912, R 4 L. NA, CA Il. 37 PR. Fort south Pl 3622, 1913 Walke 1965: 153, Nr. 17-Tab. 110
16. Ear Probe Inv. No. 3903, R 4 L. NA, CA Il. 37 PR. NA Walke 1965: 153, Nr. 18-Tab. 110	17. Ear Probe Inv. No. 3902, R 4 L. NA, CA Il. 37 PR, NA Walke 1965: 153, Nr. 19-Tab. 110	18. Ear Probe Inv. No. 3913, R 4 L. NA, CA Il. 37 PR. NA Walke 1965: 153, Nr. 20-Tab. 110
19. Olivary End Probe Inv. No. 3883, R 4 L. NA, CA Il. NA PR. North-East Vicus Pl 3632/ 4-6 Walke 1965:153, Nr. 7-Tab. 109	20 Olivary End Probe Inv. No. 3877, R 4 L. NA, CA Il. NA PR. West Vicus Pl 1009/ 21-22 Walke 1965: 153, Nr. 1-Tab. 109	21. Oculist Stamp Inv. No. NA L. NA Il. 32 PR. NA Feugère et al 1986: 479, Nr. 31, V. 254

TABLE FIFTEEN
Risstissen
Auxiliary Fort

1. Scalpel Inv. No. A 621, R 5 L. NA, CA Il. 43-45 PR. NA Ulbert 1959: 107, Nr. 6, Tab. 66	2. Sharp Hook Inv. No. A 2088, R 5 L. NA, CA Il. 23 PR. NA Ulbert 1959: 107, Nr 12, Tab. 66	3. Forceps Inv. No. A 787, R 5 L. NA, CA Il. 11-12 PR. NA Ulbert 1959: 107, Nr 13, Tab. 66
4. Spoon Probe Inv. No. 3953, R 6 L. NA, CA Il. 42 PR. NA Ulbert 1959: 107, Nr 14-Tab. 66	5. Spoon Probe Inv. No. 66/188, R 5 L. 15.3, CA Il. 42 PR. NA Ulbert 1970: 31, Nr 165, Tab. 11	6. Spoon Probe Inv. No. 66/77, R 5 L. 12.0, CA Il. 42 PR. NA Ulbert 1970: 31, Nr 166, Tab. 11
7. Spoon Probe Broken Inv. No. 66/244, R 5 L. 11.0, CA Il. 42 PR, NA Ulbert 1970: 31, Nr 167, Tab. 11	8. Forceps with Ear Probe Inv. No. 68/66, R 5 L. 14.0, CA Il. NA PR. NA Ulbert 1970: 31, Nr 164, Tab. 11	

APPENDIX SEVEN
Medical Instruments from Noricum

TABLE ONE
Enns-Lorch, Lauriacum
Legionary Fortress

1. Scalpel Inv. No. NA, N 1 L. 11.7, CA Il. 43-45 PR. NA	2. Surgical Knife Inv. No. R VII 777, N-1 L. 11.4, CA Il. 46 PR. Friedhofes Lorch Deringer 1954: 149, Fig. 81, Nr. 2	3. Forceps Inv. No. R VII 913, N 1 L. 15.1, CA Il. 11-12 PR. Parz 1076/ 1KS Enns
4. Pterygotom Inv. No. R VII 692, N 1 L. 11.5, Silver Il. 60 PR. 1951 East end of building group one, grave Deringer 1954: 149, Nr. 1-Fig. 81; Künzl (1983) 116 Ear probe at opposite end	5. Spoon Probe Inv. No. R. VII 765, N 1 L. 13.8, CA Il. 42 PR. 1905 In the Camp Barrack IV Deringer 1954: 147 d, Fig. 79 Nr. 10; Groller 1907: 141, Fig. 62, Nr 55	6. Spoon Probe Inv. No. R VII 766, N 1 l. 15.6, CA Il. 42 PR. NA Deringer 1954: 147 e, Fig 81, Nr. 3
7. Spoon Probe Inv. No. R VII 775, N 1 L. 16.9, CA Il. 42 PR. 1908 Herrschaftsfeld Deringer 1954: 147 b, Fig. 79, Nr. 8	8. Spoon Probe Inv. No. RVII 768, N 1 L. 12.85, CA Il. 42 PR. 1894 Eichburg S-E of the schottergrube Deringer 1954: 147 g, Fig. 79, Nr. 11	9. Spoon Probe Inv. No. R VII 769, N 1 L. 9.5, CA Il. 42 PR. 1907 In the central area of the fortress 147 h, Fig. 79 Nr 12; Groller 1909: 99, Fig. 39, Nr. 7
10. Spoon Probe Inv. No. R VII 764, N 1 L. 16.3, CA Il. 42 PR. NA Deringer 1954: 147 c, Fig. 79, Nr. 9	11. Spoon Probe Inv. No. R VII 767, N 1 L. 15.6, CA Il. 42 PR. Sammlung Kukonnig. Found next to the train station Deringer 1954: 147 f	12. Spoon Probe Inv. No. R VII 776, N 1 L. 17.5, CA Il. 42 PR. Deringer 1954: 147a, Fig. 79, Nr. 7
13. Spatula Probe Inv. No. R VII 765/1, N 1 L. 13.85, CA Il .39-40 1905 Barrack II Deringer 1954: 149a, Fig. 79 Nr. 13a; Groller 1907: 141, Fig. 62, Nr. 4	14. Spatula Probe Inv. No. R VII 772, N 1 L. 9.5, CA Il. 39-40 PR. NA Deringer 1954: 149c, Fig. 79, Nr. 15	15. Spatula Probe Inv. No. R VII 774, N 1 L. 10.0, CA Il. 39-40 PR. 1919 Limes excavation Deringer 1954: 149e, Fig. 79, Nr. 16
16. Spatula Probe Inv. No. R VII 585, N 1 L. 11.0, CA Il. 39-40 PR. 1930 Civil settlement Deringer 1954: 149g, Fig. 79, Nr. 18	17. Spatula Probe Inv. No. R VII 771, N 1 L. 13.7, CA Il. 39-40 PR. 1916 Friedhoff soldiers grave Deringer 1954: 149 b, Fig. 79, Nr. 14	18. Spatula Probe Broken Inv. No. R VII 773, N 1 L. 7.4, CA Il. 39-40 PR. NA Deringer 1954: 149d, Fig. 79, Nr. 17
19. Ear Probe Inv. No. R VII 756, N 1 L. 13.4, CA	20. Ear Probe Inv. No. R VII 733, N 1 L. 11.6, CA	21. Ear Probe Inv. No. R VII 734, N 1 L. 11.6, CA

Il. 37 PR. 1906 By the limes Deringer 1954: 146 c	Il. 37 PR. 1905 Camp excavations Deringer 1954: 146, Fig 79, Nr. 4 d; Groller 1907: 141	Il. 37 PR. Found in a hypocaust in the fort
22. Ear Probe (S/T) Inv. No. R VII 251, N 1 L. NA, CA Il. 37 PR. Dedrahntsfeld by Habdschuhmacher House Sammlung Bukong	23. Ear Probe (S/T) Inv. No. R VII 474, N 1 L. 13.4, CA Il. 37 PR. 1914 Limes excavation Deringer 1954: 146 a; Groller 1924: 11-12, Fig. 8	24. Ear Probe (S/T) Inv. No. R VII 739, N 1 L. 8.0, CA Il. 37 PR. 1911 Limes excavation Deringer 1954: 146 f
25. Ear Probe (S/T) Inv. No. R VII 471, N 1 L. 15.6, CA Il. 37 PR. 1914 Limes Excavation Deringer 1954: 146 b; Groller 1924: 11-12, Fig. 8	26. Olivary End Probe (S/T) Inv. No. R VII 770 N 1 L. 11.2, CA Il. NA PR. 1900 The bath of the camp Deringer 1954: 148 k, Fig. 79, Nr. 13	27. Olivary End Probe (S/T) Inv. No. R V 130, N 1 L. 11.15, CA Il. NA PR. NA Deringer 1954: 149 a, Fig. 79, Nr. 19
28. Olivary End Probe (S/T) Inv. No. R V 131, N 1 L. 10.4, CA Il. NA PR. NA Deringer 1954: 150b, Fig. 79, Nr. 20	29. Ointment Pallet (S/T) Inv. No. R V 169, N 1 L. 21.5, CA Il. 33 PR. Water canal in the retentura Deringer 1954: 150 b, Fig. 83, Nr. 2	30. Oculist Stamp Inv. No. NA L. NA Il. 32 PR. NA Feugère et al 1986: 479, Nr. 31, E. 51, V. 216

APPENDIX EIGHT
Medical Instruments from Pannonia Superior

TABLE ONE
Bad-Deutsch Altenburg, Carnuntum
Legionary Fortress and Auxiliary Fort

1. Scalpel Inv. No. 21872, PS 1 L. 6.5, CA Il. 43-45 PR. Canabae Hauff 1993/94: 116, Nr.1-Tab. 1, 1-2 century	2. Scalpel Inv. No. 21392A, PS 1 L. 11.5, CA Il. 43-45 PR. Canabae Hauff 1993/94: 116, Nr. 2 Tab. 1, 3rd Century	3. Scalpel Inv. No. 14610, PS 1 L. NA, CA Il. 43-45 PR. Carnuntum Hauff 1993/94: 116, Nr. 3-Tab. 1 Copper and Silver Inlay, Blunt dissector broken, 1-2 Century
4. Scalpel Inv. No. 13228, PS 1 L. 5.6, CA Il. 43-45 PR, Carnuntum Hauff 1993/94: 116, Nr. 4-Tab. 1, 1-2 Century	5. Scalpel Inv. No. 19863, PS 1 L. 6.5, CA Il. 43-45 PR. Civil Settlement Hauff 1993/94: 116, Nr. 5-Tab. 1. Has a small handle with a knob at the top, 1-2 Century	6. Scalpel Inv. No, NA, PS 1 L. 6.8, CA Il. 43-45 PR. Carnuntum Hauff 1993/94: 118, Nr. 6-Tab. 1, 1-4 Century
7. Sharp Hook Inv. No. 15053, PS 1 L. 15.4, CA Il. 23 PR. Carnuntum Hauff 1993/94: 124, Nr. 23-Tab. 5	8. Sharp Hook Inv. No. 15597, PS 1 L. 13.9, CA Il. 23 PR. North Section of the Retentura Right Side, Map 66 Hauff 1993/94: 124, Nr. 24-Tab. 5, Appears to be a Ligula with a diagonal handle, 1-4 Century	9. Sharp Hook Inv. No. 13176, PS 1 L. 15.0, CA Il. 23 PR. Hospital West of the Quaestorium Hauff 1993/94: 124, Nr. 25-Tab. 5, Baluster formation at the top, 1-4 Century
10. Sharp Hook Inv. No. 13081, PS 1 L. 16.5, CA Il. 23 PR. Hospital West of the Quaestorium Hauff 1993/94: 124, Nr. 26-Tab. 5, Baluster formation at the top of the instrument, 1-4 Century	11. Sharp Hook Inv. No. 12324, PS 1 L. 15.3, CA Il. 23 PR. Area Between the Via Secunda and via Quintana Hauff 1993/94: 124, Nr. 27-Tab. 6, Silver inlay on the handle, curved neck, Blunt hook, 1 Century	12. Hook with Spatula Inv. No. 15570, PS 1 L. 13.5, CA Il. NA PR. Carnuntum Hauff 1993/94: 126, Nr. 28-Tab. 6. The hook is broken and the other end has a spatula, 1 Century.
13. Needle handle Inv. No. 13230, PS 1 L. 4.8, CA Il. 30 PR. Carnuntum Hauff 1993/94: 126, Nr. 29-Tab. 6, Handle Decorated with an Acanthus formation and the other end has a hole for an iron needle, 3 Century	14. Needle handle Inv. No. 14578, PS 1 L. 5.6, CA Il. 30 PR. Carnuntum Hauff 1993/94: 126, Nr. 30 - Tab. 6, Decorated cylindrical handle with a hole on the bottom for a needle, 3 Century	15. Dental Forceps Inv. No. 15445, PS 1 L. 18.0, Iron Il. 15 PR. Carnuntum Hauff 1993/94: 126, Nr. 31 - Tab. 7, Silver inlay, a bolt in the centre holds the forceps together, 1-2 Century
16. Bone Knife Inv. No. 15039, PS 1 L. 11.4, CA Il. NA	17. Female Catheter Inv. No. 15446, PS 1 L. 14.4, CA Il. 50 A	18. Male Catheter Inv. No. NA, PS 1 L. 22.3, CA Il. 49 A

PR. Carnuntum Hauff 1993/94: 126, Nr. 32 - Tab. 7, a knife for cutting bone, 1-2 Century	PR. Carnuntum Hauff 1993/94: 126, Tab. 7, Nr. 33, the top opening is 0.9 cm and the bottom end is circular, 1 Century	PR. Carnuntum Hauff 1993/94: 128, Tab, 7. Nr. 34, the opening is 0.5 cm l, the utility end is rounded with an opening to its side, and the bottom end is circular, 1 Century
19. Forceps Inv. No. 15623, PS 1 L. 12.0, CA Il. 14 PR. Civil Settlement Insula VI 1952 Hauff 1993/94: 118, Nr. 7- Tab. 2, Clamp and Jagged teeth 2-3 Century	20. Forceps Inv. No. 15461, PS 1 L. 16.6, CA Il. 14 PR. Carnuntum Hauff 1993/94: 118, Nr. 8- Tab. 2, Jagged teeth 3rd Century	21. Forceps Inv. No. 16026, PS 1 L. 11.7, CA Il. 12 PR. NA Hauff 1993/94: 118, Nr. 9- Tab. 2, 2-3 Century
22. Forceps Inv. No. 167/90, PS 1 L. 9.8, CA Il. 12 PR. Civil Settlement 1989-90 Hauff 1993/94: 118, Nr. 10- Tab. 2, Ball Formation at the top, ends turn inwards, 2-3 Century	23. Spatula Probe Inv. No. 15052, PS 1 L. 18.5, CA Il. 39-40 PR. Carnuntum Hauff 1993/94: 128, Nr. 36 - Tab. 8, 1-4 Century	24. Spatula Probe Inv. No. 15067, PS 1 L. 15.3, CA Il. 39-40 PR. Carnuntum Hauff 1993/94: 128, Nr. 37 - Tab. 8, 1-4 Century
25. Spatula Probe Inv. No. 15605, PS 1 L. 19.4, CA Il. 39-40 PR. Civil Settlement Insula VI 1949 Hauff 1993/94: 128, Nr. 38 - Tab. 8	26. Spatula Probe Inv. No. 15065, PS 1 L. 18.1, CA Il. 39-40 PR. Civil Settlement Insula VI 1952 Hauff 1993/94: 128, Nr. 39 - Tab. 8, 1-4 century	27. Spatula Probe Inv. No. VI 2612 KhM/AS Wien, PS 1 L. 18.8, CA Il. 39-40 PR. Carnuntum Hauff 1993/94: 128-130, Nr. 40 -Tab. 9, 1-4 century
28. Spatula Probe Inv. No. VI. 4121 KhM/AS Wien, PS 1 L. 15.5, CA Il. 39-40 PR. Carnuntum Hauff 1993/94: 130, Nr. 41 - Tab. 9, 1-4 century	29. Spatula Probe Inv. No. 15469, PS 1 L. 11.2, CA Il. 39-40 PR. Carnuntum Hauff 1993/94: 130, Nr. 42 - Tab. 9, 1-4 century	30. Spatula Probe Inv. No. 16071, PS 1 L. 15.4, CA Il. 39-40 PR. Carnuntum Hauff 1993/94: 130, Nr. 43 - Tab. 9, 1-4 century
31. Spatula Probe Inv. No. 15599, PS 1 L. 14.3, CA Il. 39-40 PR. Carnuntum Hauff 1993/94: 130, Nr. 44 -Tab 9, 1-4 century	32. Spatula Probe Inv. No. NA, PS 1 L. 15.2, CA Il. 39-40 PR. Bad Deutsch-Altenburg Hauff 1993/94: 130, Nr. 45 - Tab. 10, 1-4 century	33. Spatula Probe Inv. No. 3915 NO LM, PS 1 L. 8.4, CA Il. 39-40 Hauff 1993/94: 132, Nr. 46-Tab. 10, 1-4 century
34. Spatula Probe Inv. No. 5860 NO LM, PS 1 L. 17.0, CA Il. 39-40 PR. Carnuntum Hauff 1993/94: 134, Nr. 55-Tab. 11, 1-4 century	35. Spatula Probe Inv. No. 15468, PS 1 L. 15.3, CA Il. 39-40 PR. Between Via Secunda and Via Quintana Hauff 1993/94: 134, Nr. 56- Tab. 11, 1-4 century	36. Spatula Probe Inv. No. 15070, PS 1 L. 17.7, CA Il. 39-40 PR. Carnuntum Hauff 1993/94: 134, Nr. 57-Tab. 11
37. Spatula Probe Broken Inv. No. 15598, PS 1 L. 15.3, CA	38. Spatula Probe Broken Inv. No. 15613, PS 1 L. 7.3, CA	39. Spatula Probe Broken Inv. No. 21909, PS 1 L. 5.2, CA

Il. 39-40 PR. Carnuntum Hauff 1993/94: 128, Nr. 35 - Tab. 8, 1-4 Century	Il. 39-40 PR. East and South-east of Camp Hauff 1993/94: 132, Nr. 47 - Tab. 10, 1-4 century	Il. 39-40 PR. Carnuntum Hauff 1993/94: 132, Nr. 48 - Tab. 10, 1-4 century
40. Spatula Probe Broken Inv. No. 21997a, PS 1 L. 6.0, CA Il. 39-40 PR. Carnuntum Hauff 1993/94: 132, Nr. 49 - Tab. 10, 1-4 century	41. Spatula Probe Broken Inv. No. 21997b, PS 1 L. 8.5, CA Il. 39-40 PR. Carnuntum Hauff 1993/94: 132, Nr. 50 - Tab. 10, 1-4 century	42. Spatula Probe Broken Inv. No. 22014, PS 1 L. 4.1, CA Il. 39-40 PR. Carnuntum Hauff 1993/94: 132, Nr. 51 - Tab. 10, 1-4 century
43. Spatula Probe Broken Inv. No. NA, PS 1 L. 4.6, CA Il. 39-40 PR. Canabae (west) Hauff 1993/94: 134, Nr. 52 - Tab. 10, 1-4 century	44. Spatula Probe Broken Inv. No. NA, PS 1 L. 3.3, CA Il. 39-40 PR. Carnuntum Hauff 1993/94: 134, Nr. 53 - Tab. 10, 1-4 century	45. Spatula Probe Broken Inv. No. NA, PS 1 L. 4.5, CA Il. 39-40 PR. Canabae 1986 Hauff 1993/94: 134, Nr. 54 - Tab. 10, 1-4 century
46. Spatula Probe (Small Blade) Inv. No. 15609, PS 1 L. 14.2, CA Il. NA PR. Carnuntum Hauff 1993/94: 152, Nr. 104- Tab. 20, 1-4 Century	47 Spatula Probe (Small Blade) Inv. No. 15517, PS 1 L. 7.2, CA Il. NA PR. Carnuntum Hauff 1993/94: 154, Nr. 105- Tab. 20, 1-4 Century	48. Spoon Probe Inv. No. 16056, PS 1 L. 18.2, CA Il. 42 PR. Carnuntum Hauff 1993/94: 136, Nr. 58-Tab. 12, 1-4 Century
49. Spoon Probe Inv. No. 15058, PS 1 L. 14.8, CA Il. 42 PR. Carnuntum Hauff 1993/94: 136, Nr. 59-Tab. 12, 1-4 Century	50. Spoon Probe Inv. No. NA, PS 1 L. 14.5, CA Il. 42 PR. Civil Settlement 1952 Hauff 1993/94: 136, Nr. 60-Tab. 12, 1-4 Century	51. Spoon Probe Inv. No. 15607, PS 1 L. 12.1, CA Il. 42 PR. Carnuntum Hauff 1993/94: 136, Nr. 61-Tab. 12, 1-4 Century
52. Spoon Probe Inv. No. 22347, PS 1 L. 10.9, CA Il. 42 PR. Carnuntum Hauff 1993/94: 136, Nr. 62-Tab. 12, 1-4 Century	53. Spoon Probe Inv. No. 15854,PS 1 L. 12.6, CA Il. 42 PR. Bad Deutsch-Altenburg 1963 Hauff 1993/94: 136-140, Nr. 63- Tab. 12, 1-4 Century	54. Spoon Probe Inv. No. 15060, PS 1 L. 11.8, CA Il. 42 PR. Carnuntum Hauff 1993/94: 140, Nr. 64-Tab. 13, 1-4 Century
55. Spoon Probe Inv. No. 15606,PS 1 L. 13.7, CA Il. 42 PR. Carnuntum Hauff 1993/94: 140, Nr. 65-Tab. 13, 1-4 Century	56. Spoon Probe Inv. No. 4 89, PS 1 L. 10.2, CA Il. 42 PR. Civil Settlement 1989-90 Hauff 1993/94: 140, Nr. 66-Tab. 13, 1-4 Century	57. Spoon Probe Inv. No. 15057, PS 1 L. 16.8, CA Il. 42 PR. Carnuntum Hauff 1993/94: 140, Nr. 67-Tab. 13, 1-4 Century
58. Spoon Probe Inv. No. 15601, PS 1 L. 17.1, CA Il. 42 PR. Carnuntum Hauff 1993/94: 140, Nr. 68 Tab. 14, 1-4 Century	59. Spoon Probe Inv. No. 15602, PS 1 L. 14.7, CA Il. 42 PR. Carnuntum Hauff 1993/94: 140, Nr. 69 Tab. 14, 1-4 Century	60. Spoon Probe Inv. No. 15055, PS 1 L. 15.7, CA Il. 42 PR. Carnuntum Hauff 1993/94: 142, Nr. 70- Tab. 14, 1-4 Century
61. Spoon Probe Inv. No. 15059, PS 1 L. 11.6, CA Il. 42	62 Spoon Probe Inv. No. 15066, PS 1 L. 18.7, CA Il. 42	63. Spoon Probe Inv. No. 3914 NO LM, PS 1 L. 13.4, CA Il. 42

PR. Carnuntum Hauff 1993/94: 142, Nr. 71-Tab. 14, 1-4 Century	PR. Carnuntum Hauff 1993/94: 142, Nr. 72-Tab. 15, 1-4 Century	PR. Carnuntum Hauff 1993/94: 142, Nr. 73-Tab. 15, 1-4 Century
64. Spoon Probe Inv. No. 15620, PS 1 L. 13.8, CA Il. 42 PR. Hospital West of Quaestorium Hauff 1993/94: 142, Nr. 74-Tab. 15, 1-4 Century	65. Spoon Probe Inv. No. 15608, PS 1 L. 10.0, CA Il. 42 PR. Carnuntum Hauff 1993/94: 144, Nr. 75-Tab. 15, 1-4 Century	66. Spoon Probe Inv. No. 15611, PS 1 l. 11.0, CA Il. 42 PR. Carnuntum Hauff 1993/94: 144, Nr. 76-Tab. 15, 1-4 Century
67. Spoon Probe Inv. No. 21909, PS 1 L. 8.9, CA Il. 42 PR. Carnuntum Hauff 1993/94: 144, Nr. 77-Tab. 16, 1-4 Century	68. Spoon Probe Broken Inv. No. 15603, PS 1 L. 4.7, CA Il. 42 PR. Carnuntum Hauff 1993/94: 144, Nr. 78-Tab. 16, 1-4 Century	69. Spoon Probe Broken Inv. No. 15612, PS 1 L. 4.0, CA Il. 42 PR. Carnuntum Hauff 1993/94: 144, Nr. 79-Tab. 16, 1-4 Century
70. Spoon Probe Broken Inv. No. 21842, PS 1 L. 4.4, CA Il. 42 PR. Carnuntum Hauff 1993/94: 144, Nr. 80-Tab. 16, 1-4 Century	71. Spoon Probe Broken Inv. No. 21909a, PS 1 L. 3.0, CA Il. 42 PR. Carnuntum Hauff 1993/94: 146, Nr. 81-Tab. 16, 1-4 Century	72. Spoon Probe Broken Inv. No. 21909b, PS 1 L. 5.5, CA Il. 42 PR. Carnuntum Hauff 1993/94: 146, Nr. 82-Tab. 16, 1-4 Century
73. Spoon Probe Broken Inv. No. 22152, PS 1 L. 6.0, CA Il. 42 PR. Carnuntum Hauff 1993/94: 146, Nr. 83-Tab. 16, 1-4 Century	74. Spoon Probe Broken Inv. No. 22151, PS 1 L. 5.5, CA Il. 42 PR. Carnuntum Hauff 1993/94: 146, Nr. 84-Tab. 16, 1-4 Century	75. Ear Probe Inv. No. 13172, PS 1 L. 8.2, CA Il. 37 PR. Carnuntum Hauff 1993/94: 150, Nr. 95-Tab. 19, 1-4 Century
76. Ear Probe Inv. No. 13158, PS 1 L. 11.2, CA Il. 37 PR. Civil Settlement 1963 Hauff 1993/94: 150, Nr. 96-Tab. 19, 1-4 Century	77. Ear Probe Inv. No. 13157, PS 1 L. 11.4, CA Il. 37 PR. Carnuntum Hauff 1993/94: 150, Nr. 97-Tab. 19, 1-4 Century	78. Ear Probe Inv. No. 13153, PS 1 L. 12.7, CA Il. 37 PR. Carnuntum Hauff 1993/94: 152, Nr. 98-Tab. 19, 1-4 Century
79. Ear Probe Inv. No. 13152, PS 1 L. 13.3, CA Il. 37 PR. Carnuntum Hauff 1993/94: 152, Nr. 99-Tab. 19, 1-4 Century	80. Ear Probe Inv. No. 13151, PS 1 L. 15.2, CA Il. 37 PR. Carnuntum Hauff 1993/94: 152, Nr. 100-Tab. 20, 1-4 Century	81. Ear Probe Inv. No. 12329, PS 1 L. 13.8, CA Il. 37 PR. Carnuntum Hauff 1993/94: 152, Nr. 101-Tab. 20, 1-4 Century
82. Ear Probe Inv. No. 13107, PS 1 L. 8.3, CA Il. 37 PR. Carnuntum Hauff 1993/94: 152, Nr. 102-Tab. 20, 1-4 Century	83. Ear Probe Inv. No. 13080, PS 1 L. 12.3, CA Il. 37 PR. Carnuntum Hauff 1993/94: 152, Nr. 103-Tab. 20, 1-4 Century	84. Ear Probe Inv. No. 13032, PS 1 L. 11.9, CA Il. 37 PR. Civil Settlement Insula VI 1953 Hauff 1993/94: 154, Nr. 106-Tab. 21
85. Ear Probe Inv. No. 13046, PS 1 L. 10.3, CA Il. 37 PR. Carnuntum	86. Ear Probe Inv. No. 13079, PS 1 L. 12.6, CA Il. 37 PR. Carnuntum	87. Ear Probe Inv. No. 13081, PS 1 L. 12.0, CA Il. 37 PR. Hospital west of the

Hauff 1993/94: 154, Nr. 107-Tab. 21	Hauff 1993/94: 154, Nr. 108-Tab. 21	Quaestorium, Map 66 Hauff 1993/94: 154, Nr. 109-Tab. 21
88. Ear Probe Inv. No. 13078, PS 1 L. 12.5, CA Il. 37 PR. Carnuntum Hauff 1993/94: 154, Nr. 110-Tab. 21	89. Ear Probe Inv. No. 13084, PS 1 L. 11.5, CA Il. 37 PR. Carnuntum Hauff 1993/94: 156, Nr. 111-Tab. 22	90. Ear Probe Inv. No. 13083, PS 1 L. 11.5, CA Il. 37 PR. Carnuntum Hauff 1993/94: 156, Nr. 112-Tab. 22
91. Ear Probe Inv. No. 13085, PS 1 L. 10.9, CA Il. 37 PR. Grave lined street west of the camp Hauff 1993/94: 156, Nr. 113-Tab. 22	92. Ear Probe Inv. No. 13087, PS 1 L. 10.9, CA Il. 37 PR. Carnuntum Hauff 1993/94: 156, Nr. 114-Tab. 22	93. Ear Probe Inv. No. 13088, PS 1 L. 10.5, CA Il. 37 PR. Carnuntum Hauff 1993/94: 156, Nr. 115-Tab. 22
94. Ear Probe Inv. No. 13089, PS 1 L. 10.4, CA Il. 37 PR. Carnuntum Hauff 1993/94: 156, Nr. 116-Tab. 22	95. Ear Probe Inv. No. 13091, PS 1 L. 9.5, CA Il. 37 PR. Carnuntum Hauff 1993/94: 156, Nr. 117-Tab. 23	96. Ear Probe Inv. No. 13090, PS 1 L. 10.1, CA Il. 37 PR. Carnuntum Hauff 1993/94: 158, Nr. 118-Tab. 23
97. Ear Probe Inv. No. 13093, PS 1 L. 9.5, CA Il. 37 PR. Carnuntum Hauff 1993/94: 158, Nr. 119-Tab. 23	98. Ear Probe Inv. No. 13094, PS 1 L. 9.0, CA Il. 37 PR. Legionary Camp Hauff 1993/94: 158, Nr. 120-Tab. 23	99. Ear Probe PR. 13095, PS 1 L. 9.2, CA Il. 37 PR. Carnuntum Hauff 1993/94: 158, Nr. 121-Tab. 23
100. Ear Probe Inv. No. 13096, PS 1 L. 8.9, CA Il. 37 PR. Carnuntum Hauff 1993/94: 158, Nr. 122-Tab. 23	101. Ear Probe Inv. No. 13097, PS 1 L. 8.6, CA Il. 37 PR. Carnuntum Hauff 1993/94: 158, Nr. 123-Tab. 24	102. Ear Probe Inv. No. 13098, PS 1 L. 8.5, CA Il. 37 PR. Carnuntum Hauff 1993/94: 158, Nr. 124-Tab. 24
103. Ear Probe Inv. No. 13099, PS 1 L. 8.3, CA Il. 37 PR. Praetentura left half, barracks, scamnum tribunorum Hauff 1993/94: 160, Nr. 125-Tab. 24	104 Ear Probe Inv. No. 13100, PS 1 L. 9.5, CA Il. 37 PR. Civil Settlement 1958 Hauff 1993/94: 160, Nr. 126-Tab. 24	105. Ear Probe Inv. No. 13101, PS 1 L. 8.1, CA Il. 37 PR. Carnuntum Hauff 1993/94: 160, Nr. 127-Tab. 24
106. Ear Probe Inv. No. 13102, PS 1 L. 7.9, CA Il. 37 PR. Carnuntum Hauff 1993/94: 160, Nr. 128-Tab. 24	107. Ear Probe Inv. No. 13104, PS 1 L. 7.8, CA Il. 37 PR. Retentura North section, Map 66 Hauff 1993/94: 160, Nr. 129-Tab. 25	108. Ear Probe Inv. No 13104, PS 1 L. 8.0, CA Il. 37 PR. Praetentura left half, barracks scamnum Tribunarum, Map 66 Hauff 1993/94: 160, Nr. 130-Tab. 25
109. Ear Probe Inv. No. 13106, PS 1 L. 8.0, CA	110. Ear Probe Inv. No. 13108, PS 1 L. 7.8, CA	111. Ear Probe Inv. No. 13109, PS 1 L. 7.7, CA

Il. 37 PR. Carnuntum Hauff 1993/94: 162, Nr. 131-Tab. 25	Il. 37 PR. Carnuntum Hauff 1993/94: 162, Nr. 132-Tab. 25	Il. 37 PR. Carnuntum Hauff 1993/94: 162, Nr. 133-Tab. 25
112. Ear Probe Inv. No. 13110, PS 1 L. 7.5, CA Il. 37 PR. Praetentura left half, scamnum tribunorum, barracks. Hauff 1993/94: 162, Nr. 134-Tab. 25	113. Ear Probe Inv. No. 13113, PS 1 L. 7.2, CA Il. 37 PR. Praetentura left half, scamnum tribunorum, barracks. Hauff 1993/94: 162, Nr. 135-Tab. 26	114. Ear Probe Inv. No. 13116, PS 1 L. 7.0, CA Il. 37 PR. Carnuntum Hauff 1993/94: 162, Nr. 136-Tab. 26
115. Ear Probe Inv. No. 13117, PS 1 L. 7.0, CA Il. 37 PR. Between via Secunda and via quintana Hauff 1993/94: 162, Nr. 137-Tab. 26	116. Ear Probe Inv. No. 13118, PS 1 L. 7.1, CA Il. 37 PR. Carnuntum Hauff 1993/94: 164, Nr. 138-Tab. 26	117. Ear Probe Inv. No. 13119, PS 1 L. 7.6, CA Il. 37 PR. Carnuntum Hauff 1993/94: 164, Nr. 139-Tab. 26
118. Ear Probe Inv. No. 13120, PS 1 L. 6.7, CA Il. 37 PR. Praetentura left half, scamnum tribunorum, barracks. Hauff 1993/94: 164, Nr. 140-Tab. 26	119. Ear Probe Inv. No. 13121, PS 1 L. 6.9, CA Il. 37 PR. Carnuntum Hauff 1993/94: 164, NR 141 Tab 27	120. Ear Probe Inv. No. 13122, PS 1 L. 6.7, CA Il. 37 PR. Carnuntum Hauff 1993/94: 164, Nr. 142-Tab. 27
121. Ear Probe Inv. No. 13123, PS 1 L. 7.6, CA Il. 37 PR. Carnuntum Hauff 1993/94: 164, Nr. 143-Tab. 27	122. Ear Probe Inv. No. 13124, PS 1 L. 5.9, CA Il. 37 PR. Carnuntum Hauff 1993/94: 164, Nr. 144-Tab. 27	123. Ear Probe Inv. No. 13125, PS 1 L. 4.4, CA Il. 37 PR. Praetentura left half, scamnum tribunorum, barrack. Hauff 1993/94: 166, Nr. 145-Tab. 27
124. Ear Probe Inv. No. 13126, PS 1 L. 3.7, CA Il. 37 PR. Carnuntum Hauff 1993/94: 166, Nr. 146-Tab. 27	125. Ear Probe Inv. No. 13127 (PS 1) L. 3.5, CA Il. 37 PR. Carnuntum Hauff 1993/94: 166, Nr. 147-Tab. 28	126. Ear Probe Inv. No. 13128, PS 1 L. 9.1, CA Il. 37 PR. Legionary Camp 1912 Hauff 1993/94: 166, Nr. 148-Tab. 28
127. Ear Probe Inv. No. 13129, PS 1 L. 7.2, CA Il. 37 PR. Carnuntum Hauff 1993/94: 166, Nr. 149-Tab. 28	128. Ear Probe Inv. No. 13130, PS 1 L. 7.8, CA Il. 37 PR. Carnuntum Hauff 1993/94: 166, Nr. 150-Tab. 28	129. Ear Probe Inv. No. 13131, PS 1 L. 6.0, CA Il. 37 PR. Carnuntum Hauff 1993/94: 168, Nr. 151-Tab. 28
130. Ear Probe Inv. No. 13134, PS 1 L. 12.6, CA Il. 37 PR. Civil Settlement Insula VI 1949 Hauff 1993/94: 168, Nr. 152-Tab. 28	131. Ear Probe Inv. No. 13135, PS 1 L. 5.1, CA Il. 37 PR. Civil Settlement Insula III 1950 Hauff 1993/94: 168, Nr. 153-Tab. 29	132. Ear Probe Inv. No. 13136, PS 1 L. 6.4, CA Il. 37 PR. Carnuntum Hauff 1993/94: 168, Nr. 154-Tab. 29
133. Ear Probe	134. Ear Probe	135. Ear Probe

Inv. No. 13137, PS 1 L. 8.0, CA Il. 37 PR. Carnuntum Hauff 1993/94: 168, Nr. 155- Tab. 29	Inv. No. 13138, PS 1 L. 9.1, CA Il. 37 PR. Civil Settlement Insula VI 1953 Hauff 1993/94: 168, Nr. 156- Tab. 29	Inv. No. 13139, PS 1 L. 7.7, CA Il. 37 PR, Carnuntum Hauff 1993/94: 168, Nr. 157- Tab. 29
136. Ear Probe Inv. No. 13139a, PS 1 Il. 17.1, CA Il. 37 PR. Civil Settlement Insula VI 1949 Hauff 1993/94: 172, Nr. 158- Tab. 29	137. Ear Probe Inv. No. 21320, PS 1 L. 10.8, CA Il. 37 PR. Carnuntum Hauff 1993/94: 172, Nr. 159- Tab. 30	138. Ear Probe Inv. No. 21993, PS 1 L. 8.0, CA Il. 37 PR. Carnuntum Hauff 1993/94: 172, Nr. 160- Tab. 30
139. Ear Probe Inv. No. 21994, PS 1 L. 5.6, CA Il. 37 PR. Carnuntum Hauff 1993/94: 172, Nr. 161- Tab. 30	140. Ear Probe Inv. No. 21995, PS 1 L. 4.3, CA Il. 37 PR. Carnuntum Hauff 1993/94: 172, Nr. 162- Tab. 30	141. Ear Probe Inv. No. 21996, PS 1 L. 7.0, CA Il. 37 PR. Carnuntum Hauff 1993/94: 172, Nr. 163- Tab. 30
142. Ear Probe Inv. No. 21997, PS 1 L. 7.7, CA Il. 37 PR. Carnuntum Hauff 1993/94: 172, Nr. 164- Tab. 30	143. Ear Probe Inv. No. NA, PS 1 L. 4.8, CA Il. 37 PR. Canabae 1986 Hauff 1993/94: 174, Nr. 165- Tab. 31	144. Ear Probe Inv. No. NA, PS 1 L. 7.8, CA Il. 37 PR. Carnuntum Hauff 1993/94: 174, Nr. 166- Tab. 31
145. Ear Probe Inv. No. NA, PS 1 L. 9.6, CA Il. 37 PR. Carnuntum Hauff 1993/94: 174, Nr. 167- Tab. 31	146. Ear Probe Inv. No. NA, PS 1 L. 3.0, CA Il. 37 PR. Carnuntum Hauff 1993/94: 174, Nr. 168- Tab. 31	147. Ear Probe Inv. No. 13915, PS 1 L. 6.9, CA Il. 37 PR. Carnuntum Hauff 1993/94: 174, Nr. 169- Tab. 31
148. Ear Probe Inv. No. 13114, PS 1 L. 7.3, CA Il. 37 PR. Carnuntum Hauff 1993/94: 174, Nr. 170- Tab. 31	149. Ear Probe Inv. No. 13112, PS 1 L. 7.3, CA Il. 37 PR. Carnuntum Hauff 1993/94: 176, Nr. 171- Tab. 32	150. Ear Probe Inv. No. 13103, PS 1 L. 7.5, CA Il. 37 PR. South Part of the right principal side of the retentura. Hauff 1993/94: 176, Nr. 172- Tab. 32
151. Ear Probe Inv. No. 13111, PS 1 L. 9.0, CA Il. 37 PR. Carnuntum Hauff 1993/94: 176, Nr. 173- Tab. 32	152. Ear Probe Inv. No. 13132, PS 1 L. 12.4, CA Il. 37 PR. Carnuntum Hauff 1993/94: 176, Nr. 174- Tab. 32	153. Ear Probe Inv. No. 13077, PS 1 L. 14.7, CA Il. 37 PR. Praetentura left half, scamnum tribunorum, Barracks. Hauff 1993/94: 176, Nr. 175- Tab. 32
154. Ear Probe Inv. No. 13076, PS 1 L. 17.9, CA Il. 37 PR. Hospital west of the Quaestorium. Hauff 1993/94: 176, Nr. 176-	155. Ear Probe Inv. No. NA, PS 1 L. 8.2, CA Il. 37 PR. Civil Settlement 1993 Hauff 1993/94: 176, Nr. 177- Tab. 33	156. Ear Probe Inv. No. NA, PS 1 L. 7.4, CA Il. 37 PR. Civil Settlement 1993 Hauff 1993/94: 176, Nr. 178- Tab. 33

Tab. 33		
157. Ear Probe Inv. No. NA, PS 1 L. 4.85, CA Il. 37 PR. Civil Settlement 1986 Hauff 1993/94: 178, Nr. 179-Tab. 33	158. Ear Probe Inv. No. NA, PS 1 L. 8.0, CA Il. 37 PR. Civil Settlement 1986 Hauff 1993/94: 178, Nr. 180-Tab. 33	159. Ear Probe Inv. No. 21788, PS 1 L. 10.9, Silver Il. 37 PR. Canabae 1987 Hauff 1993/94: 178, Nr. 181-Tab. 34
160. Ear Probe Inv. No. 13730, PS 1 L. 11.3, Silver Il. 37 PR. Carnuntum Hauff 1993/94: 178, Nr. 182-Tab. 34	161. Ear Probe Inv. No. 13174, PS 1 L. 9.4, Silver Il. 37 PR. Bad Deutsch-Altenburg Hauff 1993/94: 178, Nr. 183-Tab. 34	162. Ear Probe Inv. No. 13156, PS 1 L. 11.9, Silver Il. 37 Pr. Hospital west of the Quaestorium. Hauff 1993/94: 178, Nr. 184-Tab. 34
163. Ear Probe (S/T) Inv. No. NA, PS 1 L. 16.1, CA Il. 37 PR. Carnuntum Hauff 1993/94: 180, Nr. 185-Tab. 34	164. Ear Probe Inv. No. 13154, PS 1 L. 12.5, CA Il. 37 PR. Carnuntum Hauff 1993/94: 180, Nr. 186-Tab. 35	165. Ear Probe Inv. No. 13159, PS 1 L. 11.0, CA Il. 37 PR. Carnuntum Hauff 1993/94: 180, Nr. 187-Tab. 35
166. Ear Probe Inv. No. 13160, PS 1 L. 11.2, CA Il. 37 PR. Carnuntum Hauff 1993/94: 180, Nr. 188-Tab. 35	167. Ear Probe Inv. No. 13161, PS 1 L. 11.0, CA Il. 37 PR. Carnuntum Hauff 1993/94: 180, Nr. 189-Tab. 35	168. Ear Probe Inv. No. 13162, PS 1 L. 10.0, CA Il. 37 PR. Carnuntum Hauff 1993/94: 180, Nr. 190-Tab. 35
169. Ear Probe Inv. No. 13163, PS 1 L. 9.9, CA Il. 37 PR. Carnuntum Hauff 1993/94: 182, Nr. 191-Tab. 36	170. Ear Probe Inv. No. 13164, PS 1 L. 9.5, CA Il. 37 PR. Carnuntum Hauff 1993/94: 182, Nr. 192-Tab. 36	171. Ear Probe Inv. No. 13165, PS 1 L. 8.2, CA Il. 37 PR. Carnuntum Hauff 1993/94: 182, Nr. 193-Tab. 36
172. Ear Probe Inv. No. 13166, PS 1 L. 7.5, CA Il. 37 PR. Carnuntum Hauff 1993/94: 182, Nr. 194-Tab. 36	173. Ear Probe Inv. No. 13167, PS 1 L. 7.4, CA Il. 37 PR. Legionary Camp 1912 Hauff 1993/94: 182, Nr. 195-Tab. 36	174. Ear Probe Inv. No. 13168, PS 1 L. 4.5, CA Il. 37 PR. Carnuntum Hauff 1993/94: 182, Nr. 196-Tab. 36
175. Ear Probe Inv. No. 13169, PS 1 L. 4.4, CA Il. 37 PR. Carnuntum Hauff 1993/94: 184, Nr. 197-Tab. 36	176. Ear Probe Inv. No. 13171, PS 1 L. 6.0, CA Il. 37 PR. Carnuntum Hauff 1993/94: 184, Nr. 198-Tab. 37	177. Ear Probe Inv. No. 13170, PS 1 L. 6.6, CA Il. 37 PR. Carnuntum Hauff 1993/94: 184, Nr. 199-Tab. 37
178. Ear Probe Inv. No. 13173, PS 1 L. 4.9, CA Il. 37 PR. South side of the Raetentura. Hauff 1993/94: 184, Nr. 200-Tab. 37	179. Ear Probe Inv. No. NA, PS 1 L. 8.2, CA Il. 37 PR. Carnuntum Hauff 1993/94: 184, Nr. 201-Tab. 37	180. Ear Probe Inv. No. 13174, PS 1 L. 11.2, CA Il. 37 PR. Carnuntum Hauff 1993/94: 184, Nr. 202-Tab. 37

181. Ear Probe Inv. No. 13277, PS 1 L. 14, CA Il. 37 PR. Carnuntum Hauff 1993/94: 184, Nr. 203-Tab. 37	182. Ear Probe Inv. No. 13283, PS 1 L. 9.2, CA Il. 37 PR. Carnuntum Hauff 1993/94: 186, Nr. 204-Tab. 38	183. Ear Probe Inv. No. 13092, PS 1 L. 9.9, CA Il. 37 PR. Carnuntum Hauff 1993/94: 186, Nr. 205-Tab. 38
184. Ear Probe Inv. No. 13285, PS 1 L. 7.5, CA Il. 37 PR. Carnuntum Hauff 1993/94: 186, Nr. 206-Tab. 38	185. Ear Probe Inv. No. 13287, PS 1 L.6.4, CA Il. 37 PR. Carnuntum Hauff 1993/94: 186, Nr. 207-Tab. 38	186. Ear Probe Inv. No. 13178, PS 1 L. 10.1, CA Il. 37 PR. Canabae 1987 Hauff 1993/94: 186, Nr. 208-Tab. 38
187. Olivary End Probe Inv. No. 15610, PS 1 L. 13.5, CA Il. NA PR. Carnuntum Hauff 1993/94: 146, Nr. 85-Tab. 17, 1-4 Century	188. Olivary End Probe Inv. No. 15614, PS 1 L. 8.0, CA Il. NA PR. Carnuntum Hauff 1993/94: 148, Nr. 86-Tab. 17, 1-4 Century	189. Olivary End Probe Inv. No. 15615, PS 1 L. 9.0, CA Il. NA PR. Carnuntum Hauff 1993/94: 148, Nr. 87 Tab. 17, 1-4 Century
190. Olivary End Probe Inv. No. 15616, PS 1 L. 8.0, CA Il. NA PR. East and South east of the camp Hauff 1993/94: 148, Nr. 88-Tab. 17, 1-4 Century	191. Olivary End Probe Inv. No. 21320, PS 1 L. 5.3, CA Il. NA PR. Carnuntum Hauff 1993/94: 148, Nr. 89-Tab. 17, 1-4 Century	192. Olivary End Probe Inv. No. 21909, PS 1 L. 10.9, CA Il. NA PR. Carnuntum Hauff 1993/94: 148, Nr. 90-Tab. 18, 1-4 Century
193. Olivary End Probe Inv. No. 21909, PS 1 L. 10.0, CA Il. NA PR. Carnuntum Hauff 1993/94: 148, Nr. 91, Tab. 18, 1-4 Century	194. Olivary End Probe Inv. No. 21639, PS 1 L. 8.9, CA Il. NA PR. Carnuntum Hauff 1993/94: 150, Nr. 92, Tab. 18, 1-4 Century	195. Olivary End Probe Inv. No. 22001, PS 1 L. 9.3, CA Il. NA PR. Carnuntum Hauff 1993/94: 150, Nr. 93, Tab. 18, 1-4 Century
196. Olivary End Probe Inv. No. NA, PS 1 L. 10.5, CA Il. NA PR. Carnuntum Hauff 1993/94: 150, Nr. 94-Tab. 18, 1-4 Century		

TABLE TWO
Vienna, Vindobona
Legionary Fortress and Auxiliary Fort

1. Scalpel Inv. No. MV 9496, PS 2 L. 9.0, CA Il. 43-45 PR. Neuer Markt 1943 Gschwantler and Ubls 1978: 260, Nr. 81	2. Spoon Probe Inv. No. MV 1561, PS 2 L. 12.5, CA Il. 42 PR. Rudolph Spital 1909/10 (Auxiliary Fort) Gschwantler and Ubls 1978: 260, Nr. 80

TABLE THREE
Szóny, Brigetio
Legionary Fortress

1. Spoon Probe Inv. No. NA, PS 3 L. 17.5, CA Il. 42 PR. Necropolis Bonis 1968: 29	2. Ear Probe Inv. No. NA, PS 3 L. NA, CA Il. 37 PR. Necropolis Bonis 1968: 30	3. Cylindrical Instrument Case Inv. No. NA, PS 3 L. 20.3, CA Il. NA PR. Necropolis Bonis 1968: 29
4. Oculist Stamp Inv. No. NA L. NA Il. 32 PR. NA Feugère et al 1986: 479, Nr. 56, E. 52, V. 204		

APPENDIX NINE
Medical Instruments from Pannonia Inferior

TABLE ONE
Budapest, Aquincum
Legionary Fortress

1. Cupping Vessel Inv. No. 50305, PI 1 4.0 x 2.8, CA Il. 9 PR. Obuda Korbuly 1934: 22, Nr. 17-Tab. 9	2. Bifurcated Hook Inv. No. 3024, PI 1 L. 22.5, CA Il. 28 PR. Aquincum Anonymous 1986: 174, Nr. 157, 2nd c.	3. Scalpel Inv. No. 50303, PI 1 L. 11.9, CA Il. 43-45 PR. Aquincum Korbuly 1934: 23-24, Nr. 2-Tab. 9, 2nd c.
4. Iron Knife Blade Inv. No. NA, PI 1 L. NA, CA Il. NA Grave 216, Aranyheger Bach Necropolis Künzl 1983: 116, 2nd c	5. Needle Inv. No. NA, PI 1 L. NA, CA Il. 30 PR. Grave 86, Aranyheger Bach Necropolis Künzl 1983:116, 2nd c	6. Needle Handle Inv. No. 40309, PI 1 L. 9.5, CA Il. 30 PR. Aquincum Anonymous 1986: 174, Nr. 158, 2nd c.
7. Needle Handle Inv. No. 40307, PI 1 L. 9.0, CA Il. 30 PR. Aquincum Anonymous 1986: 174, Nr. 158, 2nd c	8. Forceps with Ear Probe Inv. No. NA, PI 1 L. NA, CA Il. NA PR. Grave 216, Aranyheger Bach Necropolis Künzl 1983: 116, 2nd c	9. Forceps Inv. No. 50302, PI 1 L. 11.8, CA Il. 11-12 PR. Aquincum Korbuly 1934: 12, Nr. 4-Tab. 12, 2nd c.
10. Spoon Probe Inv. No. 50310, PI 1 L. 11.8, CA Il. 37 PR. Obuda (Gas Factory) Civil Settlement Nágy 1942: 529, Pl. C1; Anonymous 1986: 174, Nr. 160, 2nd c	11. Spoon Probe Inv. No. 50299, PI 1 L. 16.0, CA Il. 37 PR. Aquincum Korbuly 1934: 25, Nr. 7-Tab. 10	12. Ear Probe Inv. No. NA, PI 1 L. NA, CA Il. 37 PR. Grave 216, Aranyheger Bach Necropolis Künzl 1983: 116, 2nd c
13. Ear Probe Inv. No. NA, PI 1 L. NA, CA Il. 37 PR. Grave 86, Aranyheger Bach Necropolis Künzl 1983: 116, 2nd c	14. Scale Inv. No. NA, PI 1 L. NA, CA Il. NA PR. Grave 86, Aranyheger Bach Necropolis Künzl 1983: 116, 2nd c	15. Medical Box Inv. No. 50312, PI 1 12.8 x 7.0 x 2.2, CA Il. 29 PR. Grave 219, Aranyheger Bach Necropolis Sobel 1991: 135

TABLE TWO
Dunaújváros, Intercisa
Auxiliary Fort

1. Scalpel Inv. No. 194/1910-45, PI 3 L. 12.0, CA Il. 43-45 PR. Grave 26 Part 18 of the Necropolis Künzl 1983: 117; Radnóti1957:	2. Scalpel Inv. No. Szfv 1153, PI 4 L. 7.3, CA Il. 43-45 PR. NA Radnóti 1957: 239, Nr. 173	3. Broken Spoon Probe Inv. No. 14/ 1907-113, PI 3 L. 5.4, CA Il. 42 PR. NA Radnóti 1957: 233, Nr. 42 Tab. 46 Nr. 18

237, Nr. 132-Tab. 47 Nr. 14, 2nd/3rd c		
4. Spoon Probe Inv. No. 28/1908-123, PI 3 L. 15.0, CA Il. 42 PR. Building 3 Radnóti 1957: 239, Nr. 173	5. Spoon Probe Inv. No. 43/1902-14, PI 3 L. 14.5, CA Il. 42 PR. NA Radnóti 1957: 235, Nr. 94-Tab. 47 Nr. 12	6. Spoon Probe Inv. No. 46/1910-98, CA L. 17.1, CA Il. 42 PR. Building Nr 6 Radnóti 1957: 236, Nr. 111-Tab. 47 Nr. 19
7. Spoon Probe Inv. No. 23/ 1927-11, PI 3 L. 14.0, CA Il. 42 PR. NA Radnóti 1957: 238, Nr. 160	8. Spoon Probe Inv. No. Szfv 2408, PI 4 L. 16.6, CA Il. 42 PR. NA Radnóti 1957: 239, Nr. 179	9. Spoon Probe Inv. No. Szfv 2428, PI 4 L. 14.0, CA Il. 42 PR. NA Radnóti 1957: 239, Nr. 180
10. Spoon Probe Inv. No. Szfv 9752, PI 4 L. 7.8, CA Il. 42 PR. NA Radnóti 1957: 240, Nr. 202	12. Ear Probe Inv. No. 8/1908-32, PI 3 L. 10.0, CA Il. 37 PR. NA Radnóti 1957: 234, Nr. 59	12. Ear Probe Inv. No. 8/1908-32, PI 3 L. 10.0, CA Il. 37 PR. NA Radnóti 1957: 234, Nr. 59
13. Ear Probe Inv. No. Szfv 2771, PI 4 L. 7.2, CA Il. 37 PR. NA Radnóti 1957: 239, Nr. 181	14. Ear Probe Inv. No. Szfv 3605, PI 4 L. 11.4, CA Il. 37 PR. NA Radnóti 1957: 239, Nr. 183	15. Medical Box Inv. No. 82.4.27, PI 4 10.0 x 5.3 x 2.9, CA Il. 29 PR. Camp 22 Sobel 1991: 135, 3rd c

APPENDIX TEN
Medical Instruments from Britain

Table One
York, Eboracum
Legionary Fortress

1. Oculist Stamp Inv. No. NA L. NA Il. 32 PR. NA Feugère et al 1986: 480, Nr. 78; V. 247	2. Oculist Stamp Inv. No. NA L. NA Il. 32 PR. NA Feugère et al 1986: 480, Nr. 79; V. 147

TABLE TWO
Caerleon, Isca Silurum
Legionary Fortress

1. Scalpel Inv. No. 84.119 H, BR 2 L. 8.5, CA Il. 43-44 PR. Isca Grange 3, Rubbish Pits, Fig. 67, Nr. 8 The scalpel bent at 90 degrees.	2. Needle Inv. No. 55T, BR 2 L. 6.2, CA Il. 30 PR. Jenkins Field II (Workshops), Fig. 67, Nr. 6 Cylindrical handle with a hole in the bottom centre, possibly for a needle.	3. Needle Inv. No, NA, BR 3 L. 8.5, CA Il. 30 PR. NA Cylindrical handle with needle coming from the bottom centre. Boon in his unpublished work refers to this as a cataract needle.
4. Dental Tool Inv. No. 31.78, BR 2 L. 14.6, CA Il. NA PR. NA Lee 1862: 67, Nr. 9-Pl. 34	5. Forceps Inv. No. 81.79 H, BR 2 L. 12.6, CA Il. 12 PR. Fortress Baths, Fig. 67, Nr. 5 Zienkiewicz (1986) 189, Nr. 188-Fig. 64	6. Forceps Inv. No. 54.389A, BR 2 L. 13.4. CA Il. 12 PR. Vicus Main Lateral Drain Boon (draft copy) 104, 130-230 AD. The forceps have an olivary probe on its end
7. Forceps Inv. No. 31.78, BR 2 L. 13.7, CA Il. 11 PR. Castle Baths, Outside fortress Lee 1862: 67, Nr. 6-Pl. 34, The arms terminate in sharp points.	8. Forceps Inv. No. 82.112/267, BR 3 L. 9.0, CA Il. 12 PR. NA	9. Spoon Probe Inv. No. NA, BR 2 L. 17.0, CA Il. 42 PR. Castle Baths, Outside fortress Lee 1862: 68, Nr. 9-Pl. 35
10. Spoon Probe Inv. No. 54.389 A, BR 2 L. 15.8, CA Il. 42 PR. Vicus, Main Lateral Drain Boon (draft copy) Nr. 101, 130-230 AD	11. Spoon Probe Inv. No. 344.90(966), BR 2 L. NA, CA Il. 42 PR. Roman Gates Block B, Fig. 67, Nr. 1	12. Spoon Probe Broken Inv. No. 513/79/161/001 UCC, BR 3 L. 9.0, CA Il. 42 PR. NA
13. Spoon Probe Broken Inv. No. NA, BR 2 L. 9.0, CA Il. 42 PR. Amphitheatre, Fig. 67, Nr. 2	14. Spoon Probe Broken Inv. No. 35.119, BR 2 L. 8.1, Bone Il. 42 PR. Amphitheatre, Fig. 67, Nr. 2	15. Spoon Probe Broken Inv. No. 69.326, BR 2 L. 10.2, CA Il. 42 PR. Vicarage Garden

Wheeler 1928: 166, Nr 36- Fig. 14. 90-120 AD found with a coin of Titus.	Wheeler 1928: 169, Nr. 19-Pl. 33.1	(Headquarters Building), Fig. 67, Nr. 7 Boon 1970: 57, Nr. 4-Fig. 57
16. Spoon Probe Broken Inv. No. 56.214 B F4, Br 2 L. 6.0, CA Il. 42 Pr. Vicus, Under building VIII Boon (unpublished draft) Nr. 103	17. Spoon Probe Broken Inv. No. 58.330 F 13, BR 2 L. 8.6, CA Il. 42 PR. Vicus, Main Lateral Drain Boon (unpublished draft) Nr. 102, 130-230 AD	18. Spatula Probe Inv. No. 277, BR 2 L. 8.7, CA Il. NA PR. Post Hole Centurion 1st Cohort, Fig. 67, Nr. 3 The spatula is flat and triangular, possibly a cautery.
19. Spatula Probe Broken Inv. No. NA, BR 2 L. NA, CA Il. 40 PR. Prysg Field Trench 1, Fig. 67, Nr. 4 Fox 1940: 127, Nr. 1-Fig. 5. Has Inscription (CIL VII, 1144)	20. Spatula Probe Broken Inv. No. CBT 138/396 781, BR 2 L. 6.5, CA Il. 39-40 PR. British Telecom, (Workshop), Fig. 67, nr. 6	21. Ear Probe Inv. No. NA, BR 2 L. 14.5, CA Il. 37 PR. NA
22. Ear Probe L. 32.6, BR 2 L. 9.8, CA Il. 39 PR. Barrack C room 11, Prysg Field, Fig. 67, Nr. 4 Nash-Williams 1932: 90, Nr. 5-Fig. 38	23. Ear Probe Inv. No. 39.386, BR 2 L. 12.5, CA Il. 39 PR. Barrack IV, Trench I Layer 2, Fig. 67, Nr. 4 Fox 1940: 32, Nr. 7-Fig. 5, Late 3rd or early 4th	24. Ear Probe Inv. No. 35.119, BR 2 L. NA, CA Il. 39 PR. Amphitheatre A-H Section, Bank, Fig. 67, Nr. 2
25. Ear Probe Inv. No. 54.389 A F 45, BR 2 L. 9.8, CA Il. 39 PR. Vicus Main Lateral Drain Boon (unpublished draft) 112	26. Ear Probe Inv. No. CBT 138/409 814, BR 2 L. 13.6, CA Il. 39 PR. British Telecom, Bath Drain? Fig. 67, Nr. 5	27. Ear Probe Inv. No. NA, BR 2 L. 12.4, CA Il. 39 PR. Vicus
28. Ear Probe Inv. No. 32.6, BR 2 L. 9.8, CA Il. 39 PR. Prysg Field Trench 1 Barrack V, Fig. 67, Nr. 4 Nash-Williams 1932: 90, Nr. 5-Fig. 38	29. Ear Probe Inv. No. 35.119, BR 2 L. 12.2, CA Il. 39 PR. Amphitheatre, Fig. 67, Nr. 2 Wheeler 1928: 169, Nr. 4-Fig. 33.1.	30. Ear Probe Inv. No. 2392 (1632), BR 2 L. NA, CA Il. 39 PR. Roman Gates Block B, Fig. 67, Nr. 1
31. Ear Probe Inv. No. 82/389, BR 3 L. NA, CA Il. 39 PR, NA	32. Ear Probe Bent Inv. No. 88.165 H, BR 2 L. 8.6, CA Il. 39 PR. Roman gates Rampart Area, Fig. 67, Nr. 1	33. Olivary End Probe Inv. No. NA, BR 2 L 9.6, CA Il. NA PR. NA
34. Olivary End Probe Inv. No. 84.43 H, BR 2 L. 10.5, CA Il. NA PR. Museum Basement Area Zienkiewicz Forthcoming Report 39	35. Olivary End Probe Inv. No. 242/ 354, BR 2 L. 11.2, CA Il. NA PR. Museum Gardens Zienkiewicz Forthcoming Report 28	36. Olivary End Probe Inv. No. 31/548 778/1636, BR 2 L. 12.0, CA Il. NA PR. Roman Gates Rampart Area, Fig. 67, Nr. 1
37. Olivary End Probe Inv. No. 35.119, BR 2 L. 5.9, CA Il. NA	38. Olivary End Probe Inv. No. 1684 (1301), BR 2 L. NA, CA Il. NA	

PR. Amphitheatre, Fig. 67, Nr. 2	PR. Roman Gates, Rampart Area, Fig. 67, Nr. 1

TABLE THREE
Chester, Deva
Legionary Fortress

1. Double Ended Olivary Probe Inv. No. NA, BR 4 L. 18.0, CA Il. 34 PR. Antonine Deposit Room 18, N-E Corner Barracks, Dearney Field, Fig. 66, Nr. 1 Hole in one end of the probe	2. Forceps Inv. No. 250. R. 176 28 A67/3, BR 4 L. 10.3, CA Il. 11-12 PR. Amphitheatre East Entrance Antonine Deposit	3. Forceps Inv. No. CHE NSM 88 306, BR 4 L. 8.0, CA Il. NA PR. Extra Mural, Fig. 66, Nr. 6 There is an ear scoop attached to the top and an incised vine decoration on the arms.
4. Spoon Probe Broken Inv. No. CRS 1973-74 524 5, BR 4 L. NA, CA Il. 42 PR. First cohort Barracks, Fig. 66, Nr. 5	5. Spoon Probe Broken Inv. No. CHE/HSS 79 201, BR 4 L. 4.8, CA Il. 42 PR. Courtyard Building Hunter Street, Fig. 66, Nr. 3	6. Ear Probe Inv. No. CHE/NSM 88 271, BR 4 L. 3.2, CA Il. 37 PR. Extra Mural West St. Nicholas Mews, Fig. 66, Nr. 6
7. Ear Probe Inv. No. CHE/HSS 79 258, BR 4 L. 10.4, CA Il. 37 PR. Courtyard Hunter Street, Fig. 66, Nr. 2	8. Ear Probe Inv. No. CHE/PP 89 136, BR 4 L. NA, CA Il. 37 PR. Priory Place Extra Mural East, Fig. 66, Nr. 7	9. Ear Probe Inv. No. CHE/PP 89 84, BR 4 L. 5.5, CA Il. 37 PR. Priory Place Extra Mural East, Fig. 66, Nr. 7
10. Ear Probe Inv. No. CHE/CRS 63-64 187, BR 4 L. 15.6, Bone Il. 38 PR. First Cohort's Barrack, Fig. 66, Nr. 4	11. Olivary End Probe Inv. No. NA, BR 4 L. 3.36, CA Il. NA PR. Vicus Love Street East of Fort	12. Olivary End Probe Inv. No. CHE/OMH 67-9 600, BR 4 L. 2.1, CA Il. NA PR. Pit 17, Fig. 66, Nr. 3
13. Olivary End Probe Inv. No. CHE/CRS 73-4 148, BR 4 L. 7.4, CA Il. NA PR. First Cohort Centurion's Quarters, Fig. 66, Nr. 5	14. Oculist Stamp Inv. No. NA L. NA Il. 32 PR. NA Feugère et al 1986: 480, Nr. 72; V. 271	

TABLE FOUR
Corbridge, Corstopitum
Auxiliary Fort

1. Scalpel Inv. No. CO 11311 75.897, BR 5 L. 7.7, CA Il. 42-43 PR. Forum Site Gilson 1981: Nr.1-Fig. 1, Possible Forum Site because it	2. Scalpel Inv. No. CO 11322 75. 896, BR 5 L. 5.8, CA Il. 42-43 PR. NA Gilson 1981: Nr.2-Fig. 1	3. Scalpel Inv. No. CO11323 75. 899, BR 5 L. 10.6, CA Il. 42-43 PR. NA Gilson 1981: Nr.3-Fig. 1

is in a photograph Archaeologia Aeliana 1911		
4. Surgical Knife Inv. No. CO11312 75.1449, BR 5 L. 8.2, CA Il. 46 PR. NA Gilson 1981: Nr.1-Fig. 2	5. Surgical Knife Inv. No. CO11311 75. 897, BR 5 L. 5.0, CA Il. 46 PR. NA Gilson 1981: Nr.2-Fig. 2	6. Arm of Forceps Inv. No. CO11325 75.911, BR 5 L. 9.0, CA Il. 12 PR. NA Gilson 1981: Nr.1-Fig. 3
7. Double Simple Probe Inv. No. CO10294 75. 906, BR 5 L. 13.0, CA Il. 35 PR. NA Gilson 1981: Nr.1-Fig. 4	8. Spatula Probe Inv. No. CO10293 75.903, BR 5 L. 17.3, CA Il. 40 PR. NA Gilson 1981: Nr.5-Fig. 4	9. Spatula Probe bent Inv. No. CO10295 75. 909, BR 5 L. 16.0, CA Il. 40 PR. NA Gilson 1981: Nr.4-Fig. 4
10. Spoon Probe Inv. No. CO11306 75.459, BR 5 L. 10.5, CA Il. 42 PR. NA Gilson 1981: Nr.7-Fig. 4	11. Spoon Probe Inv. No. CO11285 75.463, BR 5 L. 6.5, CA Il. 42 PR. NA Gilson 1981: Nr.8-Fig. 4	12. Spoon Scoop Inv. No. CO11306 75.461, BR 5 L. 15.0, CA Il. NA Pr. NA Gilson 1981: Nr.6-Fig. 4
13. Ear Probe Bent Inv. No. CO11321 75.904, BR 5 L. 8.0, CA Il. 37 PR. NA Gilson 1981: Nr. 3-Fig. 3 bent in the centre, suggesting a possible use as a tongue depressor	14. Ear Probe Inv. No. CO10286 75. 457, BR 5 L. 5.1, CA Il. 37 PR. NA Gilson 1981: Nr.1-Fig. 5	15. Ear Probe Inv. No. CO10288 75. 460, BR 5 L. 9.9, CA Il. 37 PR. Forum Site Gilson 1981: Nr.4-Fig. 5, Possibly found in Forum due to Photograph in Archaeologia Aeliana 1911
16. Ear Probe Inv. No. CO10287 75. 458, BR 5 L. 9.4, CA Il. 37 PR. NA Gilson 1981: Nr.3-Fig. 5	17. Ear Probe Inv. No. CO10290 75. 910, BR 5 L. 13.5, CA Il. 37 PR. NA Gilson 1981: Nr.5-Fig. 5	18. Ear Probe Broken Inv. No. CO6729 R 236/452, BR 5 L. 8.1, CA Il. 37 PR. NA
19. Ear Probe Bent Inv. No. CO8515 75. 137, BR 5 L. 13.5, Ca Il. 37 PR. NA Bent at 45 degrees, suggesting use as a tongue depressor	20. Ear Probe Bent and Broken Inv. No. CO584 68 150 IP 68, BR 5 L. 6.1, CA Il. 37 PR. Temple III B6	21. Probe With Diamond Shaped Head Inv. No. CO10291 75.905, BR 5 L. 12.5, CA Il. NA PR. NA Gilson 1981: Nr. 6-Fig. 5 the spatula is 0.7 cm at its widest point
22. Olivary End Probe Inv. No. CO10296 75. 908, BR 5 L. 7.5, CA Il. NA PR. NA Gilson 1981: Nr 2-Fig. 4	23. Olivary End Probe Inv. No. CO1297 75. 907, BR 5 L. 9.5, CA Il. NA PR. NA Gilson 1981: Nr 3 Fig. 4	24. Ointment Pallet Inv. No. CO1582 75. 3754, BR 5 5.4 x 3.0 x 0.7, Schist Il. 33 PR. NA Bishop and Dore 1988: 214, Nr. 1

TABLE FIVE
South Shields, Arbeia
Auxiliary Fort

1. Spoon Probe Inv. No. SS 1900 8 (2), BR 6 L. 11.3, CA Il. 42 PR. NA Allason-Jones and Miket 1984: 170, Nr. 451-Fig. 3	2. Spoon Probe Inv. No. SS 1900 8 (1), BR 6 L. 14.7, CA Il. 42 PR. NA Allason-Jones and Miket 1984: 170, Nr. 453-Fig. 3	3. Ear Probe Inv. No. MA 1956. 128. 66 A (2), BR 7 L. 4.3, CA Il. 37 PR. NA Allason-Jones and Miket 1984: 170, Nr. 458-Fig. 3
4. Ear Probe Inv. No. MA 1956. 128. 66 A (1), BR 7 L. 11.7, CA Il. 37 PR. NA Allason-Jones and Miket 1984: 172, Nr.459-Fig. 3	5. Ear Probe Inv. No. MA 1925. 35+37 (28), BR 7 L. 5.4 , CA Il. 37 PR. NA Allason-Jones and Miket 1984: 172, Nr. 460-Fig. 3	6. Ear Probe Inv. No. SS 1900.7 (3), BR 6 L. 13.7, CA Il. 37 PR. NA Allason-Jones and Miket 1984: 172, Nr. 461-Fig. 3
7. Ear Probe Inv. No. SS 1900.7 (1), BR 6 L. 15.1, CA Il. 37 PR. NA Allason-Jones and Miket 1984: 172, Nr. 462-Fig. 3	8. Ear Probe Inv. No. MA 1929.120 (1), BR 7 L. 6.0, CA Il. 37 PR. NA Allason-Jones and Miket 1984: 172, Nr. 463-Fig. 3	9. Ear Probe Inv. No. MA 1929. 119, BR 7 L. 11.4, CA Il. 37 PR. NA Allason-Jones and Miket 1984: 172, Nr. 464-Fig. 3
10. Ear Probe Inv. No. MA 1929. 119, BR 7 L. 12.0, CA Il. 37 PR. NA Allason-Jones and Miket 1984: 172, Nr. 465-Fig. 3		

TABLE SIX
Wallsend, Segedunum
Auxiliary Fort

1. Spatula Probe Broken Inv. No. C11 4 (1196) L. 5.1, CA Il. 39-40 PR. NA Allason-Jones (Unpublished Draft)	2. Spatula Probe Broken Inv. No. C1332 (886) L. 2.6, CA Il. 39-40 PR. NA Allason-Jones (Unpublished Draft)	3. Olivary End Probe Inv. No. C11 4 (1199) L. 12.5, CA Il. NA PR. NA Allason-Jones (Unpublished Draft)

TABLE SEVEN
Halton Chesters, Hunnum
Auxiliary Fort

1. Spoon Probe Inv. No. H60 IR L. 17.0, CA Il. 42	2. Spoon Probe Inv. No. H61 QO 333 L. 5.8, CA Il. 42

PR. NA Allason-Jones (Unpublished Draft)	PR. NA Allason-Jones (Unpublished Draft)

TABLE EIGHT
Chesters, Cilurnum
Auxiliary Fort

1. Spoon Probe Inv. No. CH 1043, BR 8 L. 7.8, CA Il. 42 PR. NA Both ends are broken	2. Spoon Probe Inv. No. CH 1045, BR 8 L. 10.0, CA Il. 42 PR. NA The handle is slightly bent	3. Spoon Probe Broken Inv. No. CH 744, BR 8 L. 4.5, CA Il. 42 PR. NA Most of the spoon is broken.
4. Ear Probe Inv. No. 1512, 74014 EER/50, BR 5 L. 11.5, CA Il. 37 PR. NA	5. Ear Probe Inv. No. 818 (1072), BR 5 L. 11.0, CA Il. 18 PR. 37 Below the scoop is a rectangular decoration with a hole through the centre	6. Ear Probe Inv. No. CH2432, 1083, BR 5 L. 7.4, CA Il. 37 PR. NA
7. Ear Probe Inv. No. CH1044, BR 8 L. 11.0, CA Il. 37 PR. NA There is a circular design below the spoon with a hole through its centre.	8. Ear Probe Bent Inv. No. CH2431, 1041,1516, BR 5 L. 5.5, CA Il. 37 PR. NA The handle is bent in the middle at a right angle.	9. Ear Probe Bent Inv. No. CH 2439, BR 5 L. 8.0, CA Il. 37 PR. NA
10. Ear Probe Broken Inv. No. CH 695, BR 8 L. 7.2, CA Il. 37 PR. NA The end is broken.	11. Shears Inv. No. CH 1041, BR 8 L. 8.9, CA Il. 47 PR. NA One arm is broken	12. Ointment Pallet Inv. No. CH 1210, BR 8 7.0 x 7.3, Stone Il. 33 PR. NA
13. Ointment Pallet Inv. No. CH1209, BR 8 7.6 x 7.9, Stone Il. 33 PR. NA		

TABLE NINE
Housesteads, Borcovicium
Auxiliary Fort

1. Sharp Hook Inv. No. NA, BR 7 L. NA, CA Il. 23 PR. Trial Trench, South of Fort, Fig. 71 Bosanquet 1904: 289	2. Spoon Scoop Inv. No. 81072056, BR 5 L. 14.5, CA Il. NA PR. Hospital, Fig. 71 The handle is hollow and opens onto the spoon.	3. Spoon Probe Inv. No. 79208631(75. 4879), BR 5 L. 12.5, CA Il. 42 PR. NA
4. Ear Probe Inv. No. H13. 1075. 444, BR 5 L. 12.0, CA Il. 37 PR. Outside the Commandant's	5. Ear Probe Inv. No. 79208511, BR 5 L. 12.5, CA Il. 37 PR. NA	6. Ointment Pallet Inv. No. HSE1 23 (9254), BR 5 6.4 x 8.0, Stone Il. 33 PR. NA

Quarters, Fig. 71		

TABLE TEN
Birdoswald, Banna
Auxiliary Fort

1. Ear Probe Inv. No. 575 127, BR 9 L. 10.6, CA Il. 37 PR. Building 197 (Granary) Period 5 Floor Layer, Fig. 70 Wilmott 1997: 287, Nr. 102 Period 5	2. Ear Probe Inv. No. 712 235, BR 9 L. 12.0, CA Il. 37 PR. Building 198 (Granary) Dump Period 5. Fig. 70 Wilmott 1997: 287, Nr. 103 Period 5	3. Ear Probe Inv. No. 923 1505, BR 9 L. 12.7, CA Il. 37 PR. Via Praetoria Period 4 B, Fig. 7o Wilmott 1997: 287, Nr. 103 Period 4b
4. Ointment Pallet Inv. No. 903 1403, BR 9 6.4 x 3.7, Sandstone Il. 33 PR. Building 198 Dump, Fig. 70 Wilmott 1997: 288, Nr. 108 Phase Five	5. Ointment Pallet Inv. No. 581 1, BR 9 6.3 x 3.0, Slate Il. 33 PR. Area A Topsoil, Fig. 70 Wilmott 1997: 288, Nr. 109	

TABLE ELEVEN
Carlisle
Auxiliary Fort

1. Sharp Hook Inv. No. Ae 219, BR 9 L. 12.5, CA Il. 23 PR. Building One Period 4 McCarthy 1990: 137-8, Nr. 123, Fig. 122, mid second century	2. Scalpel Inv. No. A1237 Ae 656, BR 9 L. 9.0, CA Il. 43-45 PR. Annetwell St. Excavations McCarthy 1990: 137-8, Nr. 123, Fig 123, mid second century	3. Cataract Needle Inv. No. A3550 Ae 881. 4 B, BR 9 L. 11.0, CA Il. 31 PR. Annetwell St. Excavations McCarthy 1990: 137-8, Nr. 123- Fig. 124, mid second century

TABLE TWELVE
Bowness on Solway, Maia
Auxiliary Fort

1. Ear Probe Inv. No. 15-1939-1, BR 9 L. 19.0, CA Il. 37 PR. Sewer Trench

APPENDIX ELEVEN
Chi-Squared Test One

Q. Is there an association between province and fortification with or without instruments?

Province	Instruments	Without Instruments	Total
GI	9	23	32
GS	26	59	85
R	15	25	40
N	1	16	17
PS	4	7	11
PI	2	17	19
B	12	10	22
Total	69	157	226

		O	E	(O-E)	(O-E)2	(O-E)2/E
GI	W	9	9.76	-0.76	0.57	0.059
	W/O	23	22.2	0.8	0.64	0.028
GS	W	26	25.95	0.05	0.0025	0.000
	W/O	59	59.09	0.04	0.0016	0.000
R	W	15	12.2	2.8	7.85	0.64
	W/O	25	27.7	-2.7	7.29	0.26
N	W	1	5.19	-4.19	17.55	3.3
	W/O	16	11.8	4.2	17.64	1.49
PS	W	4	3.35	0.65	0.42	0.12
	W/O	7	7.6	-0.6	0.36	0.05
PI	W	2	5.80	-3.8	14.44	2.48
	W/O	17	13.1	3.9	15.21	1.16
B	W	12	6.71	5.29	27.98	4.17
	W/O	10	15.8	-5.8	33.64	2.12
					Total	$15.87=\chi 2$

d.f.= (7-1)(2-1)
= (6)(1)
= 6

For 6 d.f. the 0.1% level is 22.5. The $\chi 2$ value is 15.87, allowing for the null hypothesis to be rejected just above the 1% level which has a $\chi 2$ value of 16.8. Thus for the number of fortifications with instruments compared to those fortifications without there is a significant number of fortifications to have a mathematically significant association.

APPENDIX TWELVE
Chi-Squared Test Two

Q. Is there an association between province and the types of fortifications with instruments?

Province	Legion	Auxiliary	Numerus	Total
GI	4	5	0	9
GS	2	22	2	26
R	1	14	0	15
N	1	0	0	1
PS	3	1	0	4
PI	1	1	0	2
B	3	9	0	12
Total	14	52	2	69

		O	E	(O-E)	(O-E)2	(O-E)2/E
GI	Leg	4	1.9	2.1	4.41	2.32
	Aux	5	6.78	-1.78	3.16	0.46
	Num	0	0.26	-0.26	0.067	0.26
GS	Leg	2	5.6	-3.6	12.96	2.31
	Aux	22	19.59	2.41	5.8	0.296
	Num	2	0.75	1.25	1.56	2.08
R	Leg	1	3.2	2.2	4.84	1.51
	Aux	14	11.3	2.7	7.29	0.645
	Num	0	0.43	-0.43	0.18	0.43
N	Leg	1	0.21	0.79	0.62	2.95
	Aux	0	0.75	-0.75	0.56	0.75
	Num	0	0.028	-0.028	0.0007	0.028
PS	Leg	3	0.86	2.14	4.57	5.3
	Aux	1	3.01	-2.01	4.04	1.34
	Num	0	0.115	-0.115	0.013	0.115
PI	Leg	1	0.43	0.57	0.32	0.74
	Aux	1	1.5	-0.5	0.25	0.16
	Num	0	0.05	-0.05	0.0.0025	0.05
B	Leg	3	2.6	0.4	0.16	0.06
	Aux	9	0.04	-.04	0.005	0.0005
	Num	0	0.34	-0.34	0.115	0.34
					Total	22.144=$\chi 2$

d.f. = (7-1)(3-1)
= (6)(2)
= 12

For 12 d.f. the 0.1% value is 32.9. The $\chi 2$ value is 22.144, allowing for a null hypothesis to be rejected at the 5% level which has a d.f. value of 21.0 and the 1% value is 26.2. There is just a significant association between provinces and the types of fortifications with instruments.

APPENDIX THIRTEEN
Chi-Squared Test Three

Q. Is there an association between instrument numbers per unit type and province?

Province	Leg.	Aux.	Num.	Total
GI	118	25	0	143
GS	360	111	3	474
R	5	73	0	78
N	30	0	0	30
PS	201	1	0	202
PI	15	15	0	30
B	54	67	0	121
Total	783	292	3	1078

		O	E	(O-E)	(O-E)2	(O-E)2/E
GI	Leg	118	103.86	14.14	199.9	1.92
	Aux	25	38.7	-13.7	187.69	4.84
	Num	0	0.39	-0.39	0.1521	0.39
GS	Leg	360	344.2	15.8	246.64	0.72
	Aux	111	128.3	-17.3	299.29	2.3
	Num	3	1.31	1.69	2.85	2.18
R	Leg	5	56.6	-51.6	2662.56	47.04
	Aux	73	21.12	51.88	2691.53	127.4
	Num	0	0.21	-0.21	0.044	0.21
N	Leg	30	21.8	8.2	67.24	3.08
	Aux	0	8.12	-8.12	65.9	8.12
	Num	0	0.08	-0.08	0.0064	0.08
PS	Leg	201	146.7	54.3	2948	20.08
	Aux	1	54.7	-53.7	2883.6	52.7
	Num	0	0.56	-0.56	0.313	0.56
PI	Leg	15	21.8	-6.8	47.3	5.82
	Aux	15	8.12	6.88	47.3	5.82
	Num	0	0.08	-0.08	0.0064	0.08
B	Leg	54	87.8	-33.8	1142.4	13.01
	Aux	67	32.7	34.3	1176.49	35.9
	Num	0	0.33	-0.33	0.108	0.33
					Total	328.88=$\chi 2$

d.f. = (7-1)(3-1)
(6)(2)
12

For 12 d.f the 0.1% value is 32.9. The $\chi 2$ value is 328.88, allowing the null hypothesis to be rejected at the 0.1% level. There is a significant association between the numbers of instruments per unit type in comparison with the provinces.

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Fig. 1. Map of the frontiers of Germania Inferior, Germania Superior and Raetia. After Schönberger 1969: Fig 20.

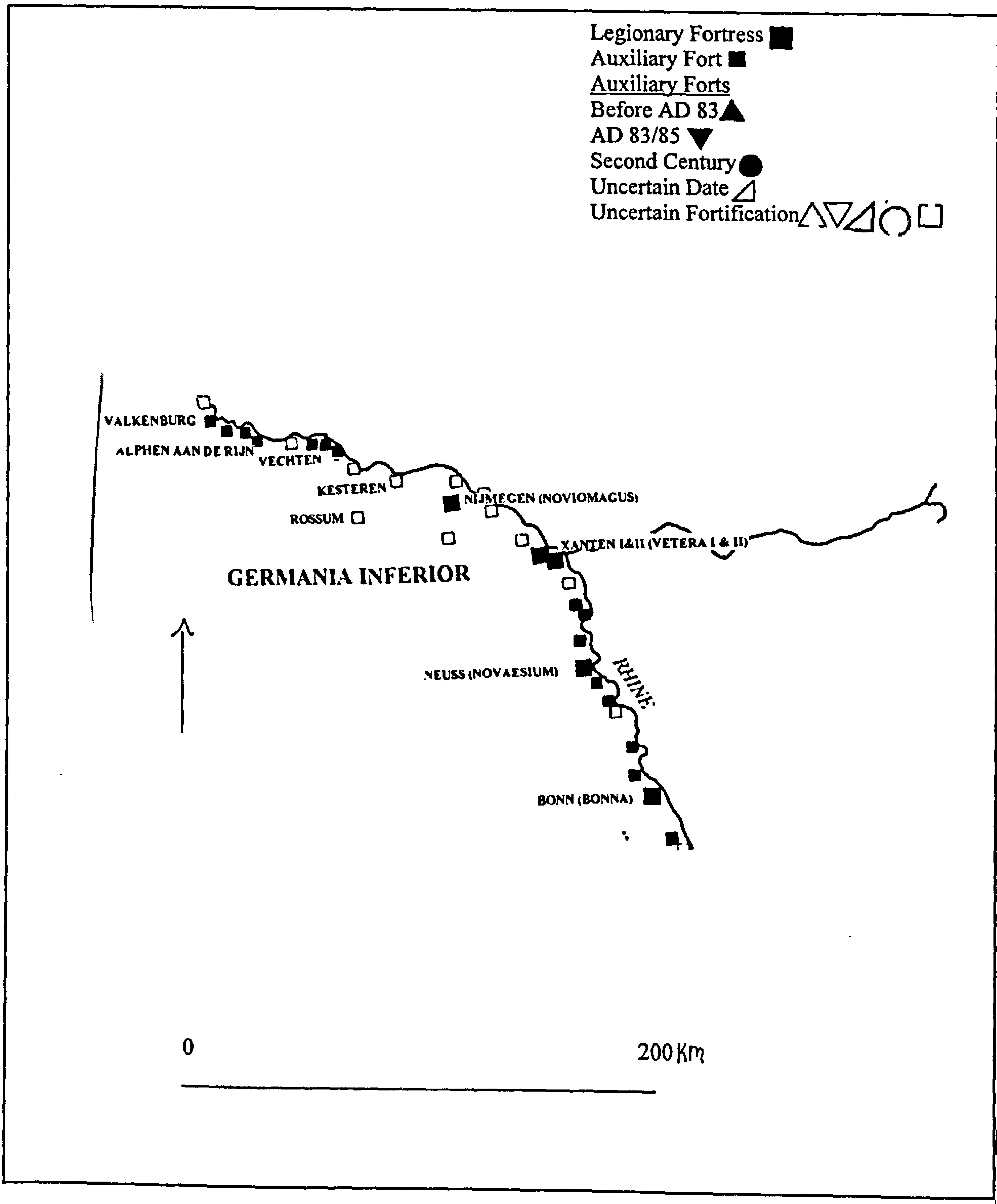


Fig. 2. Map of the frontier of Germania Inferior. After Schönberger 1969: Fig 20.

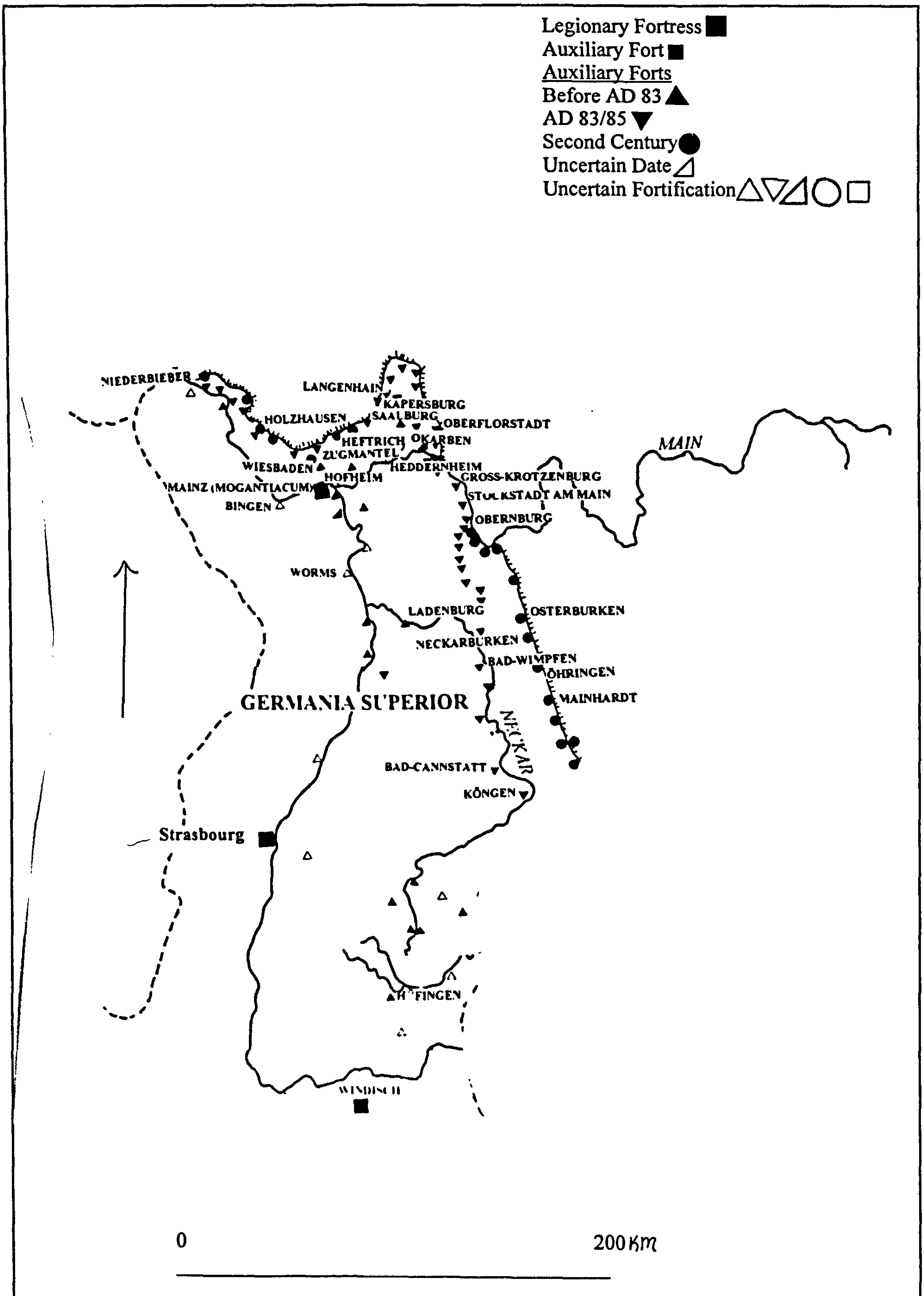


Fig. 3. Map of the frontier of Germania Superior. After Schönberger 1969: Fig 20.

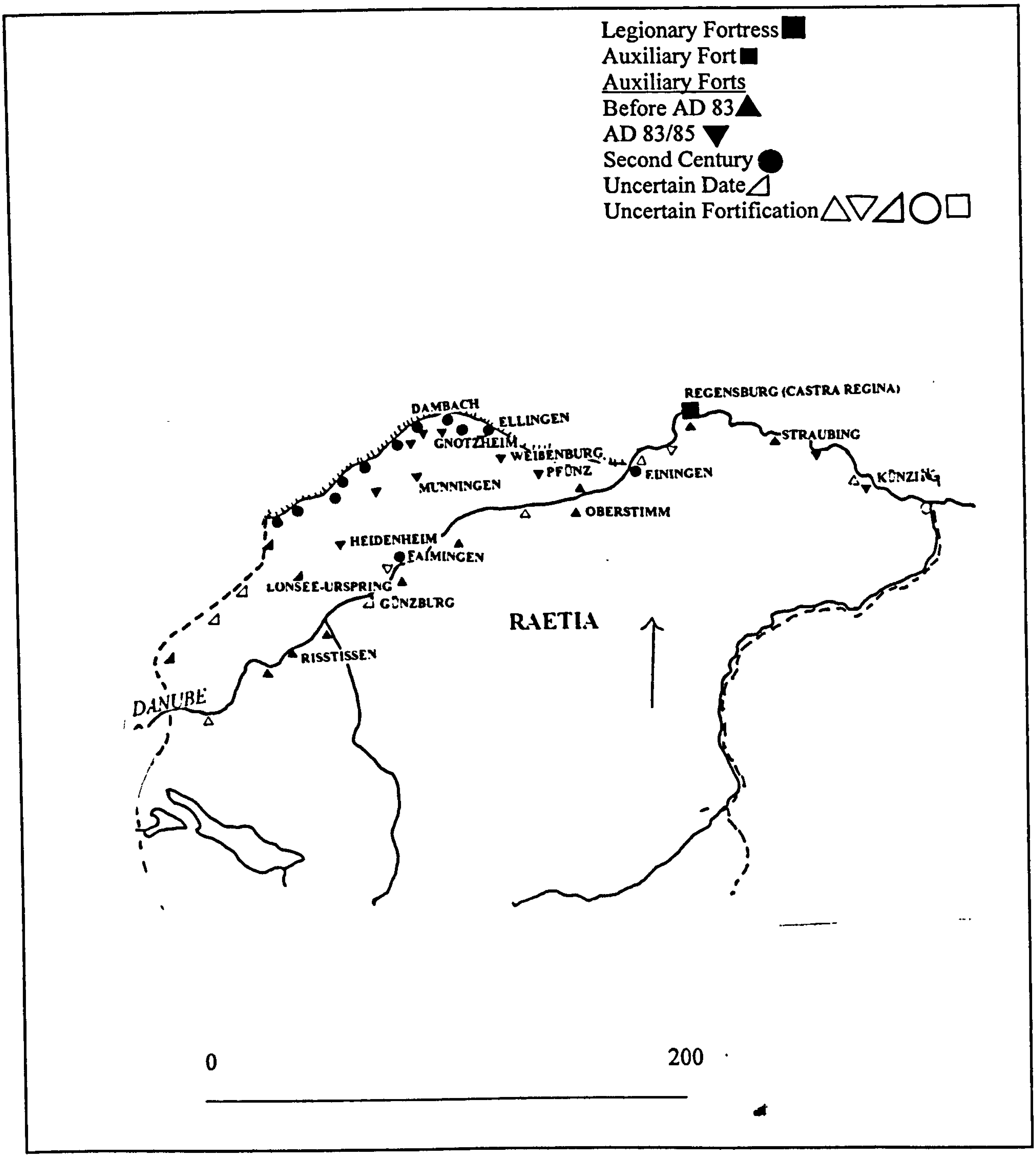


Fig. 4. Map of the frontier of Raetia. After Schönberger 1969: Fig 20.

Fig. 5. Map of the frontier of Noricum. After Alföldy 1974.

Fig. 6. Map of the frontiers of Pannonia Superior and Inferior. After Mócsy 1974.

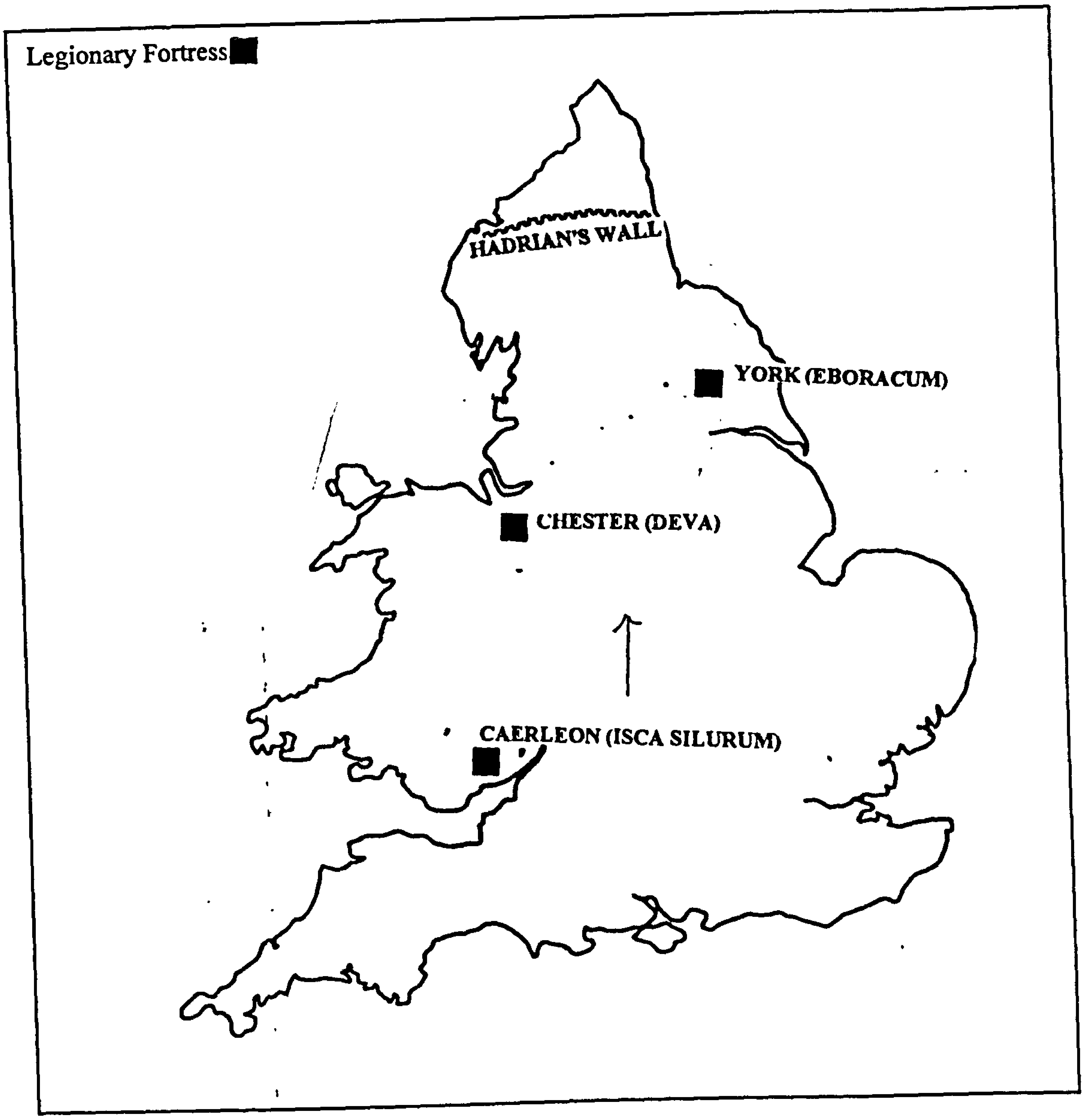


Fig. 7. Map of the legionary fortresses in Britain.

Fig. 8. Map of Hadrian's Wall. After Breeze and Dobson 1991.

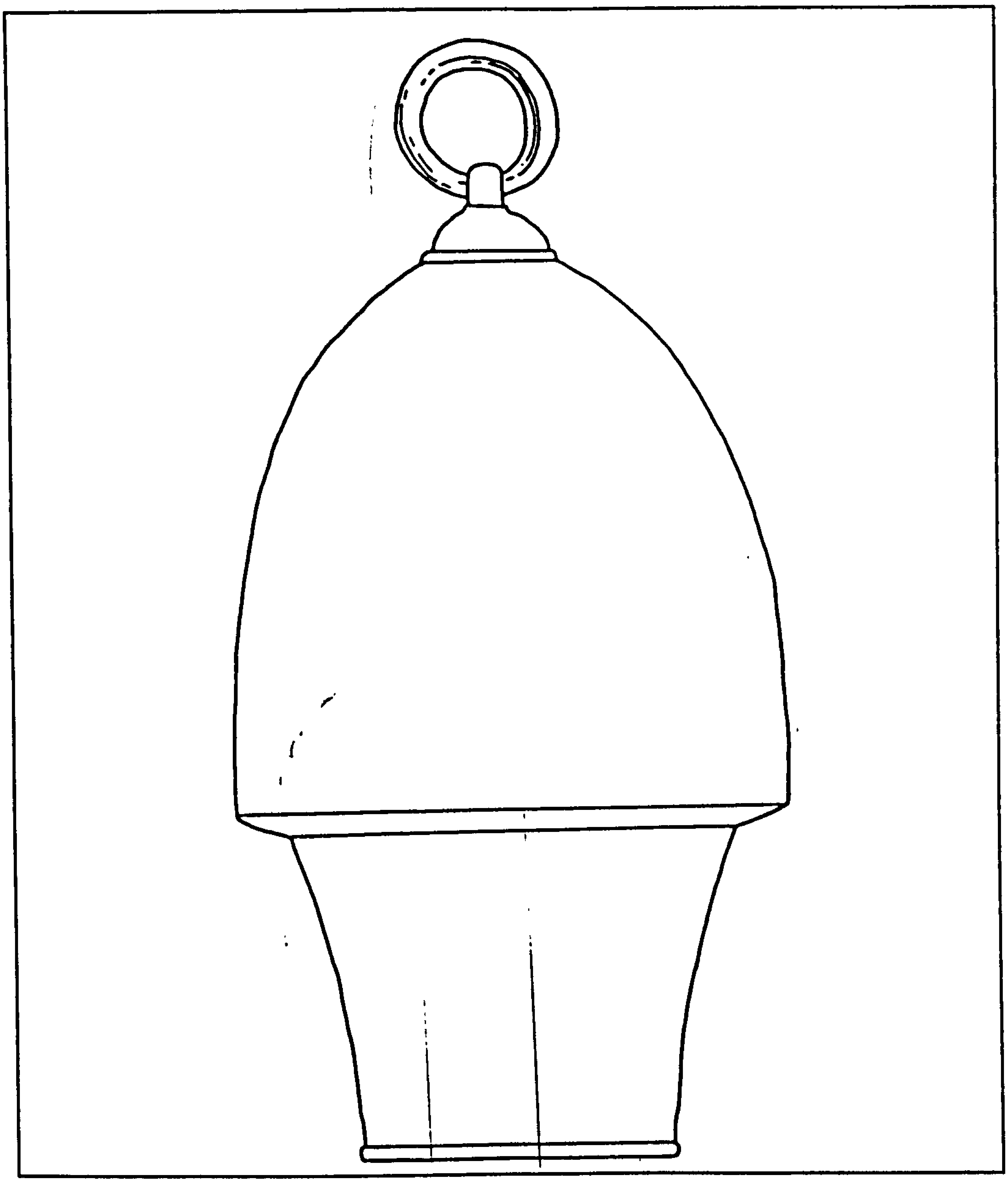


Fig. 9. Cupping Vessel (1:1). After Jackson 1990: Fig 1, Nr. 1.

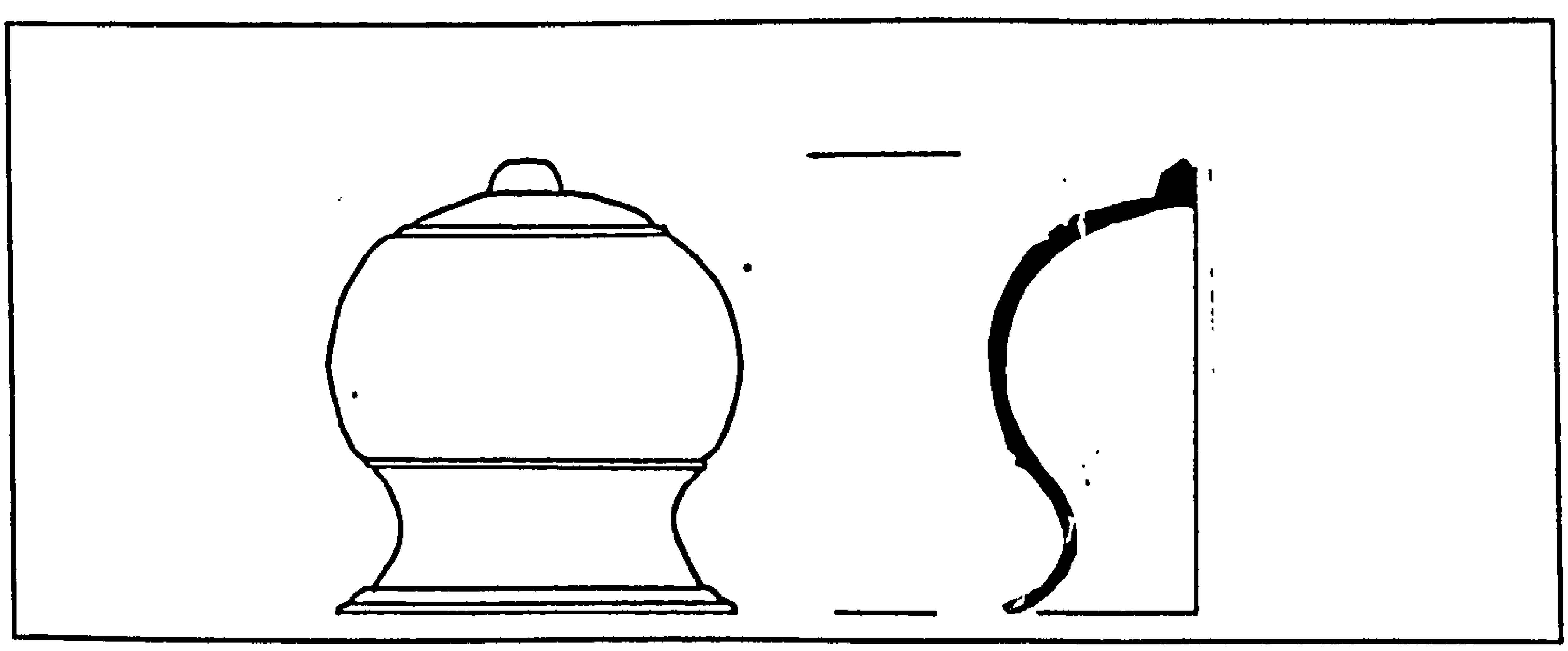
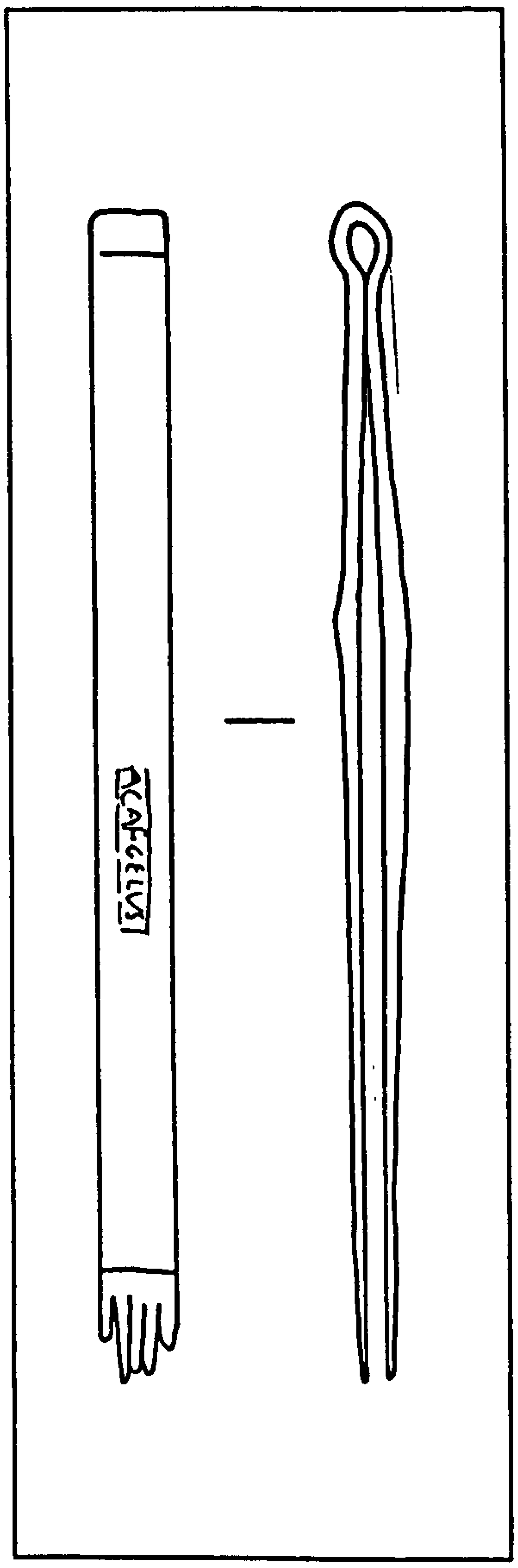


Fig. 9a. Cupping Vessel from Zugmantel. After Künzl 1984/85.

←Fig. 10. Forceps made of one strip of metal with toothed edges (1:1). After Jackson 1990: Fig. 3, Nr. 9



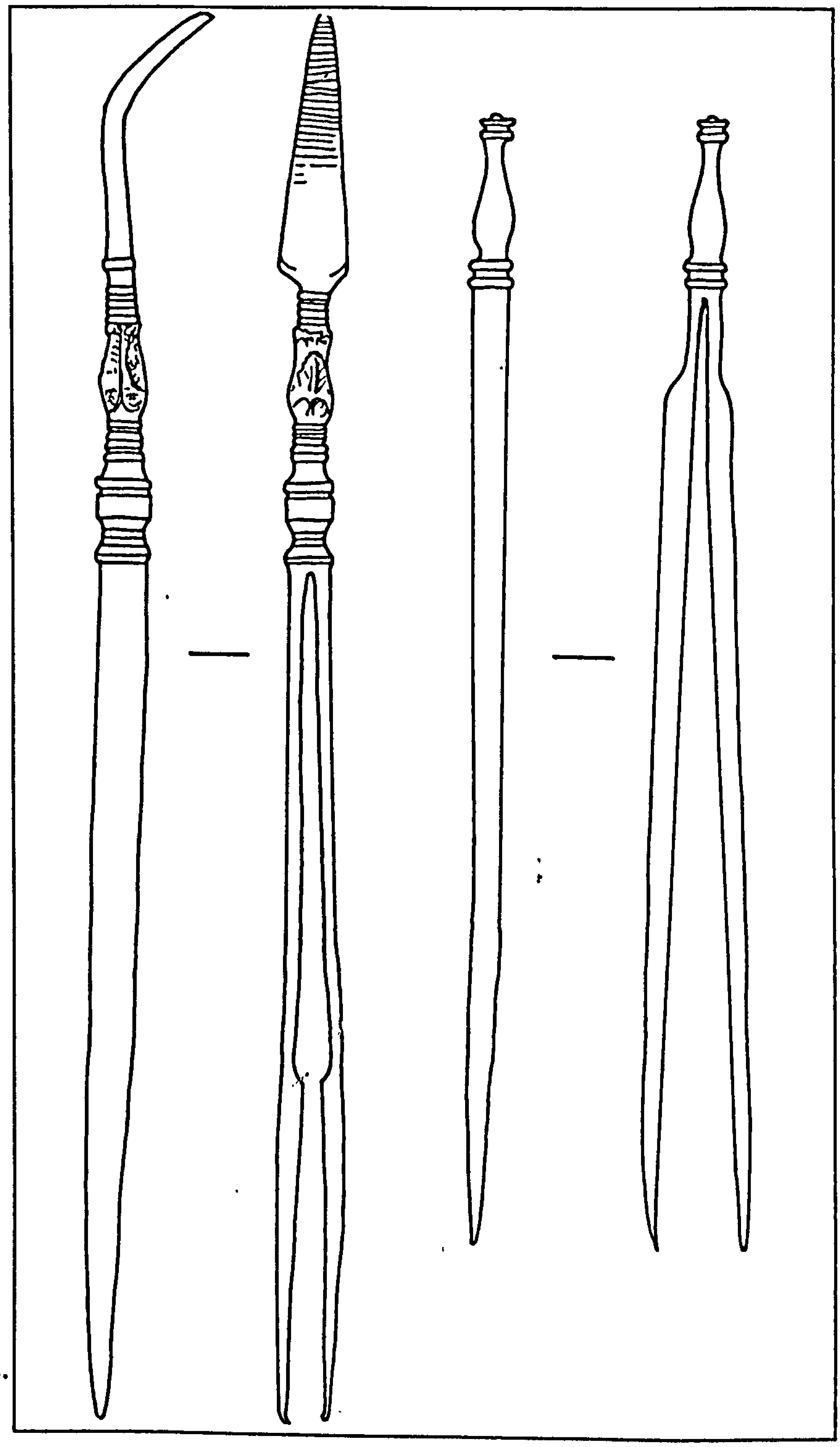


Fig. 11. Two Forceps with straight edges (1:1).
After Jackson 1990: Fig 2, Nr. 2.

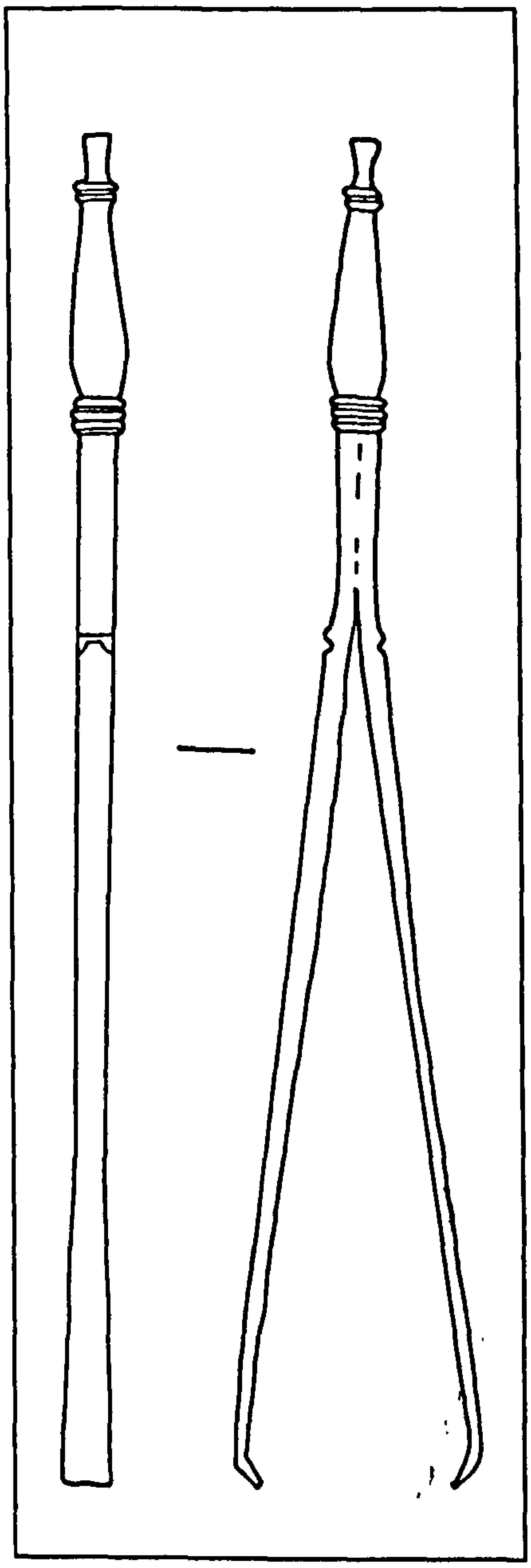


Fig. 12. Forceps with edges turned inwards (1:1). After Jackson 1990: Fig 2, Nr. 3.

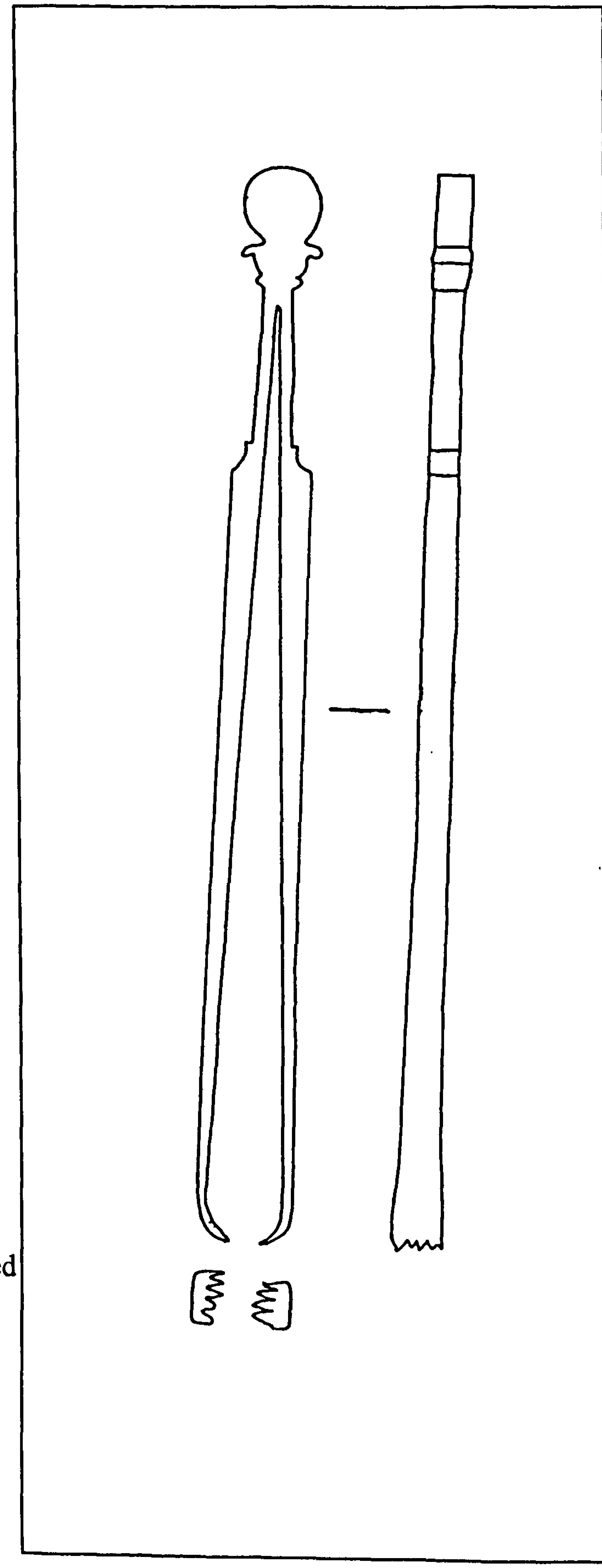


Fig. 13. Forceps with toothed edges turned inwards (1:1). After Jackson 1990: Fig. 3, Nr. 5.

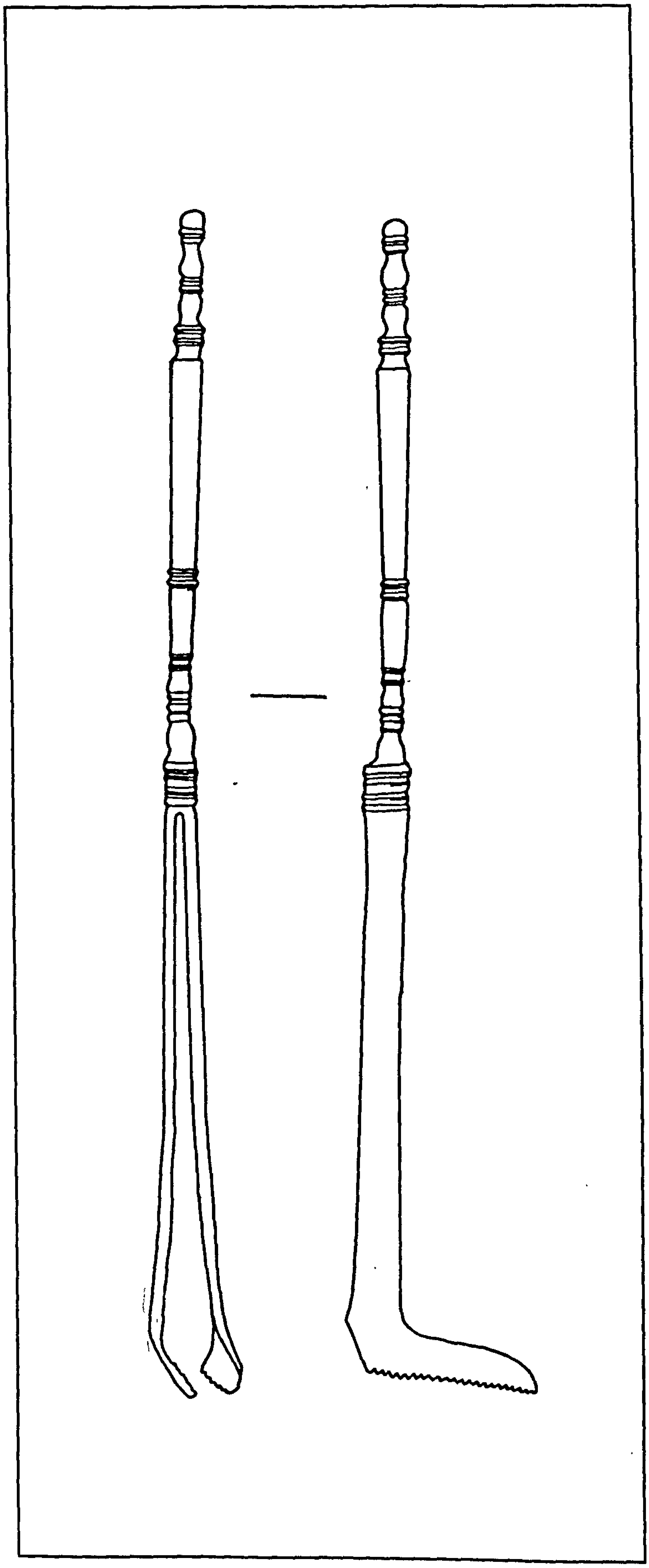


Fig. 14. Angle-edged toothed forceps (1:1). After Jackson 1990: Fig. 3, Nr. 6.

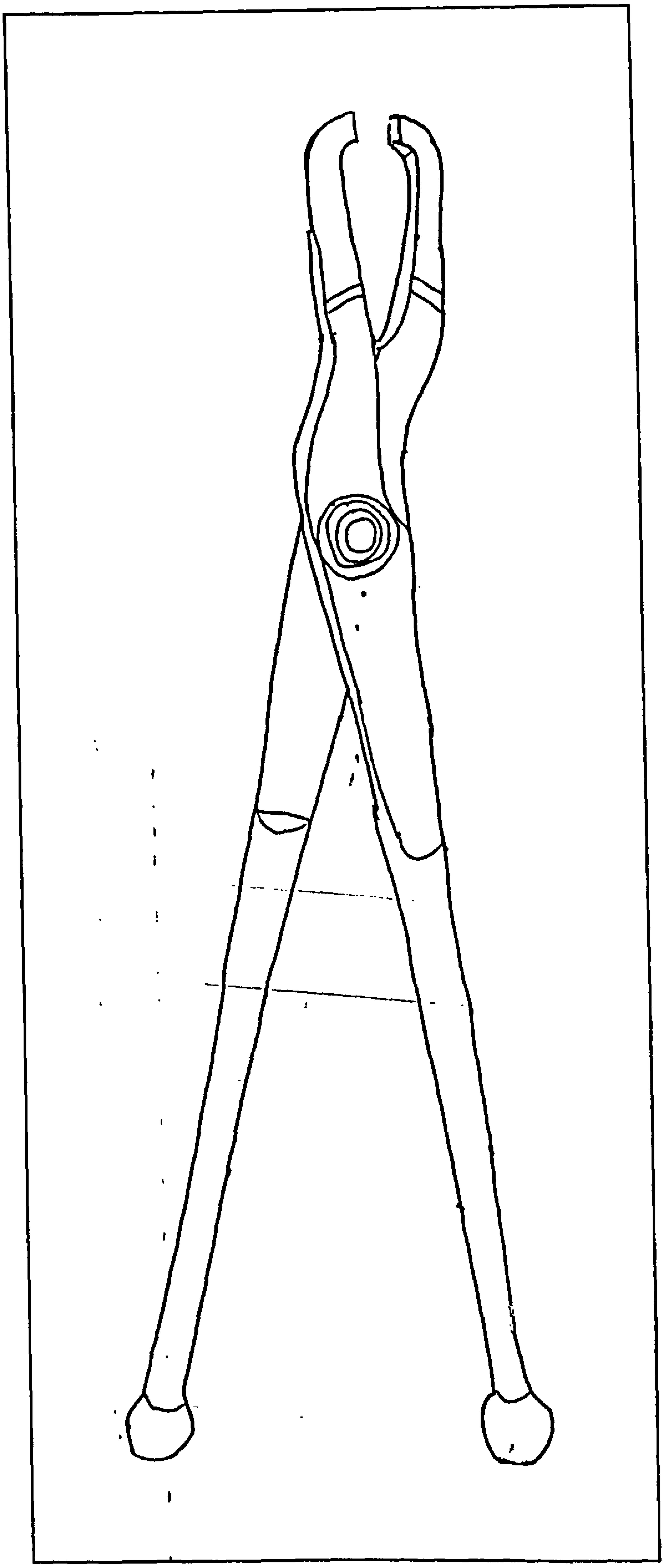


Fig. 15. Dental forceps (18 cm). After Matthäus 1989: Fig. 13.

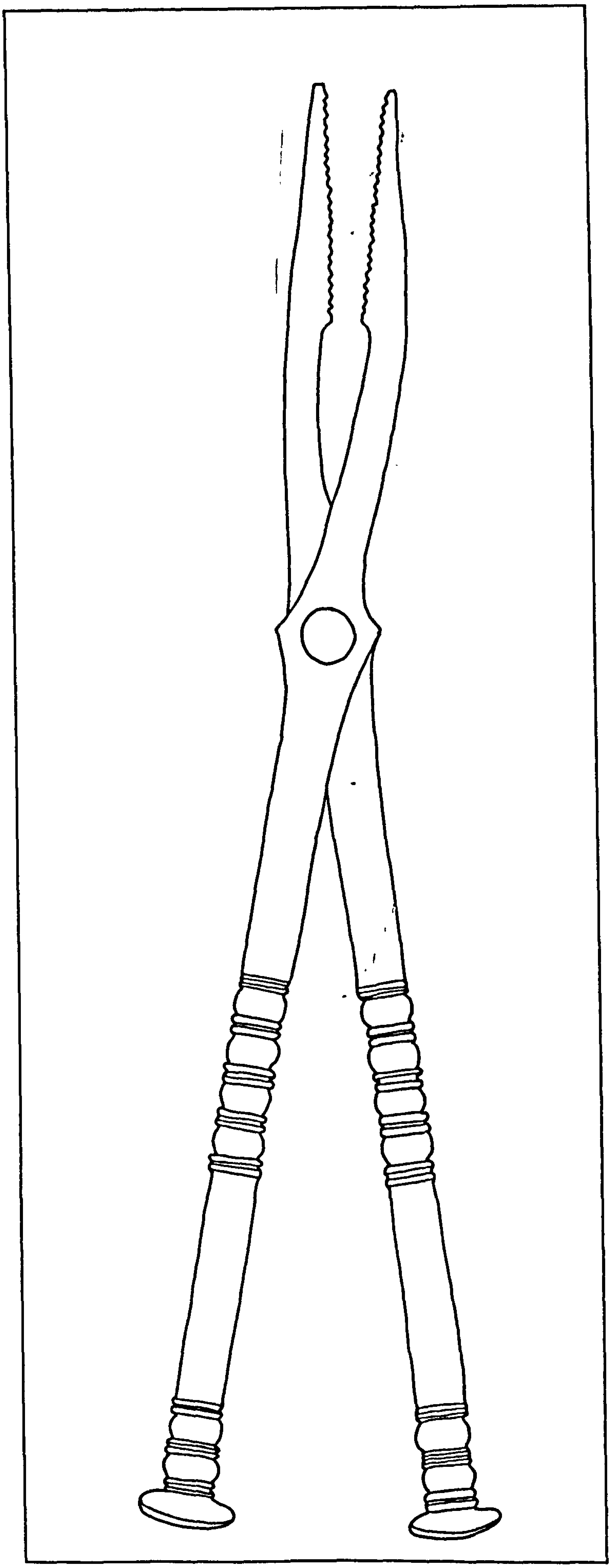


Fig. 16. Straight-edged bone forceps (l:1). After Jackson 1990: Fig. 5, Nr. 4.

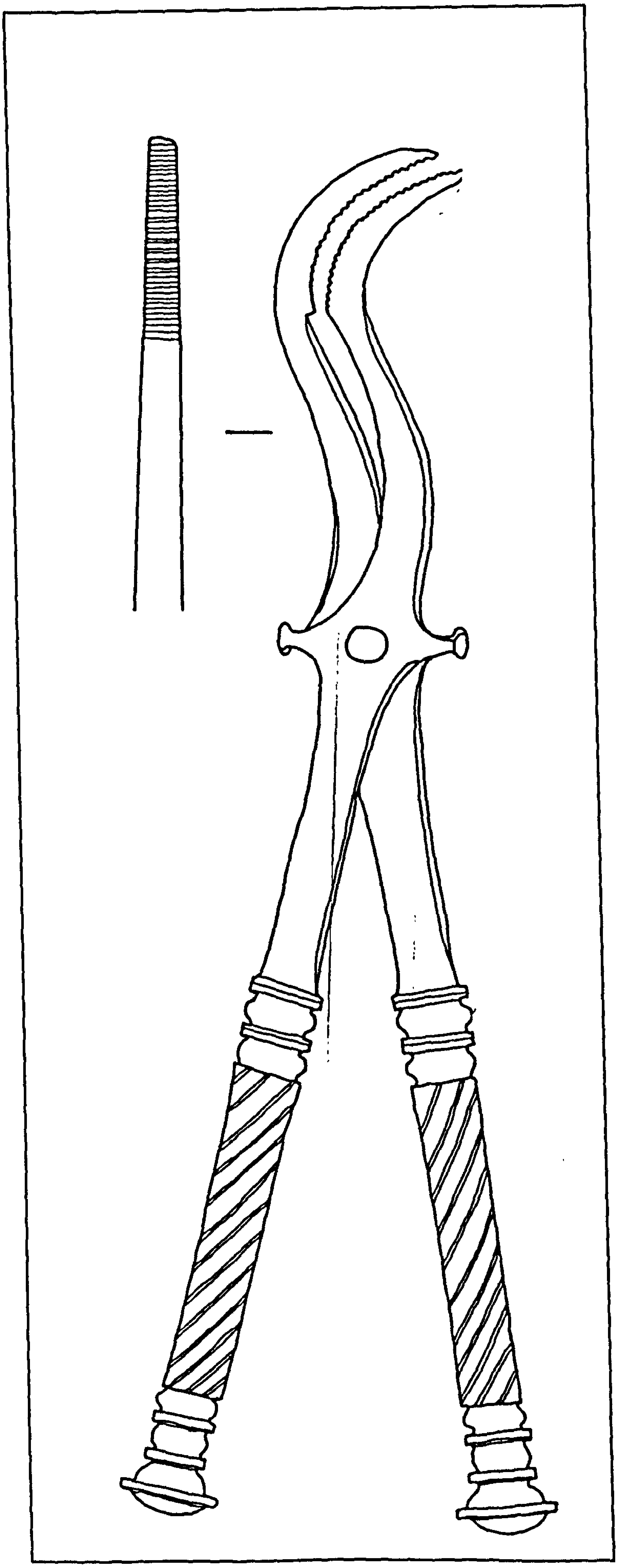


Fig. 17. Curved-edged bone forceps (1:1). After Jackson 1990: Fig. 5, Nr. 3

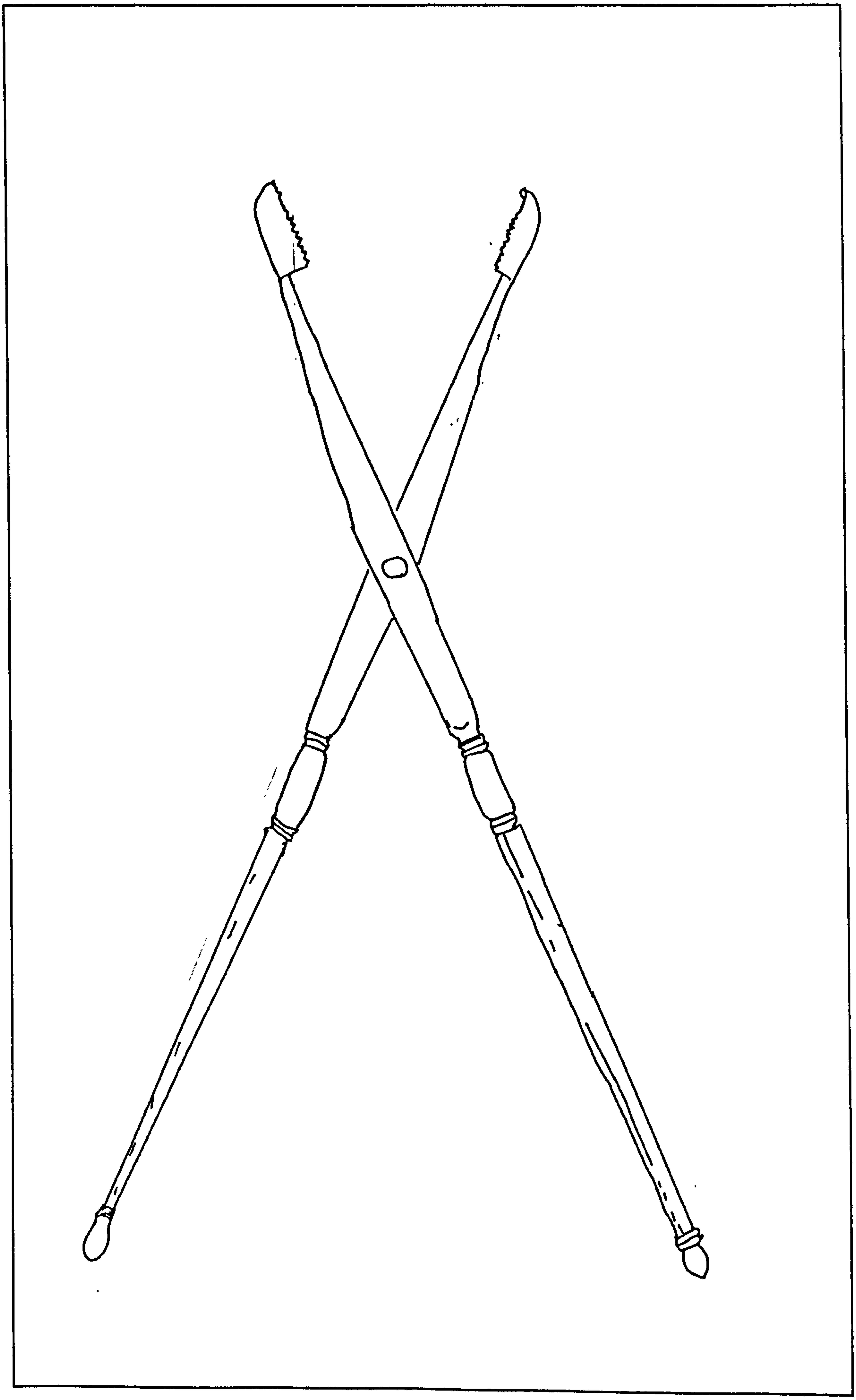


Fig. 18. Staphylagra (1:1). After Jackson 1990: Fig. 3, Nr. 7.

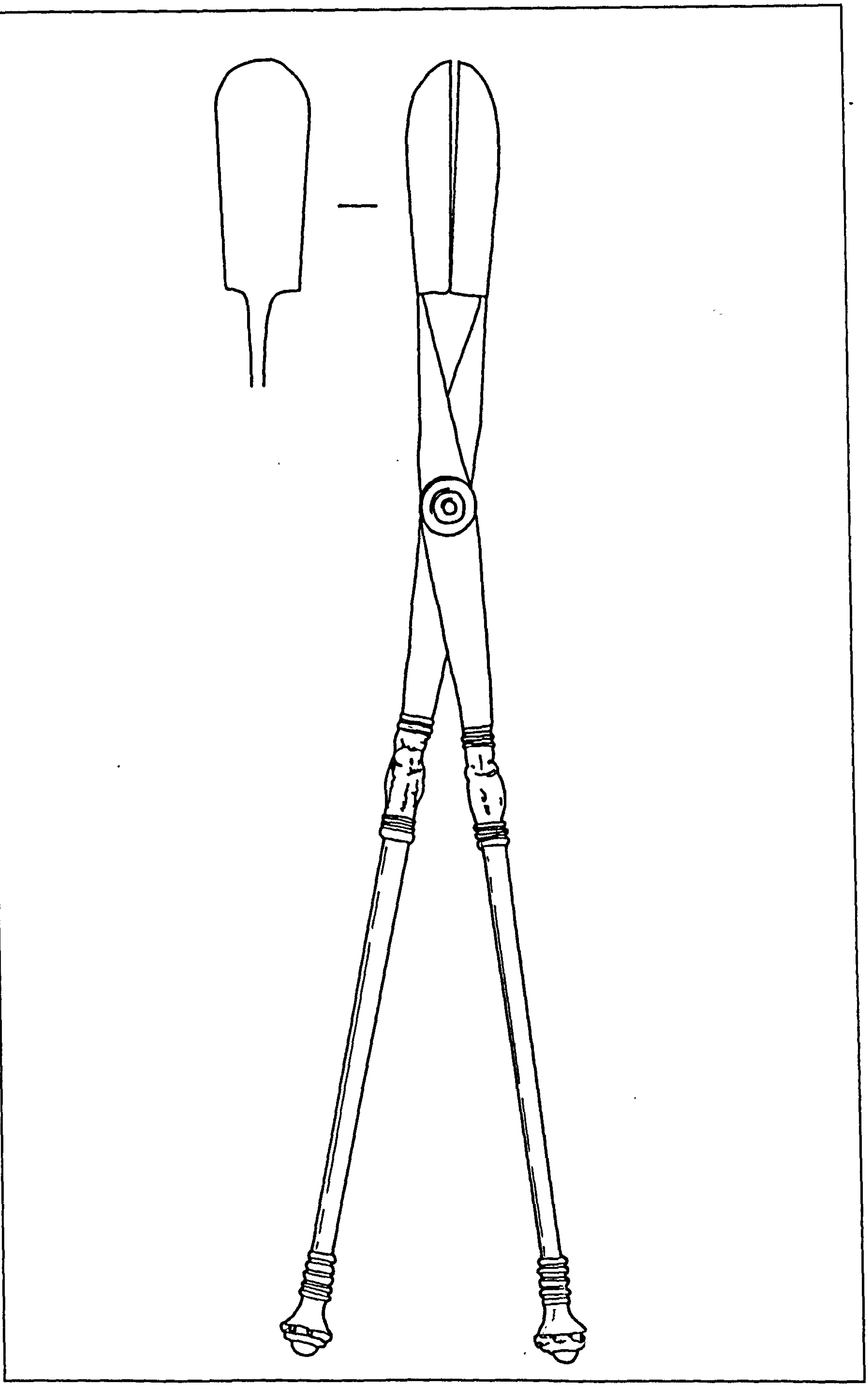


Fig. 19. Staphylocaustes (1:1). After Jackson 1990: Fig. 3, Nr. 8.

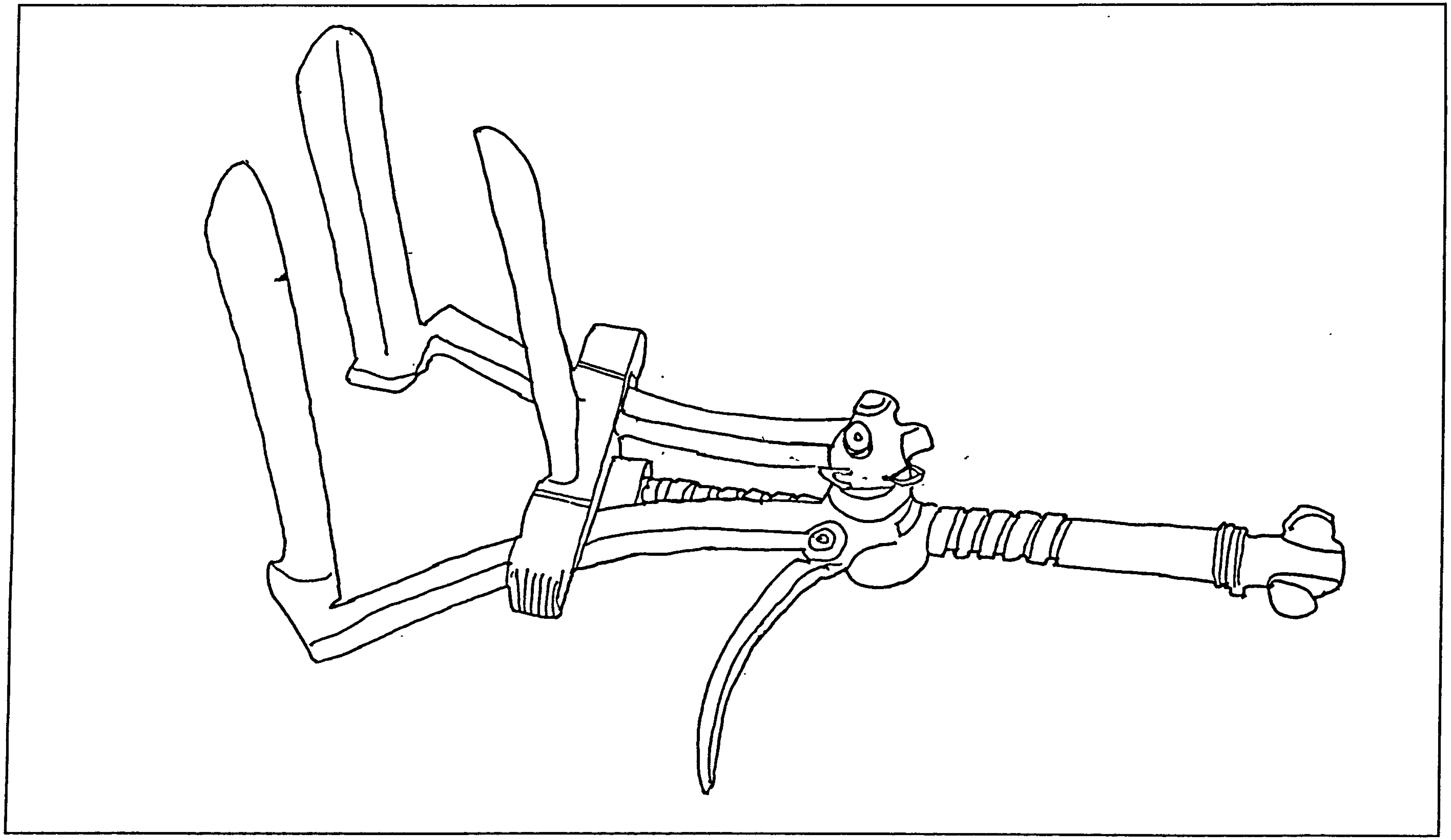
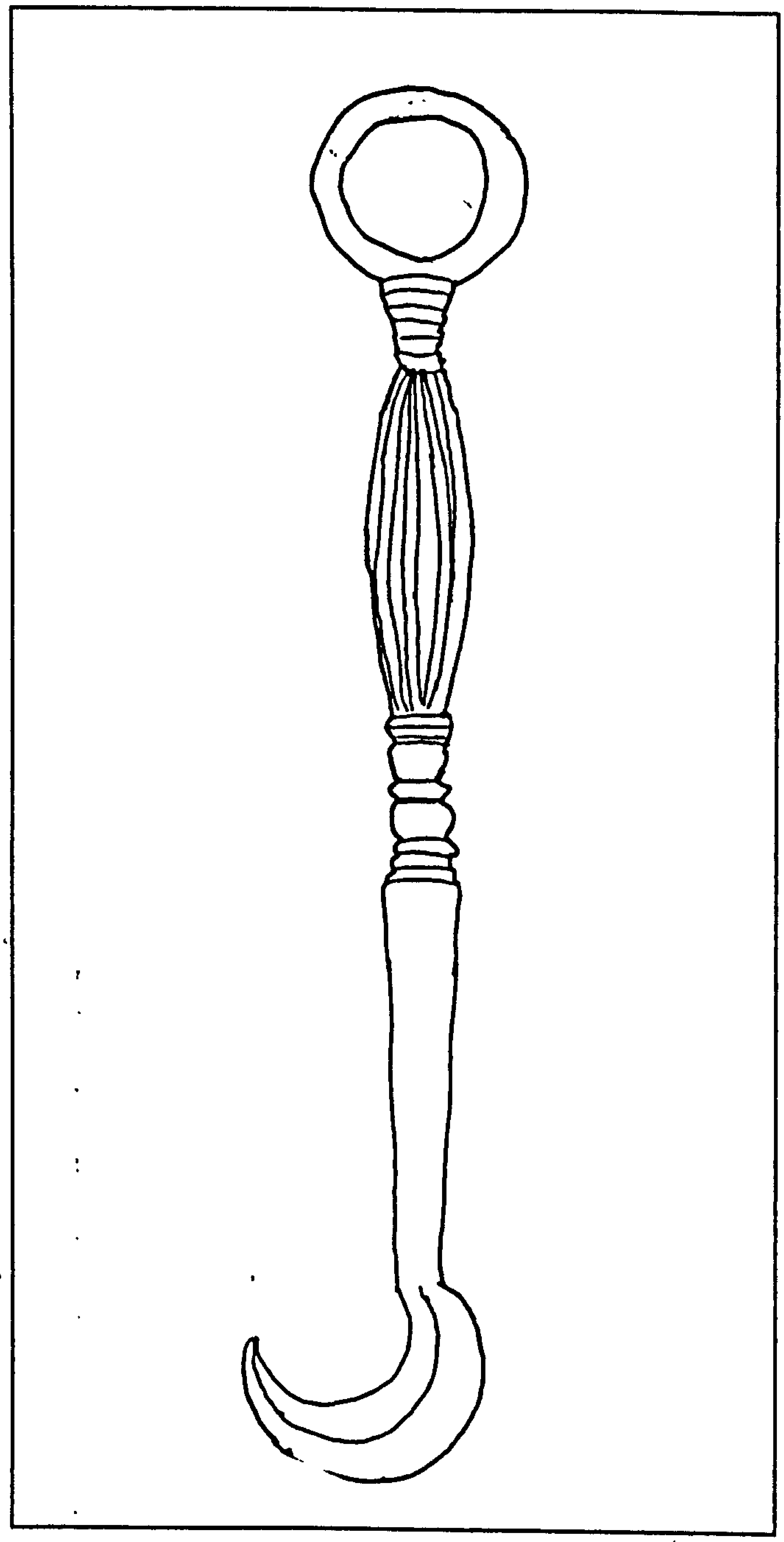


Fig. 20. Vaginal Speculum. After Matthäus 1989: Fig 27.

Fig. 21. Foetal Hook. After Milne 1907: Plate 5



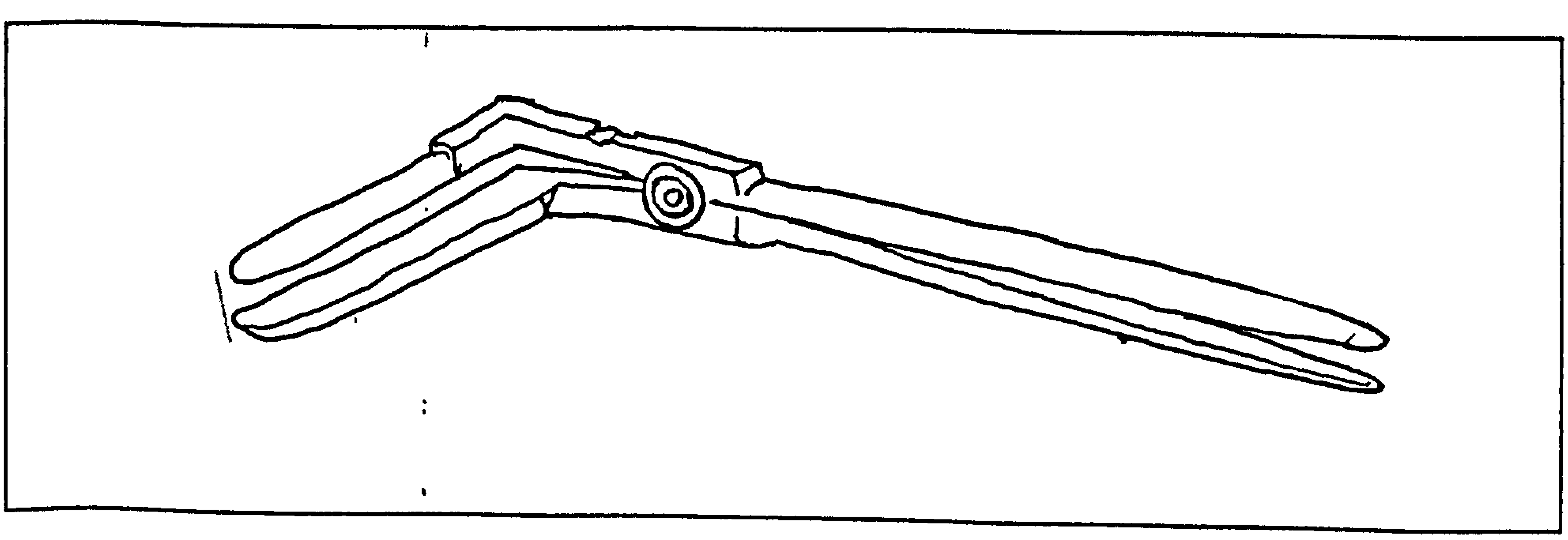


Fig. 22. Rectal Speculum. After Matthäus 1989: Fig 27.

Fig. 23. Sharp Hook (1:1). After Jackson 1990: Fig. 2, Nr. 2.

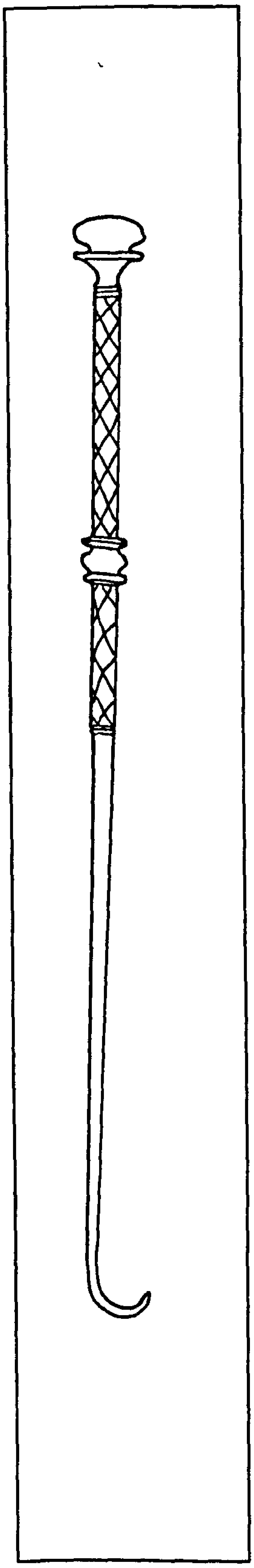


Fig. 24. Blunt hook (1:1). After Jackson 1990: Fig. 2, Nr. 8.

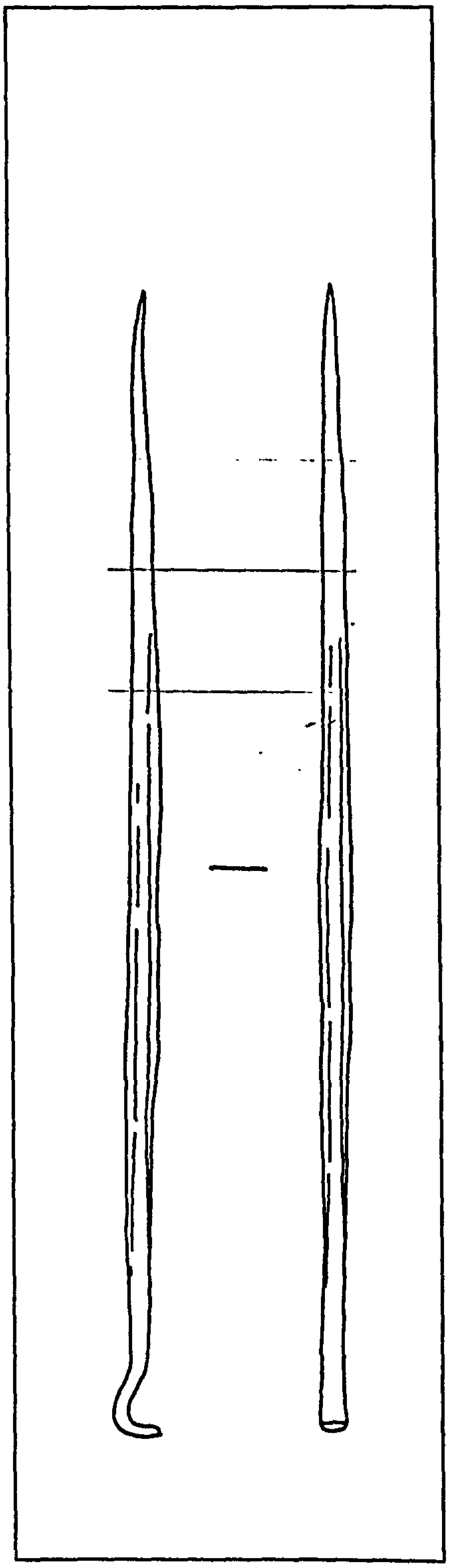
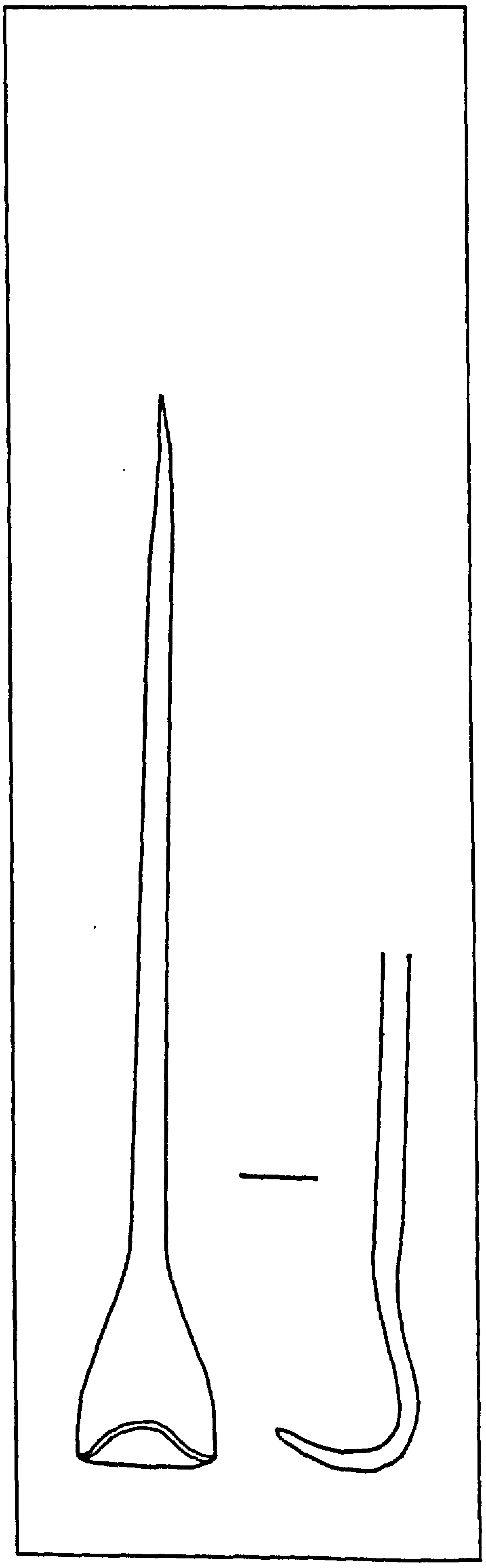


Fig. 25. Wide blunt hook (1:1). After Jackson 1990: Fig. 2, Nr. 9.



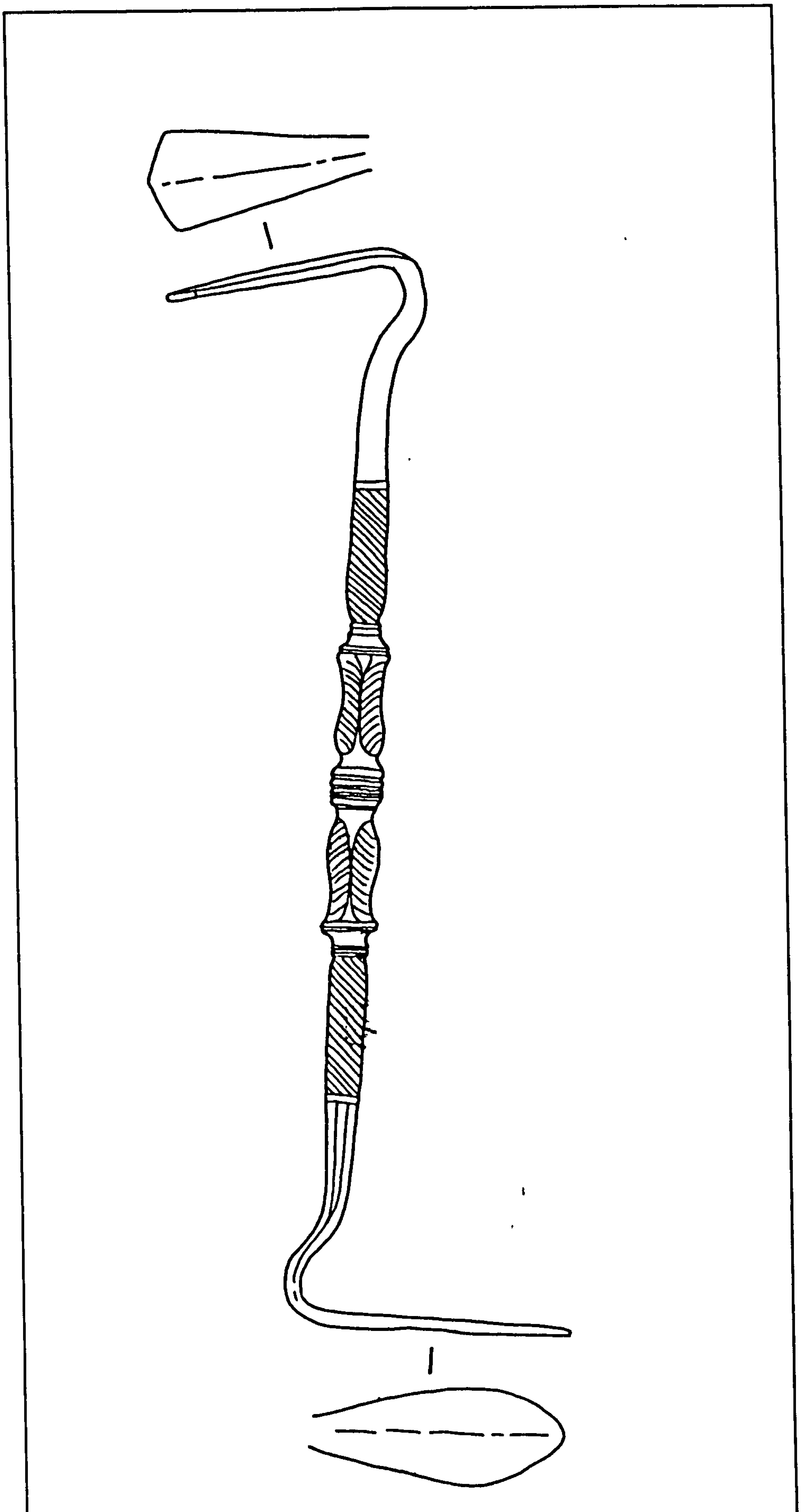


Fig. 26. Double-ended blunt hook. After Jackson 1990: Fig. 2, Nr. 7.

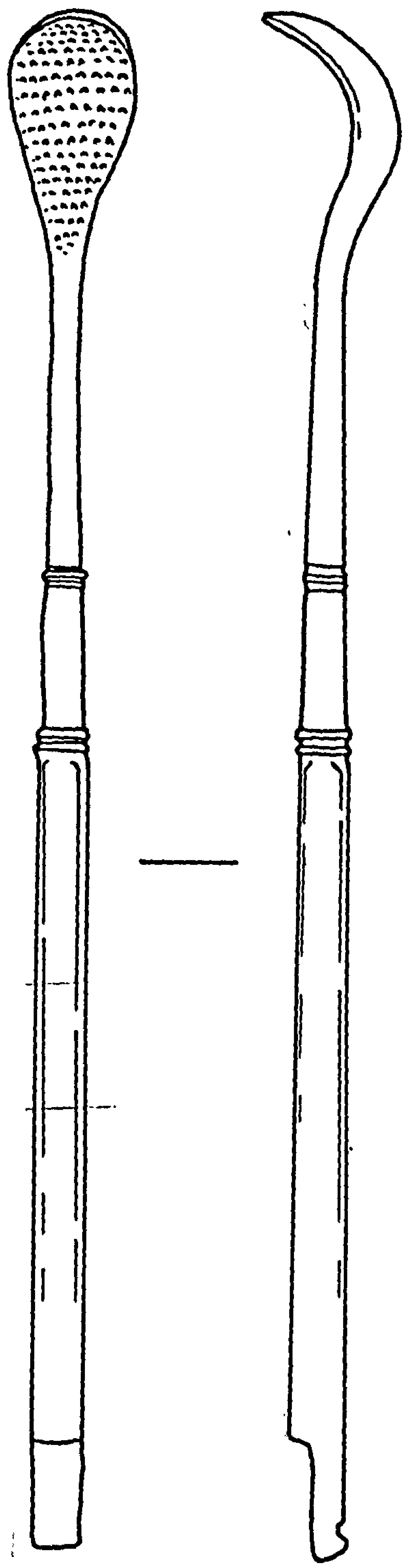


Fig. 27. Double-ended lithotomy scoop with slot for a blade (1:1). After Jackson 1990: Fig. 6, Nr. 7.

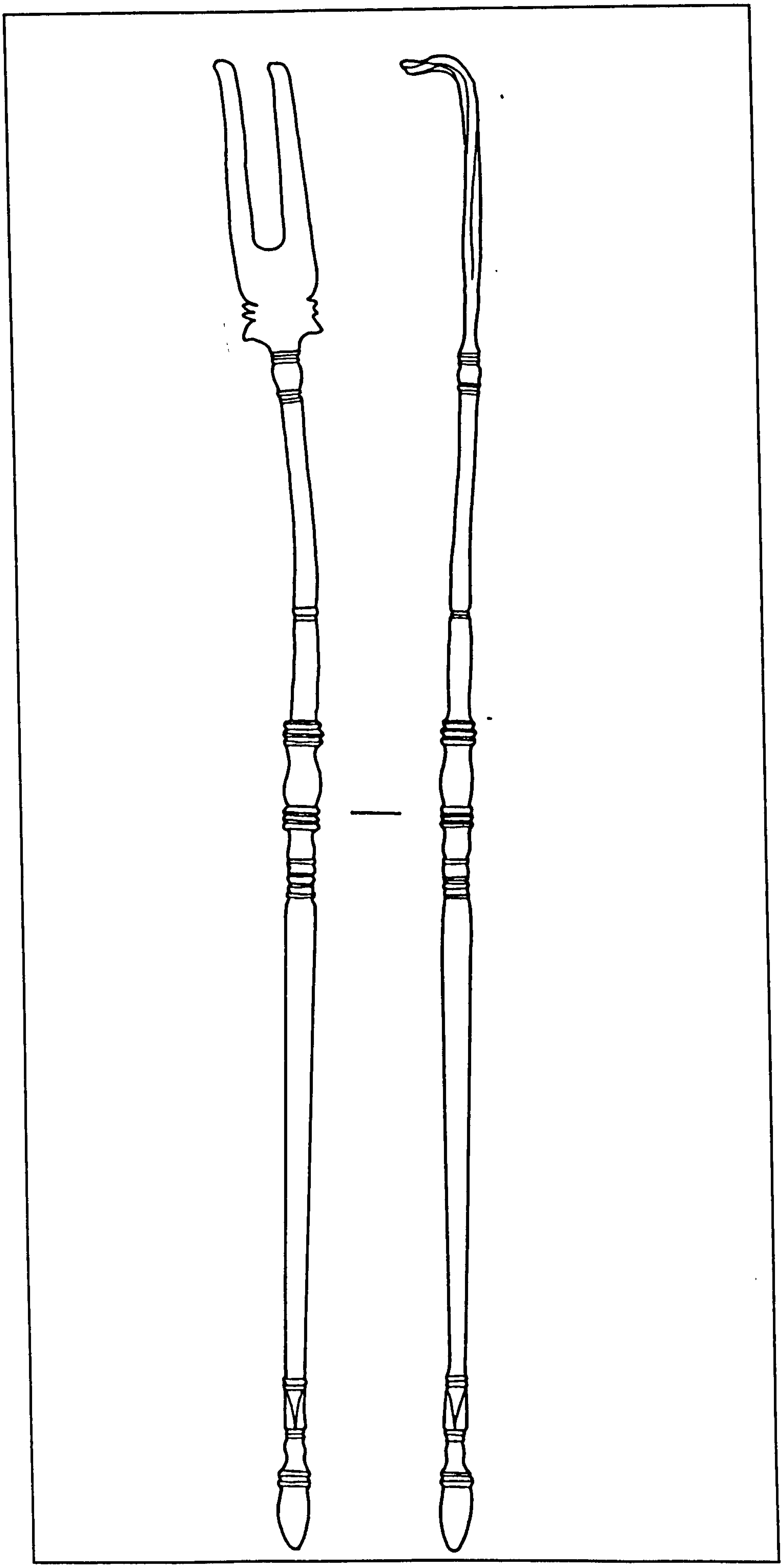


Fig. 28. Bifurcated Hook (1:1). After Jackson 1990: Fig 2. Nr. 5.

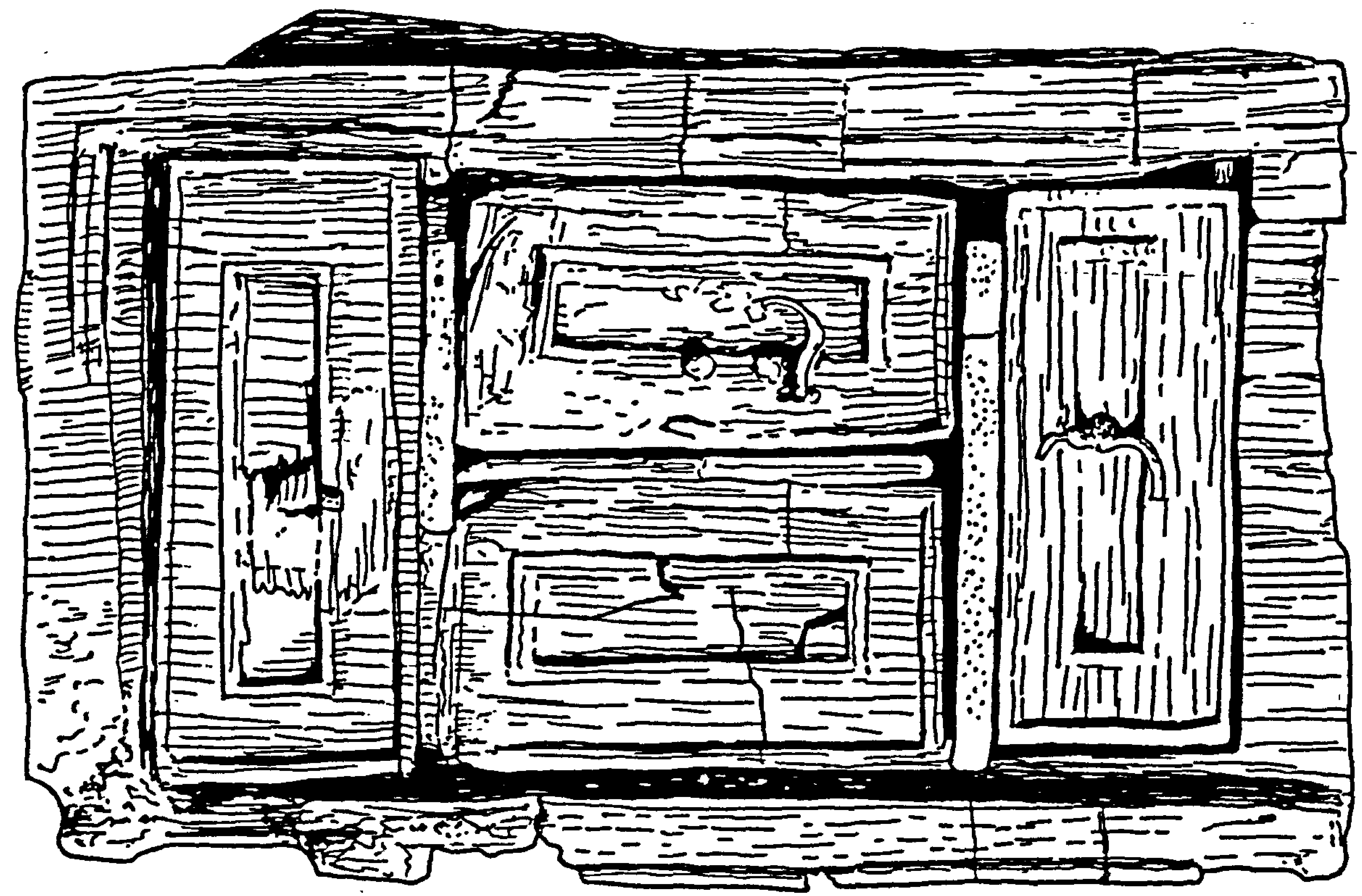
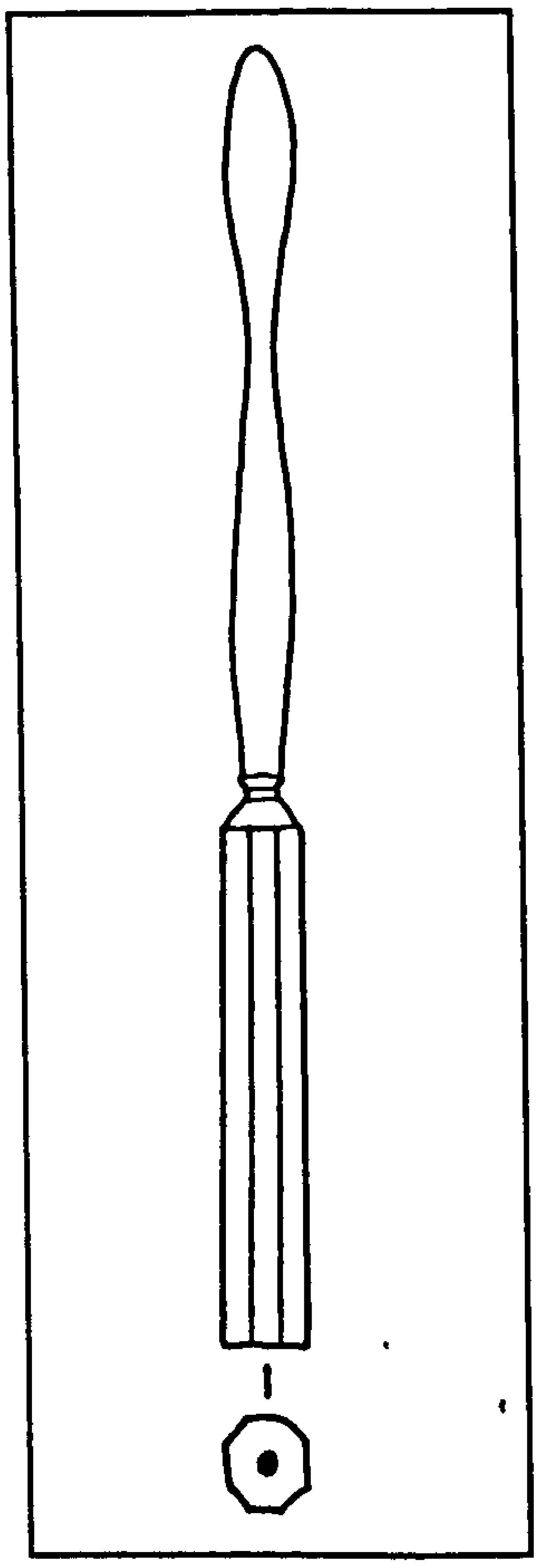


Fig. 29. Medical Box. After Künzl 1983: Fig. 76.

Fig. 30. Needle handle (1:1).
After Jackson 1990: Fig. 4, Nr. 5.



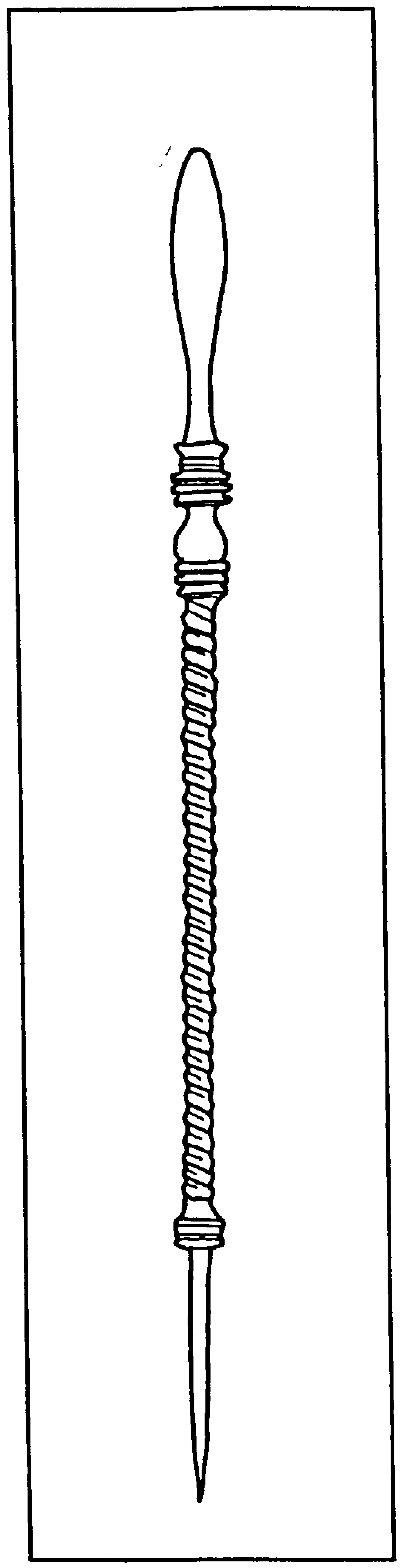
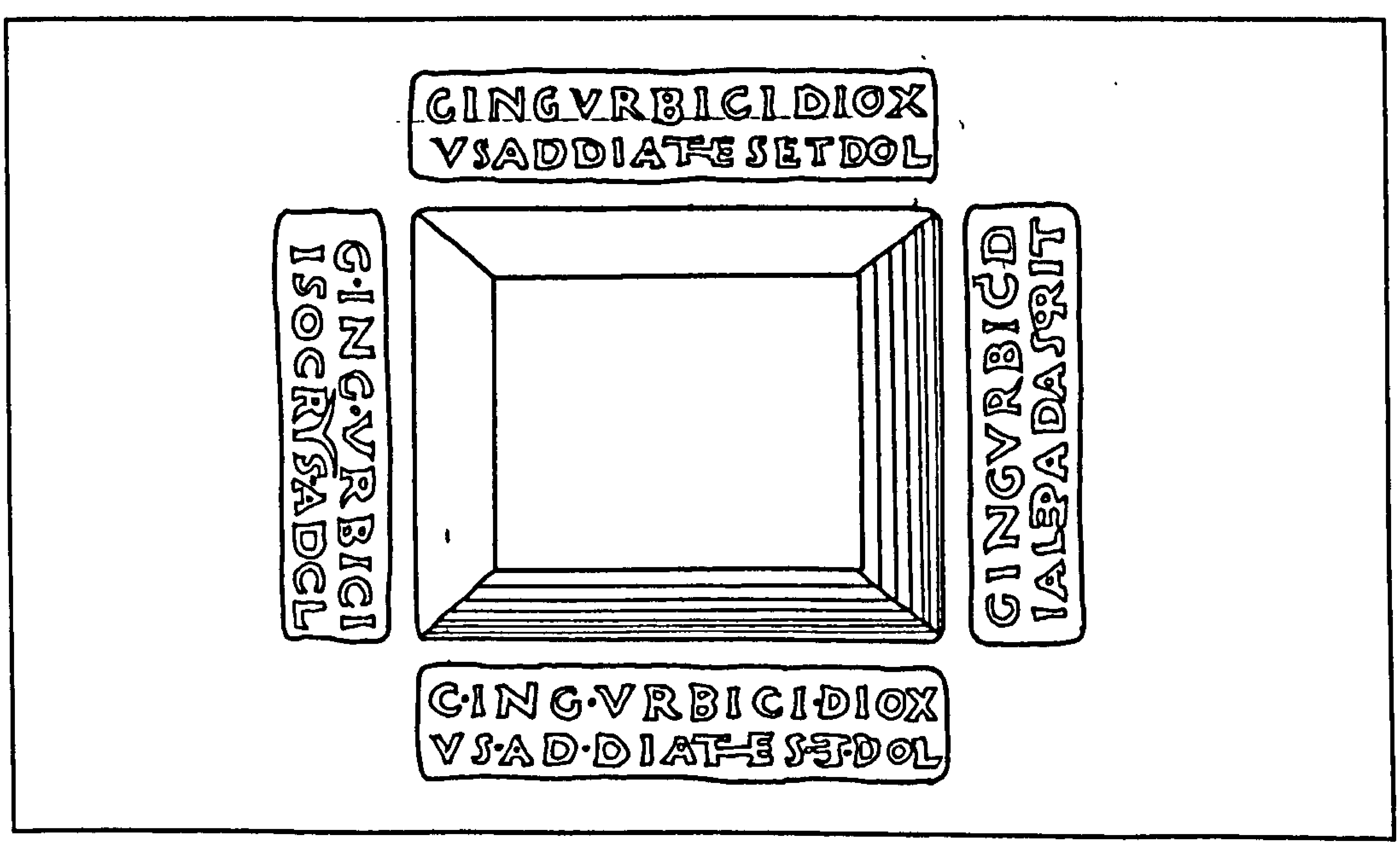


Fig. 31.
Cataract needle (1:1). After Jackson 1990: Fig. 4, Nr. 1.

Fig. 32. Oculist Stamp (1:1).
After Künzl 1983: Fig. 48.



Fig, 33. Ointment Pallet (15.0 x 12.0cm).
After Matthäus 1989.

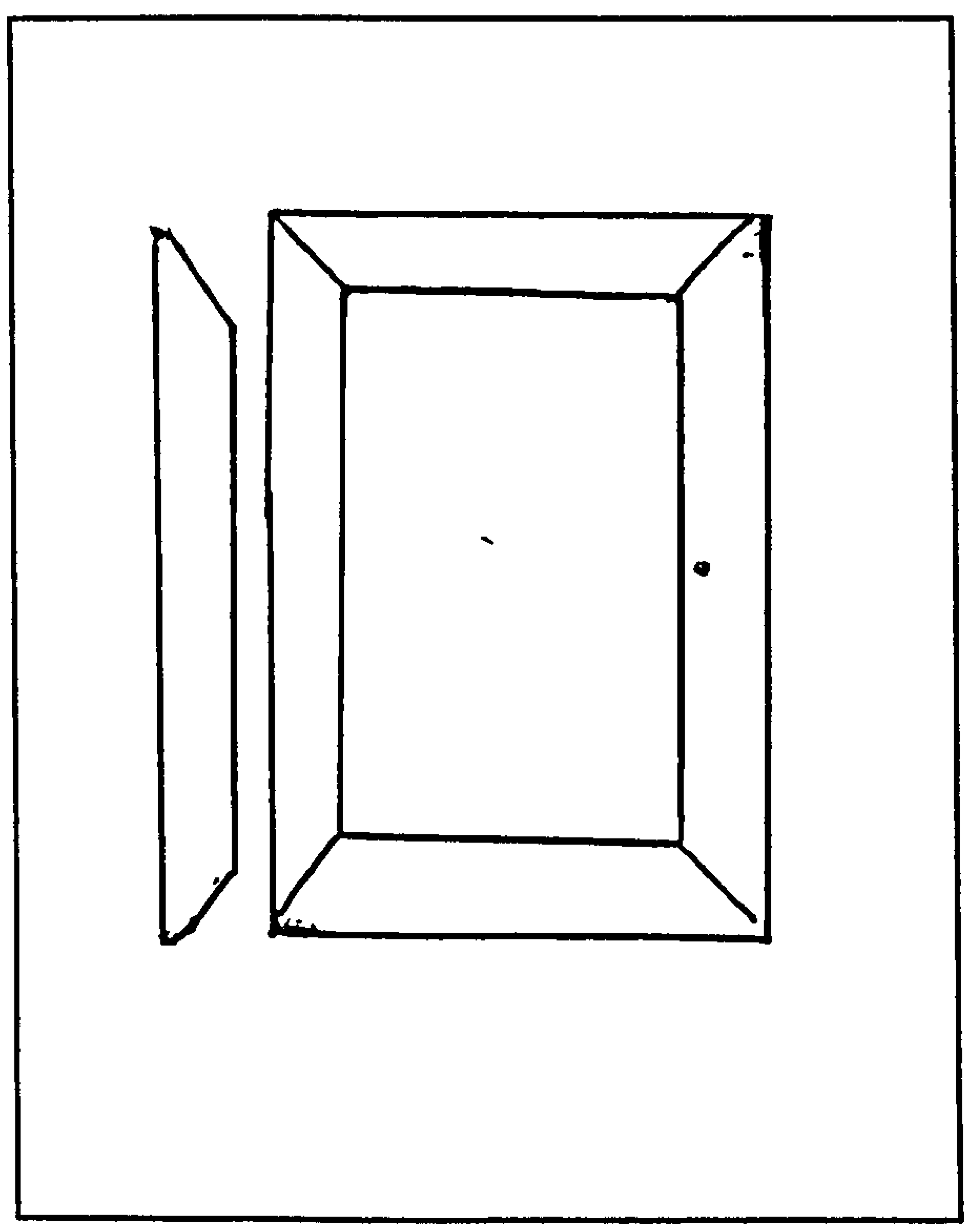


Fig. 34. Double-ended olivary probe with eye (1:1). After Jackson 1990: Fig. 4, Nr. 7.

Fig. 35. Double simple probe (1:1).
After Gilson 1981: Fig. 4.

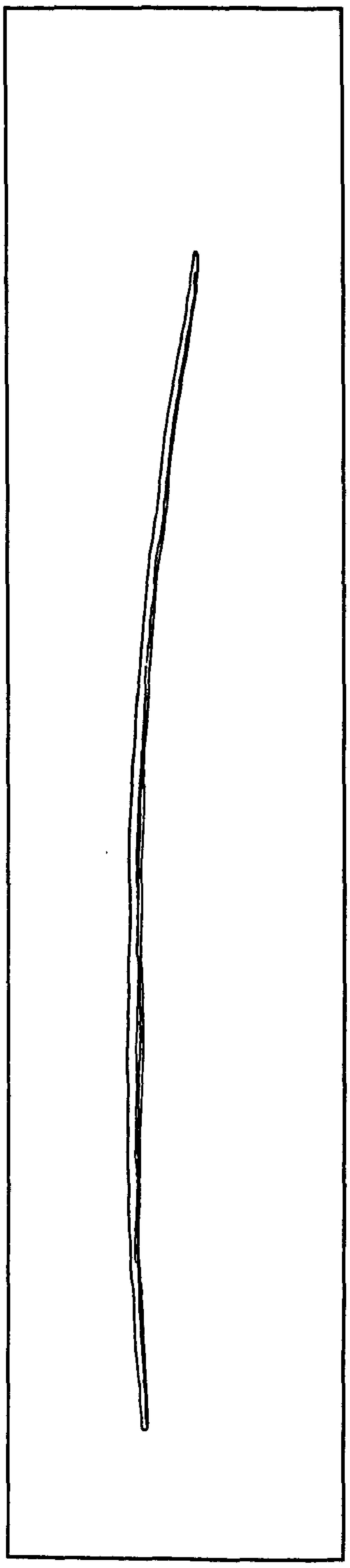


Fig. 36. Dipryene (1:1). After
Jackson 1990: Fig 4, Nr. 8.

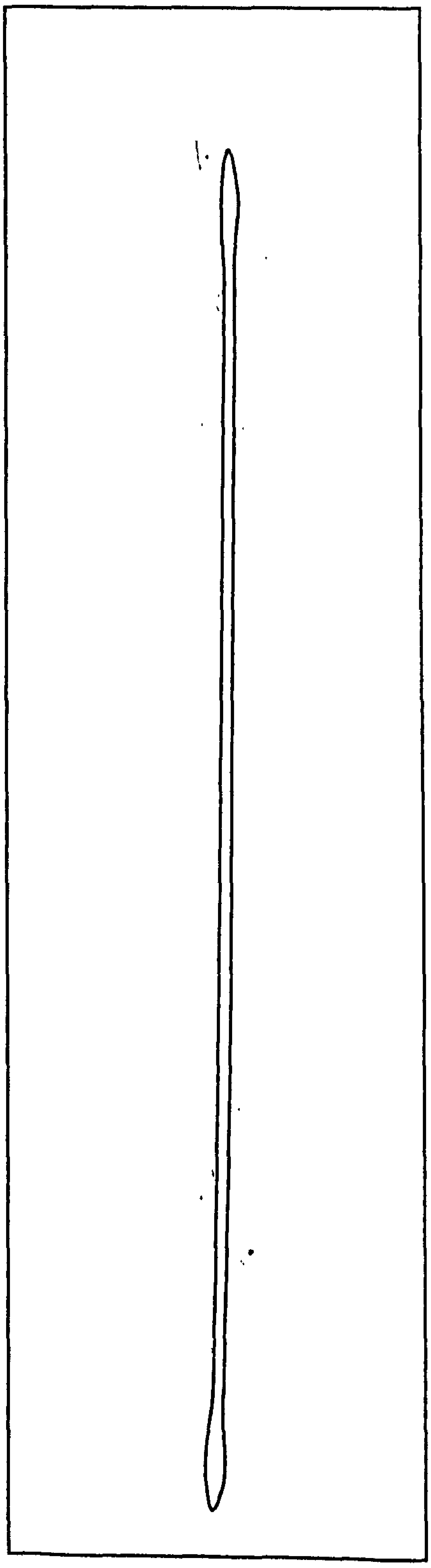


Fig. 37. Flat-headed ear probes (1:1). After Jackson 1990: Fig. 4, Nr. 9.

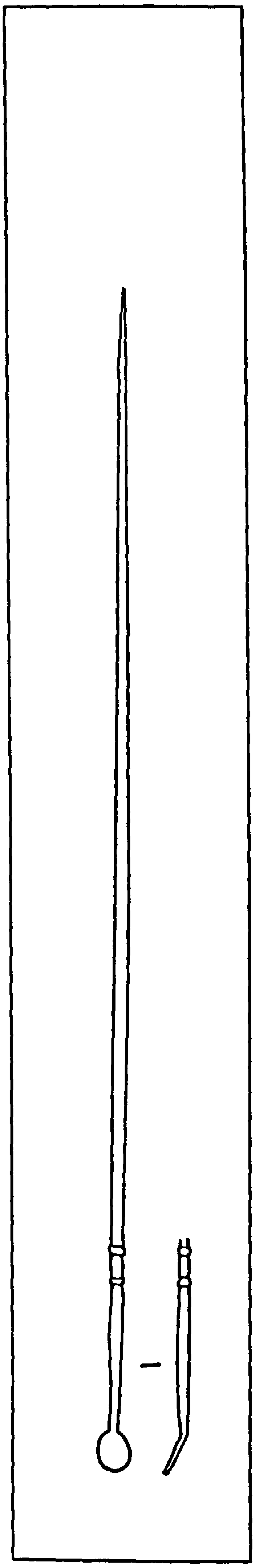


Fig. 38. Spoon-headed ear probe (1:1). After Jackson 1990: Fig. 4, Nr. 10.

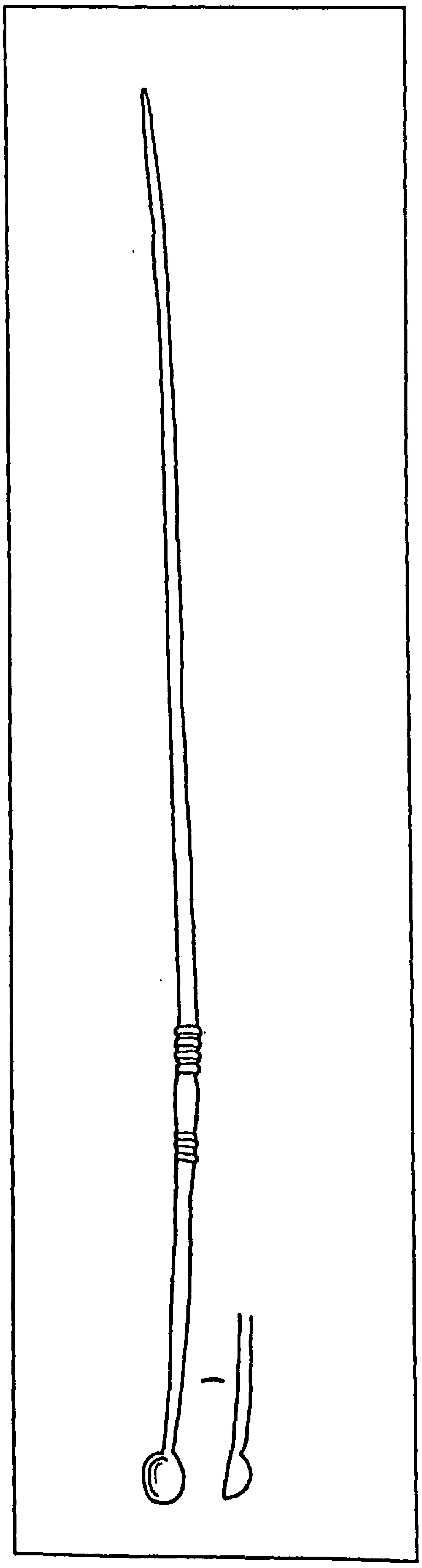


Fig. 39. Leaf-shaped spatula probe (1:1).
After Jackson 1990: Fig. 4, Nr. 15.

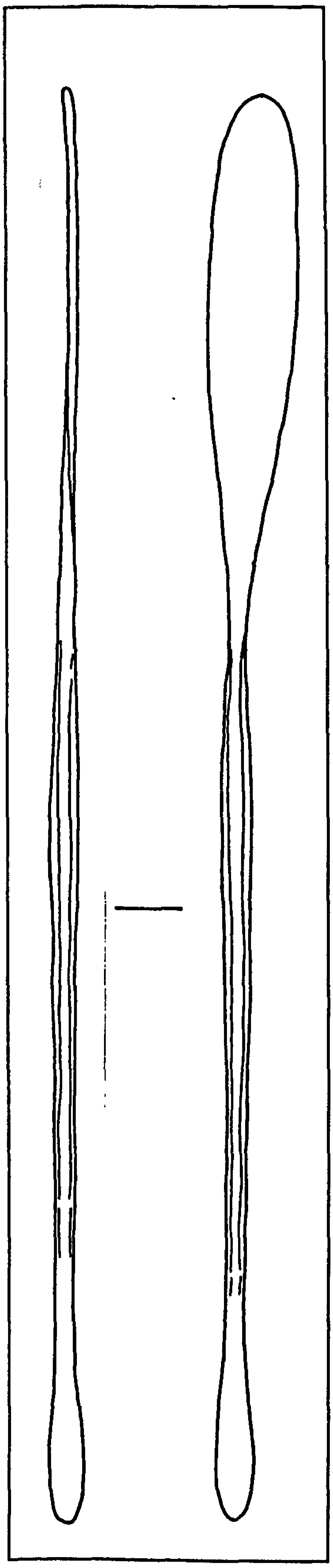


Fig. 40. Rectangular spatula probe (1:1).
After Jackson 1990: Fig. 4, Nr. 14.

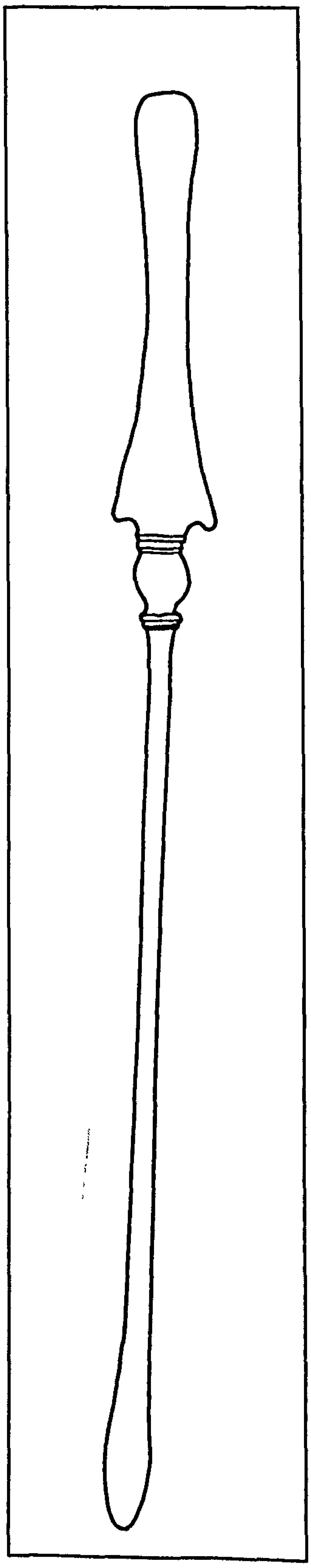
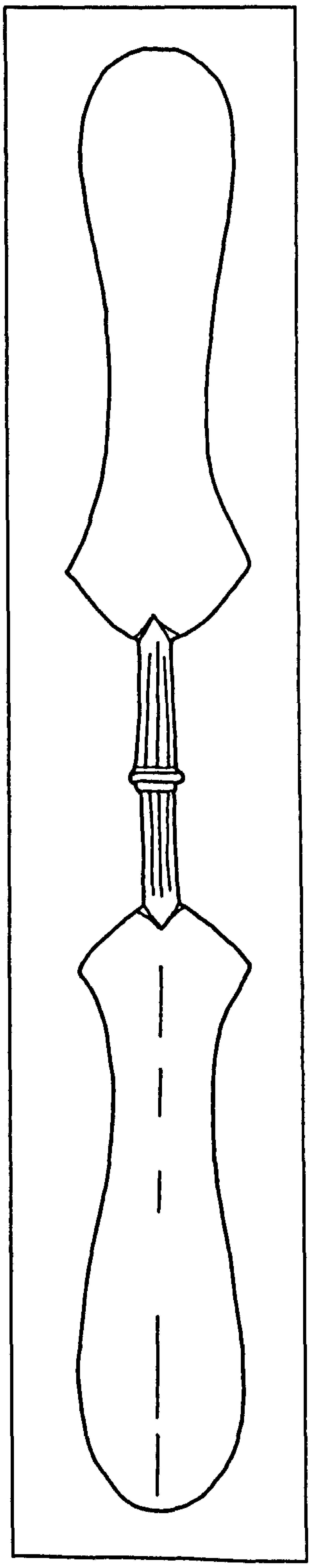


Fig. 41. Double-ended spatula probe (1:1).
After Jackson 1990:
Fig. 4, Nr. 16.



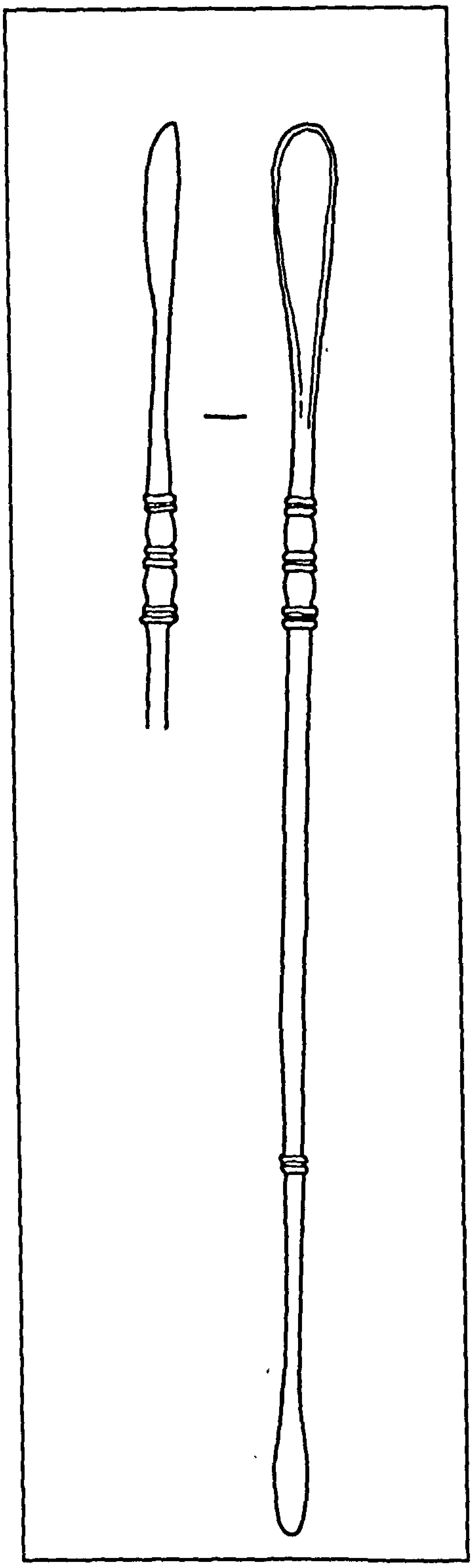


Fig. 42. Spoon probe (1:1). After Jackson 1990: Fig. 4, Nr. 11.

Fig. 43. Scalpel (1:1).
After Jackson 1990: Fig. 1, Nr. 6.

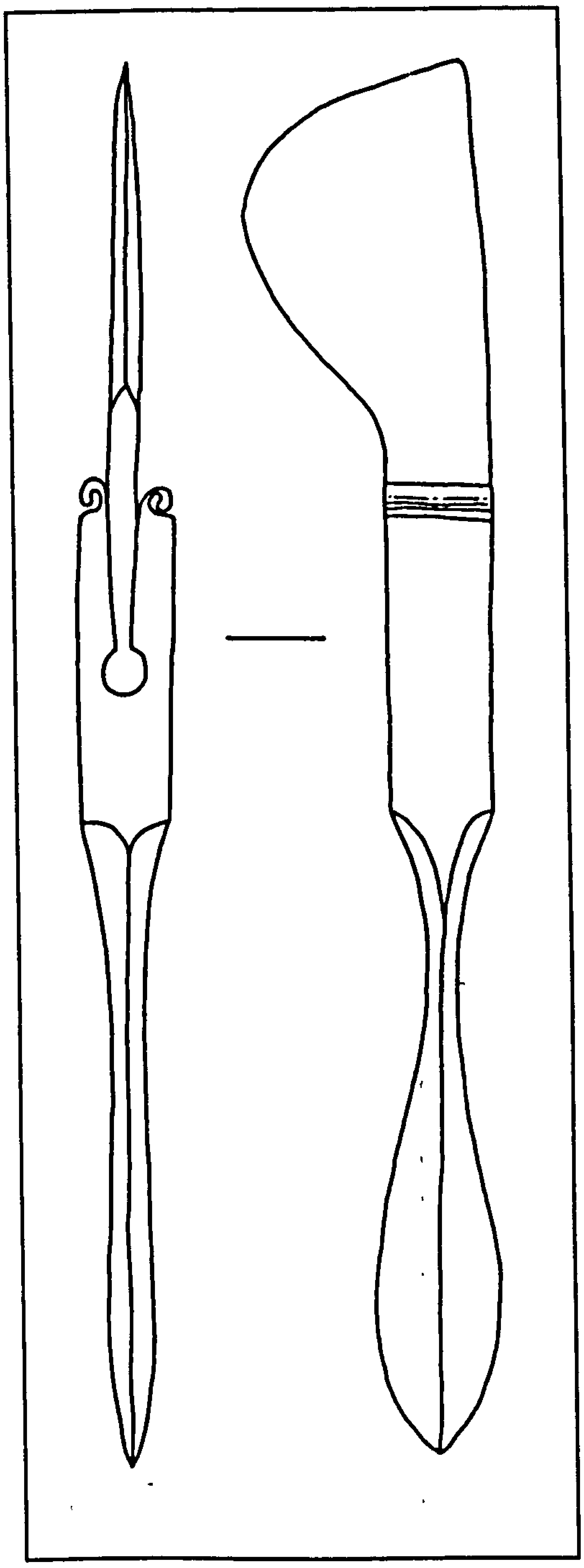
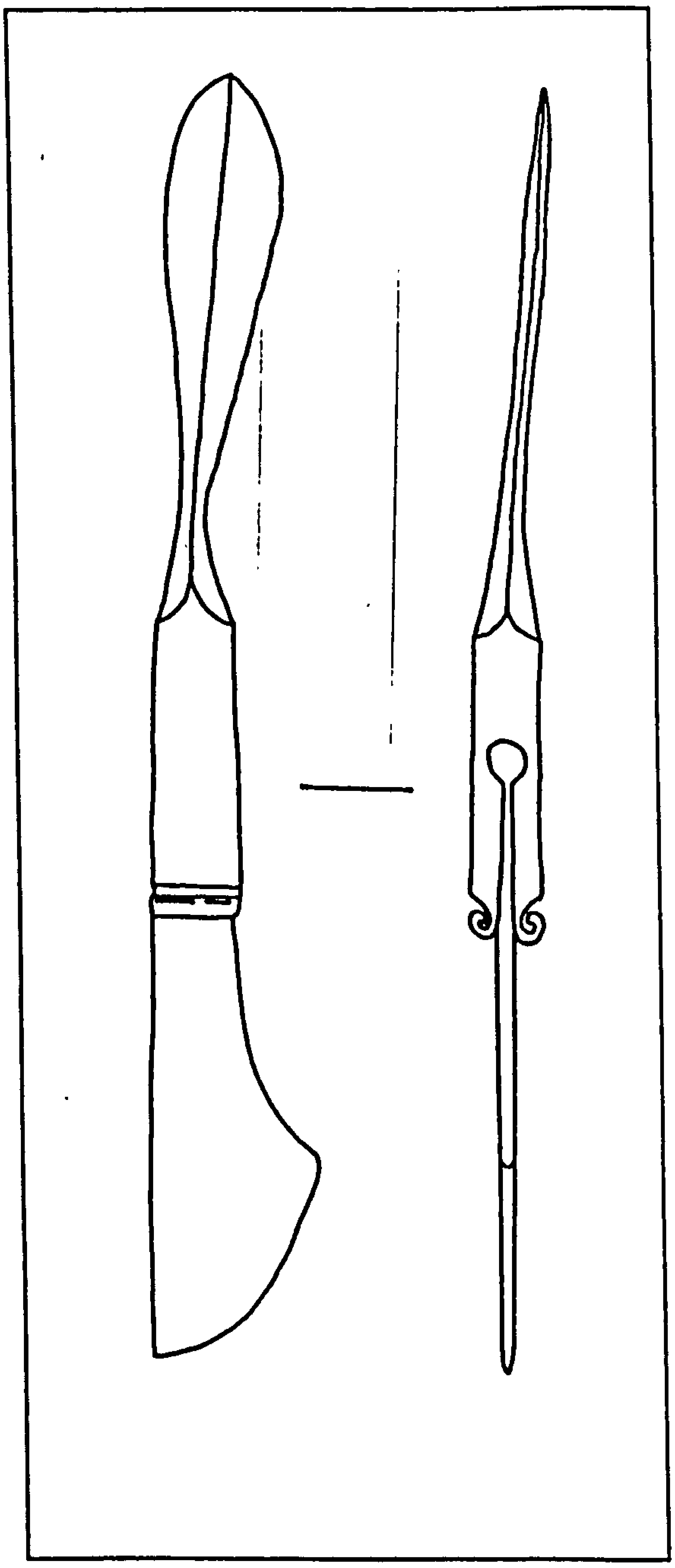


Fig. 44. Scalpel (1:1). After Jackson 1990: Fig. 1, Nr. 7.



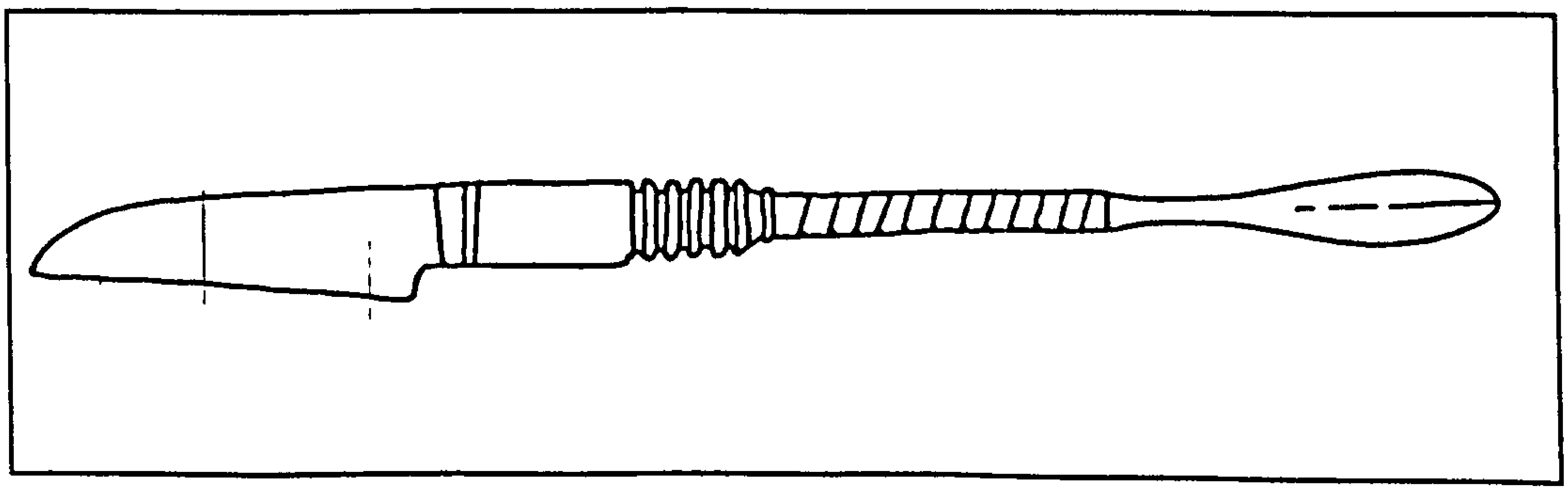


Fig. 45. Scalpel (1:1). After Jackson 1990: Fig. 1, Nr. 8.

Fig. 46. Surgical knife.
After Deringer 1954: 149, Fig. 81, Nr. 2..

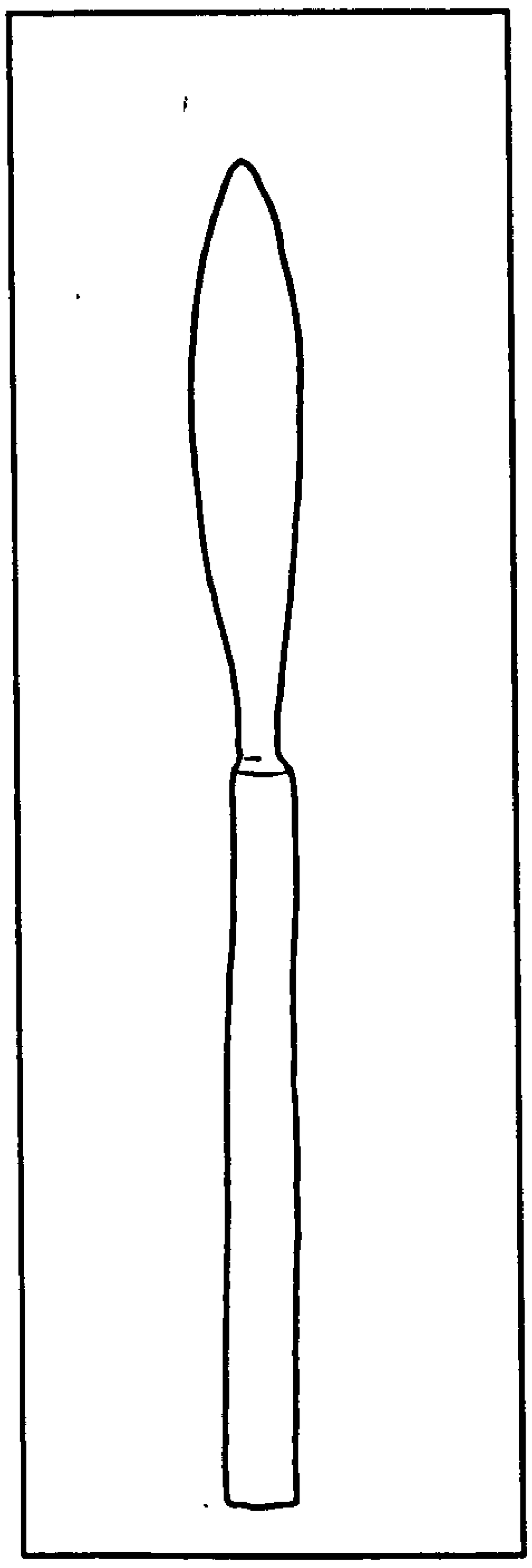


Fig. 47. Shears (1:1). After Jackson 1990: Fig 1, Nr. 5.

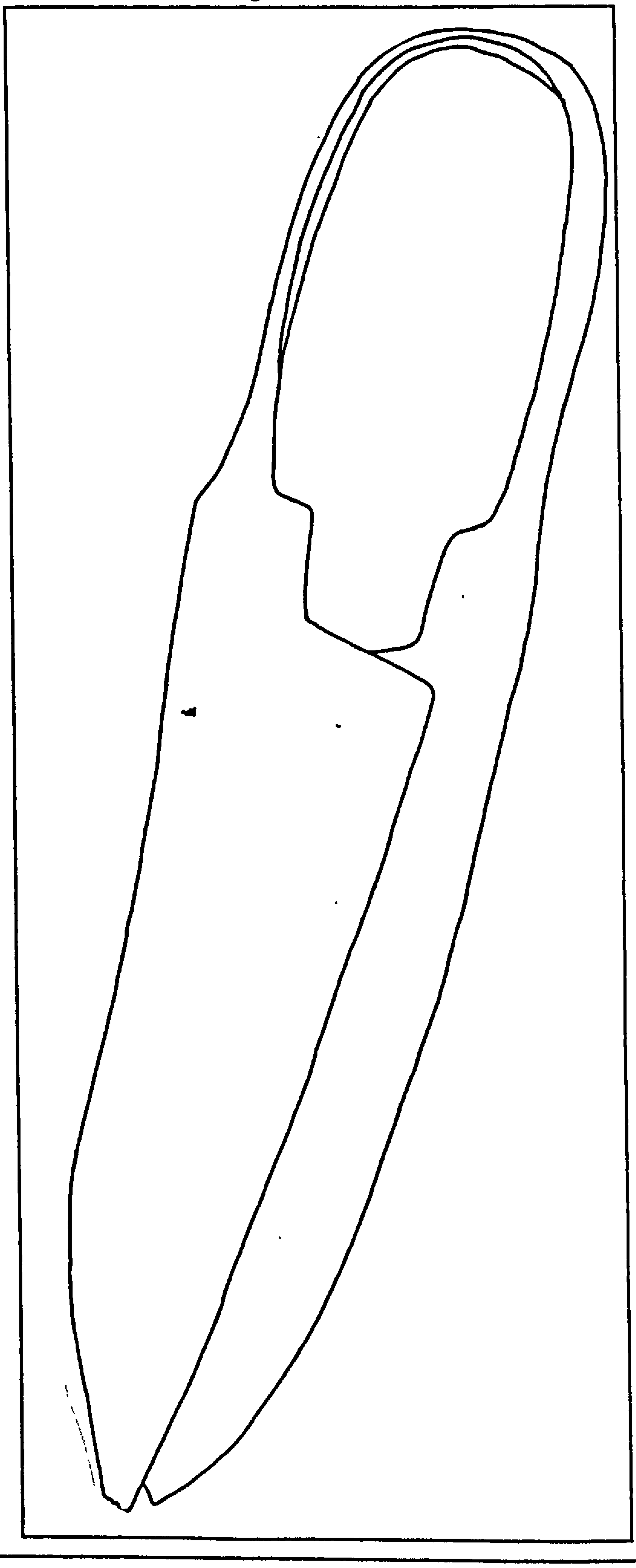


Fig. 48. Lancet (1:1).
After Jackson 1990: Fig 1, Nr. 4.

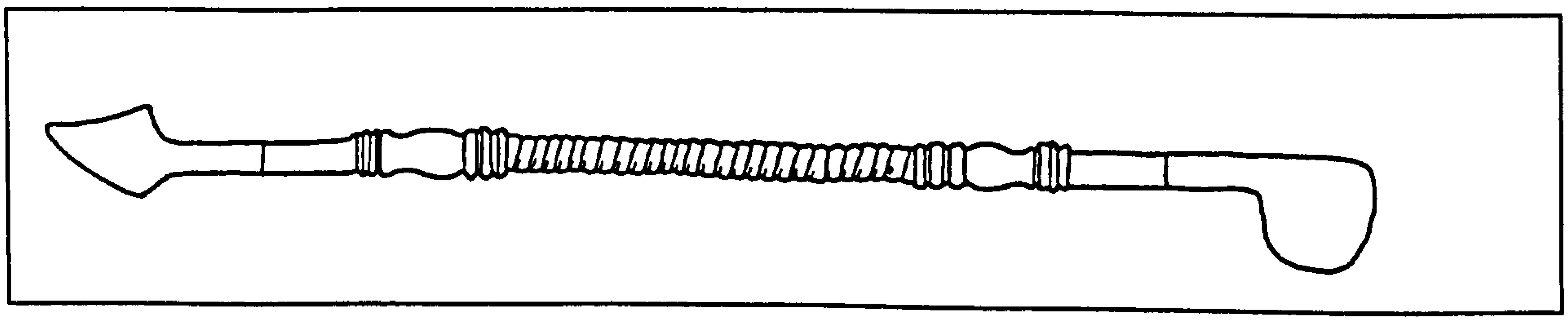
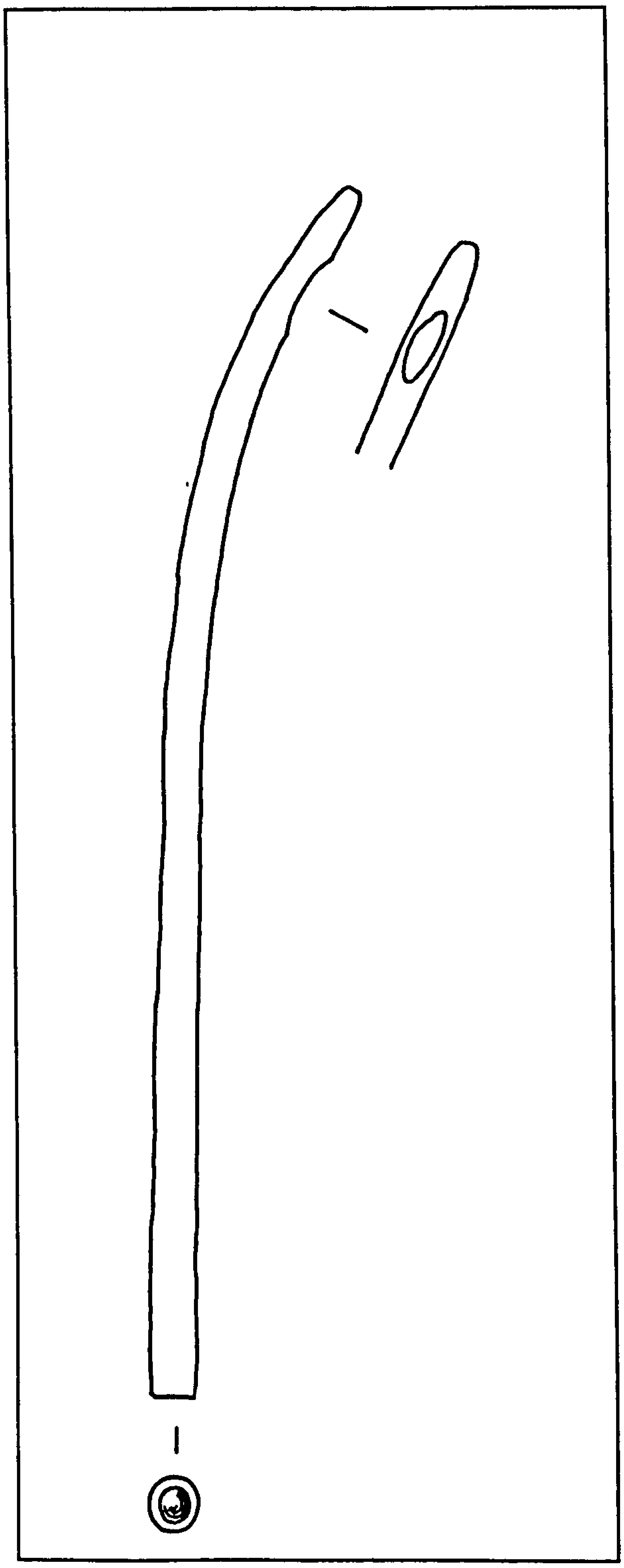


Fig. 49. Male Catheter (l:1). After Jackson 1990: Fig. 6, Nr. 2.
Fig. 49a. Male Catheter from Carnuntum. (22 cm shown at 76%). After Hauff 1993/94: Tab 7, Nr. 34.

Fig. 50. Female Catheter (l:1). After Jackson 1990: Fig. 6, Nr. 3.



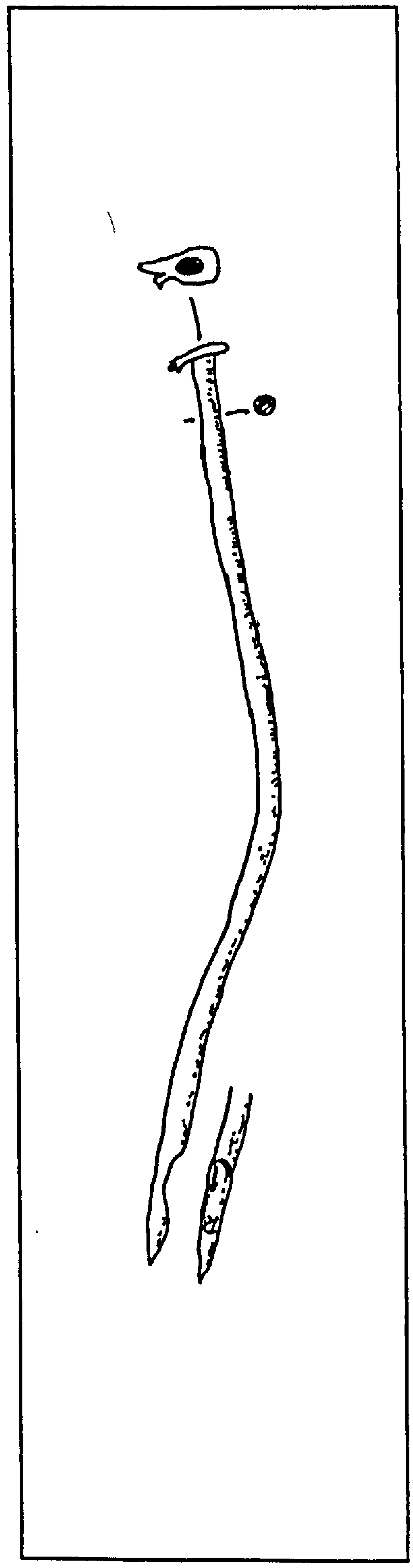
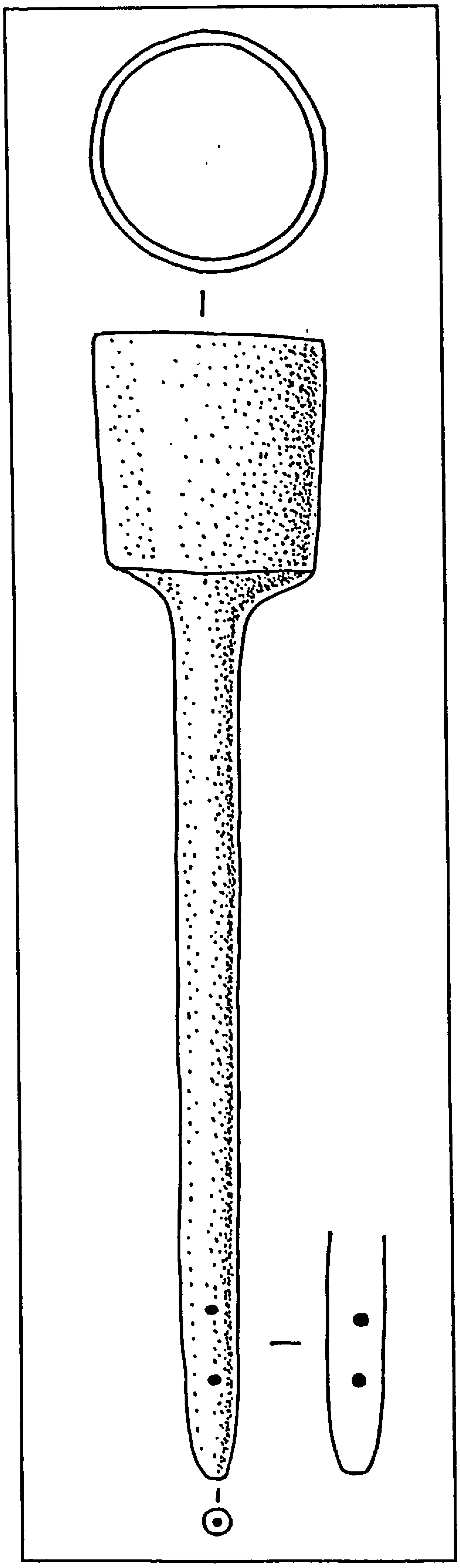


Fig. 50a. Female Catheter from Carnuntum
(14.4 cm. Shown at 76%). After Hauff 1993/94: Tab. 7, Nr. 33.

Fig. 51. Clyster (1:1). After Jackson 1990: Fig. 6: Nr. 5.



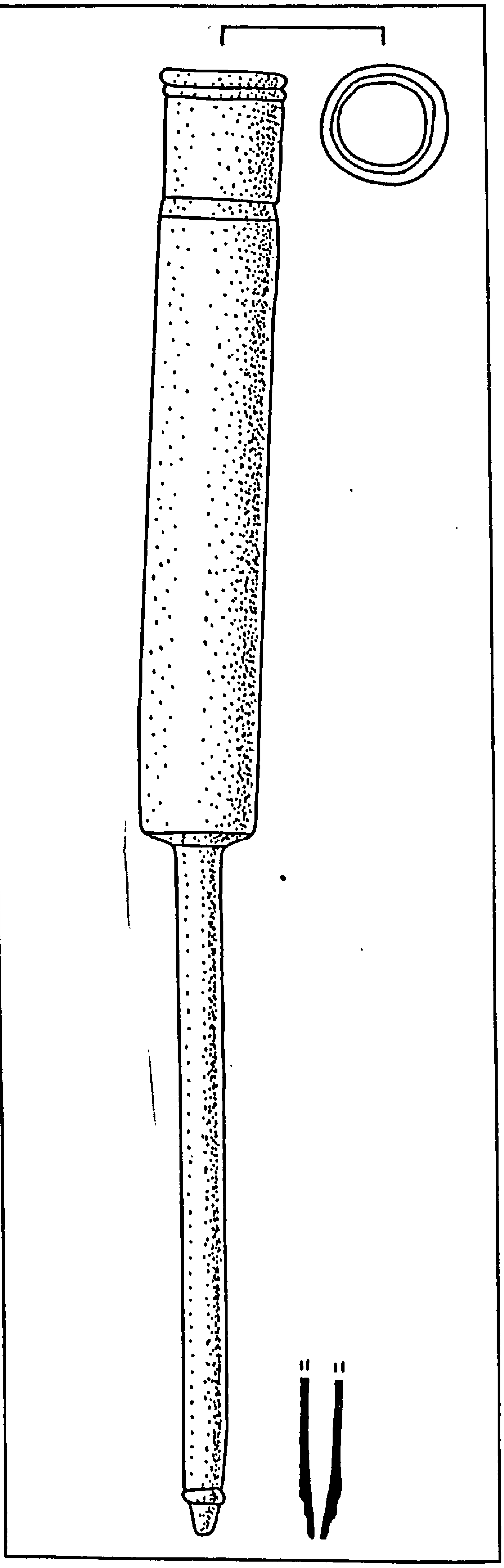


Fig. 52. Clyster or Syringe (1:1).
After Jackson 1990: Fig. 6: Nr. 6.

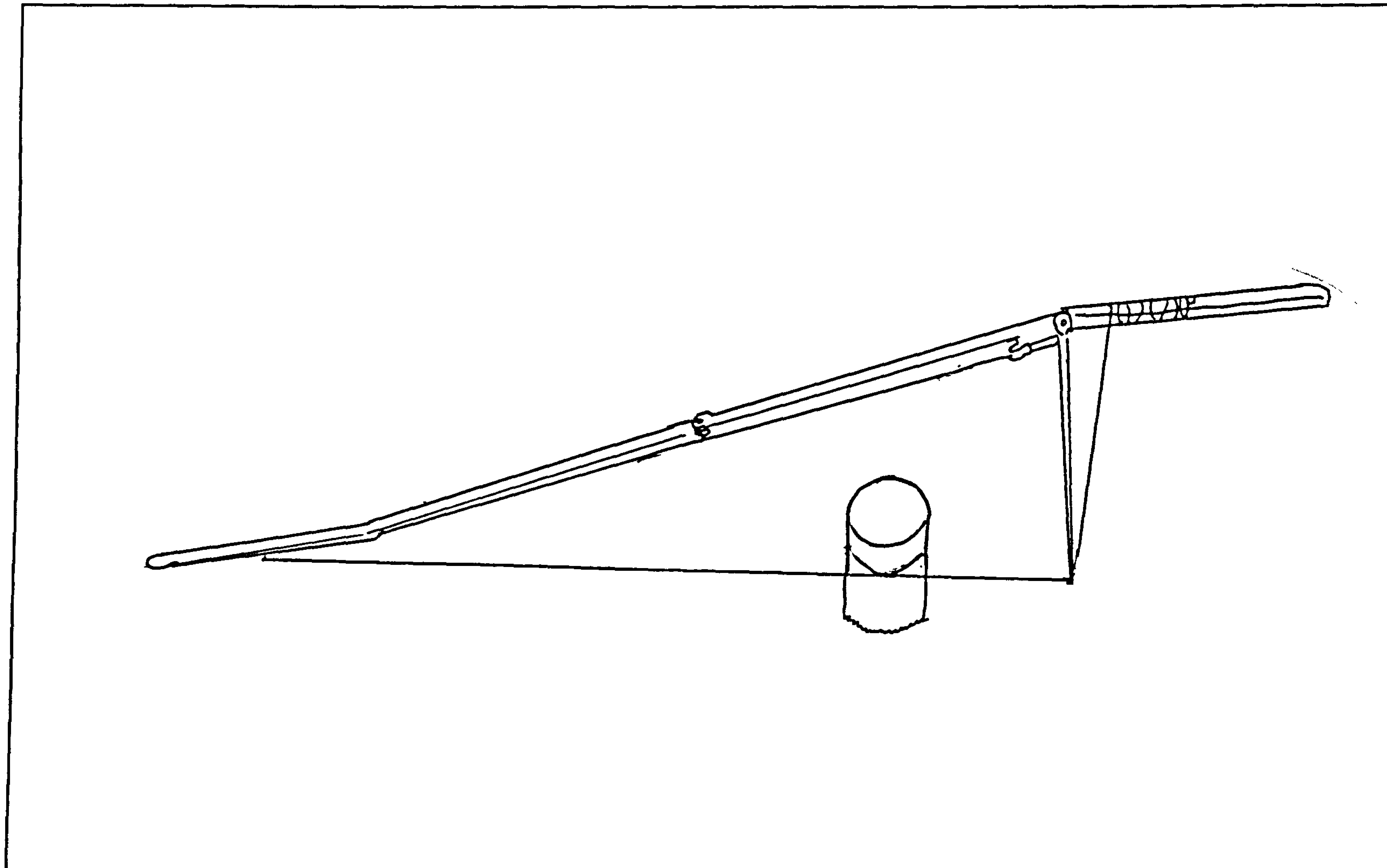


Fig. 53. Trepanning blade with bow (1:2). After Jackson 1990: Fig. 5, Nr. 8.

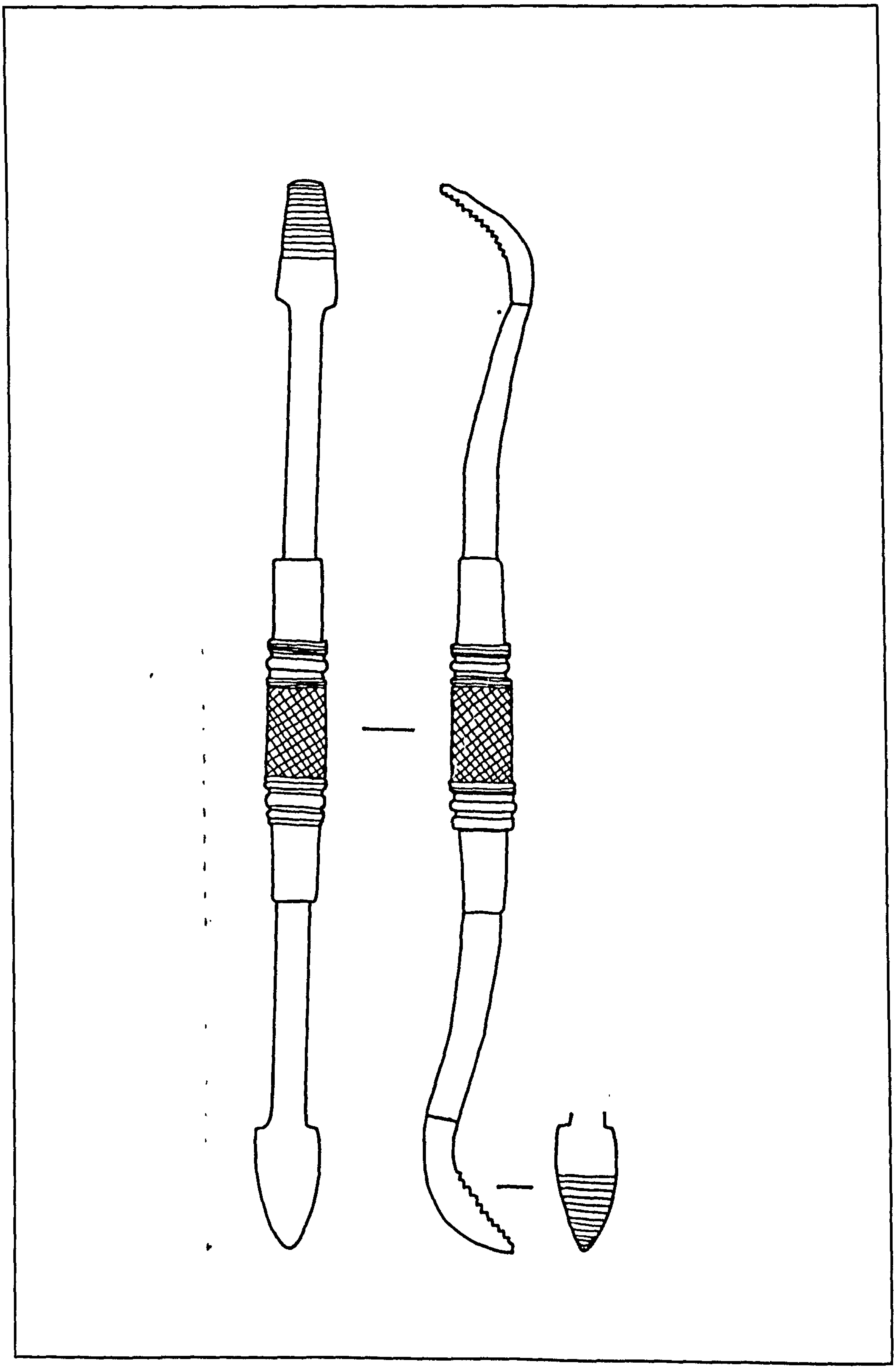


Fig. 54. Bone lever (1:1). After Jackson 1990: Fig. 5, Nr. 6.

Fig. 55: A comparison of fortification numbers with instruments to those without in accordance with their province

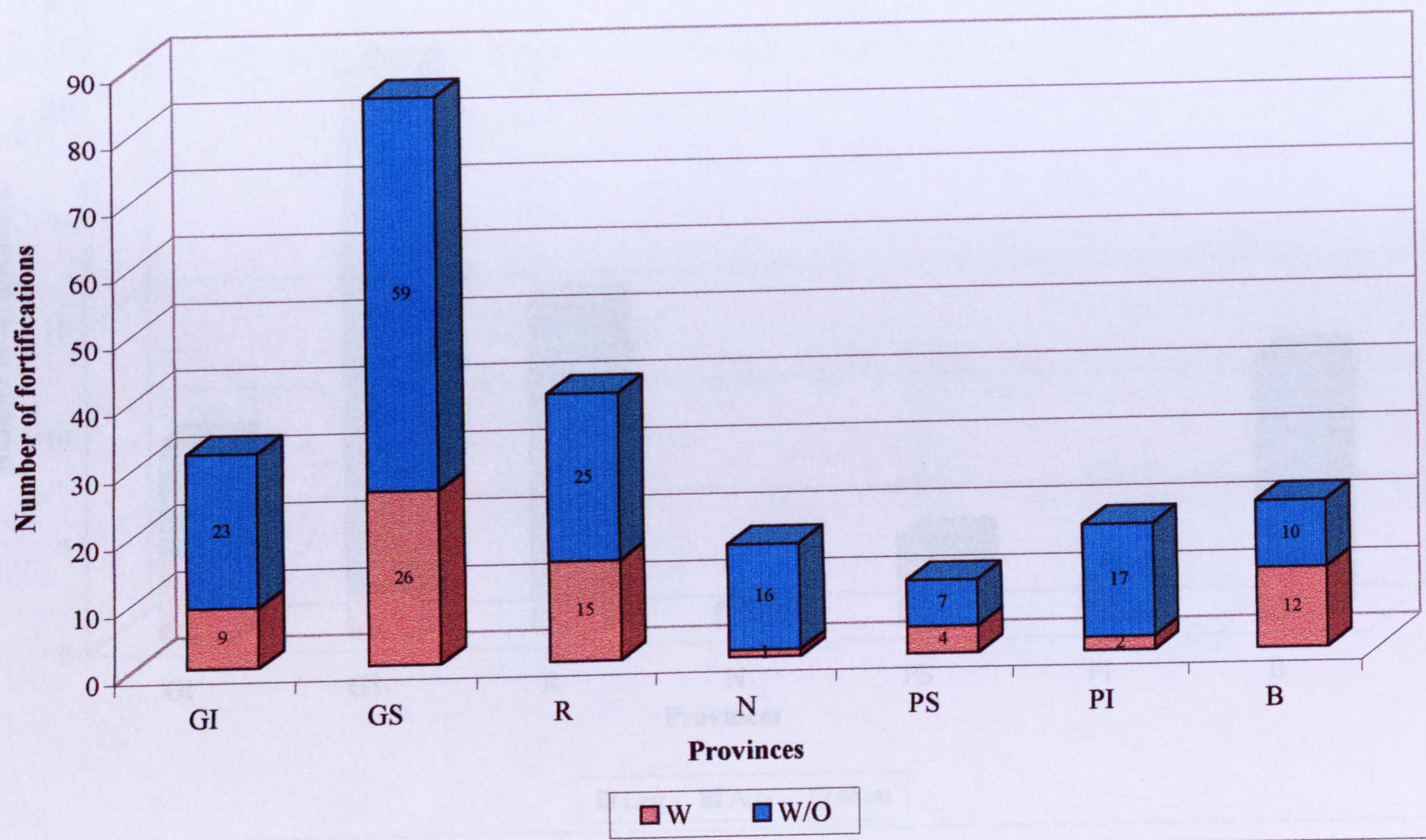


Fig. 56: A comparison of fortification numbers per unit type in accordance with their province

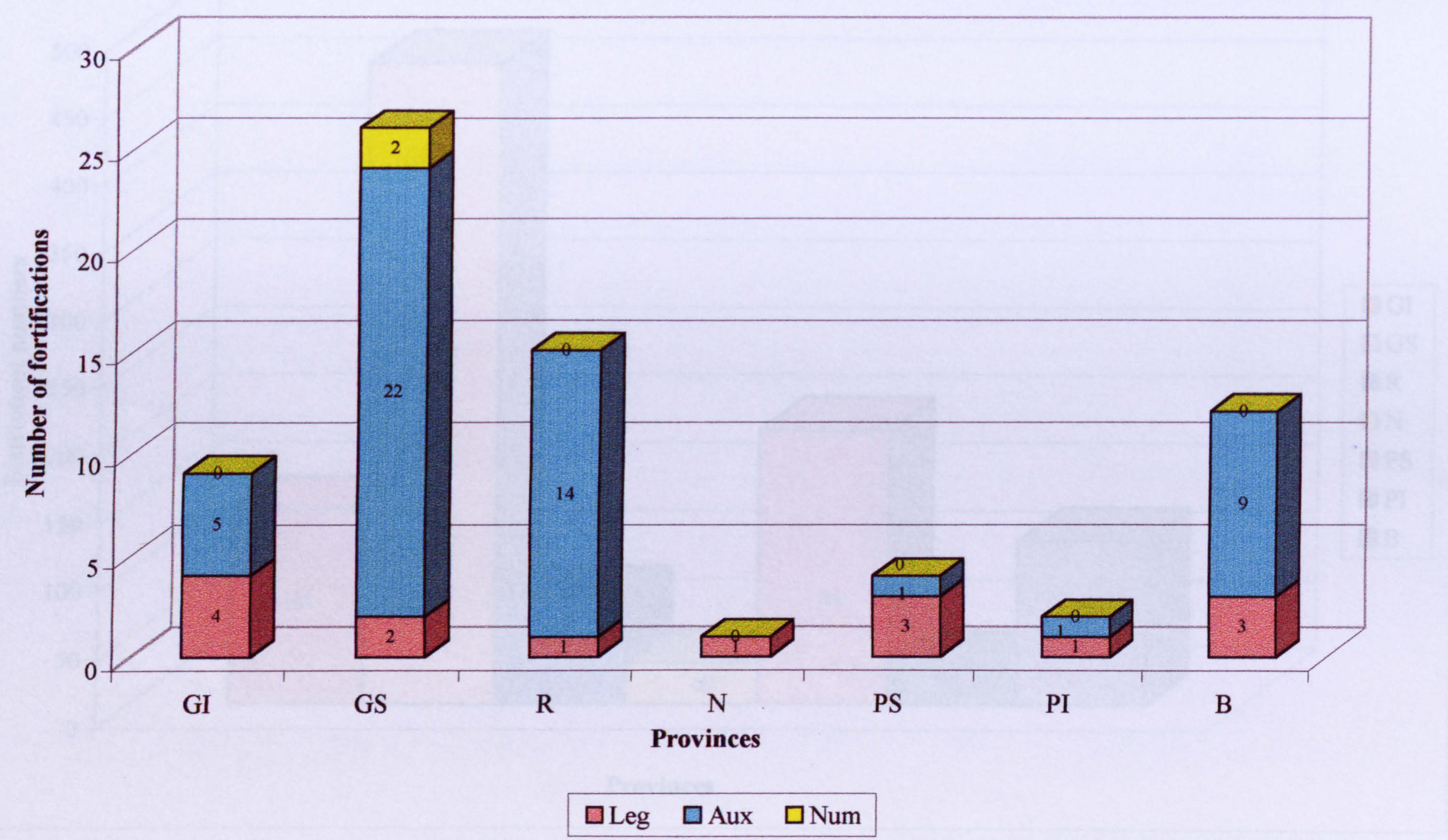


Fig. 57: A comparison of the total number of medical instruments per province

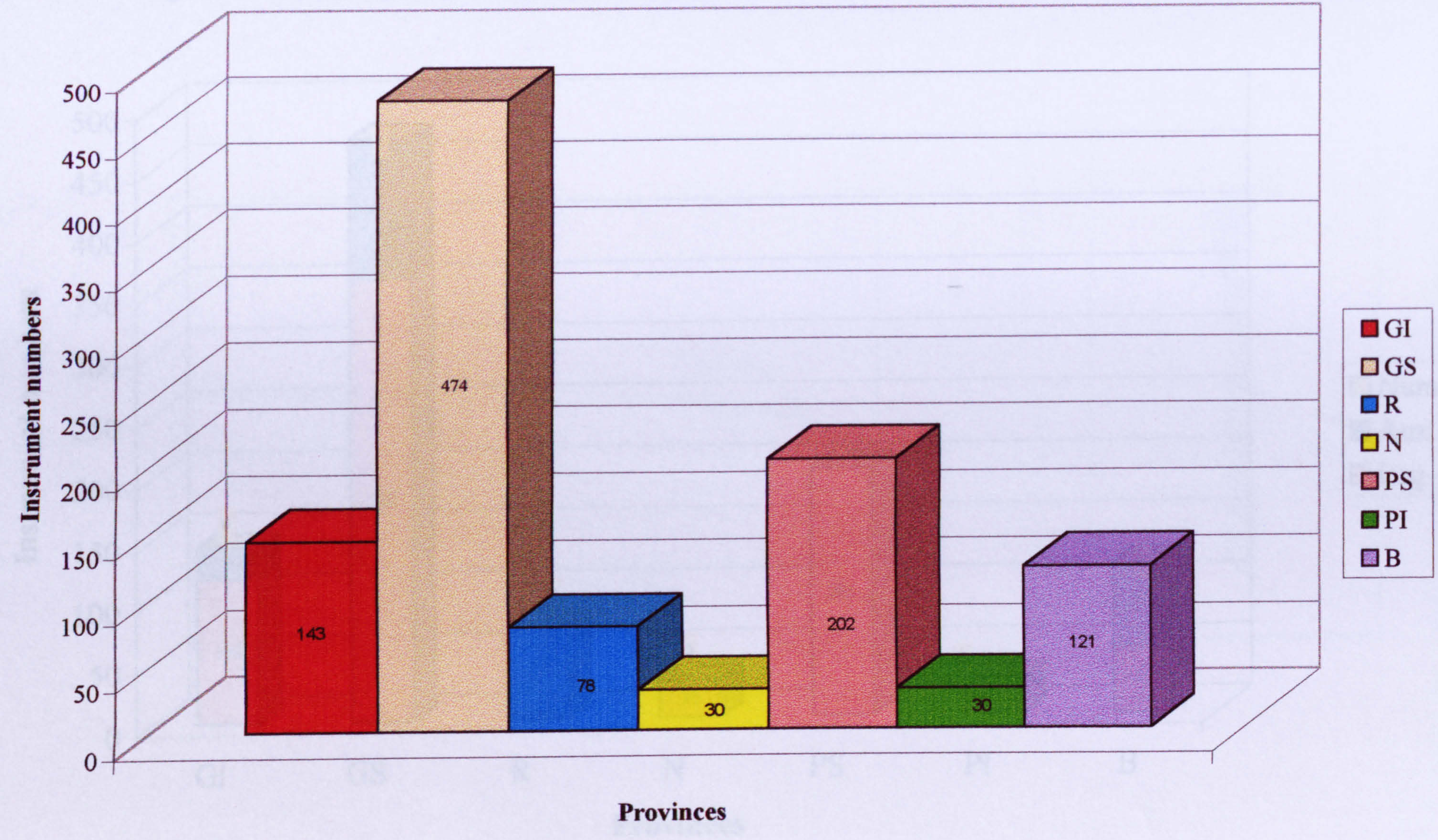


Fig. 58: A comparison of instrument numbers per unit type according to province

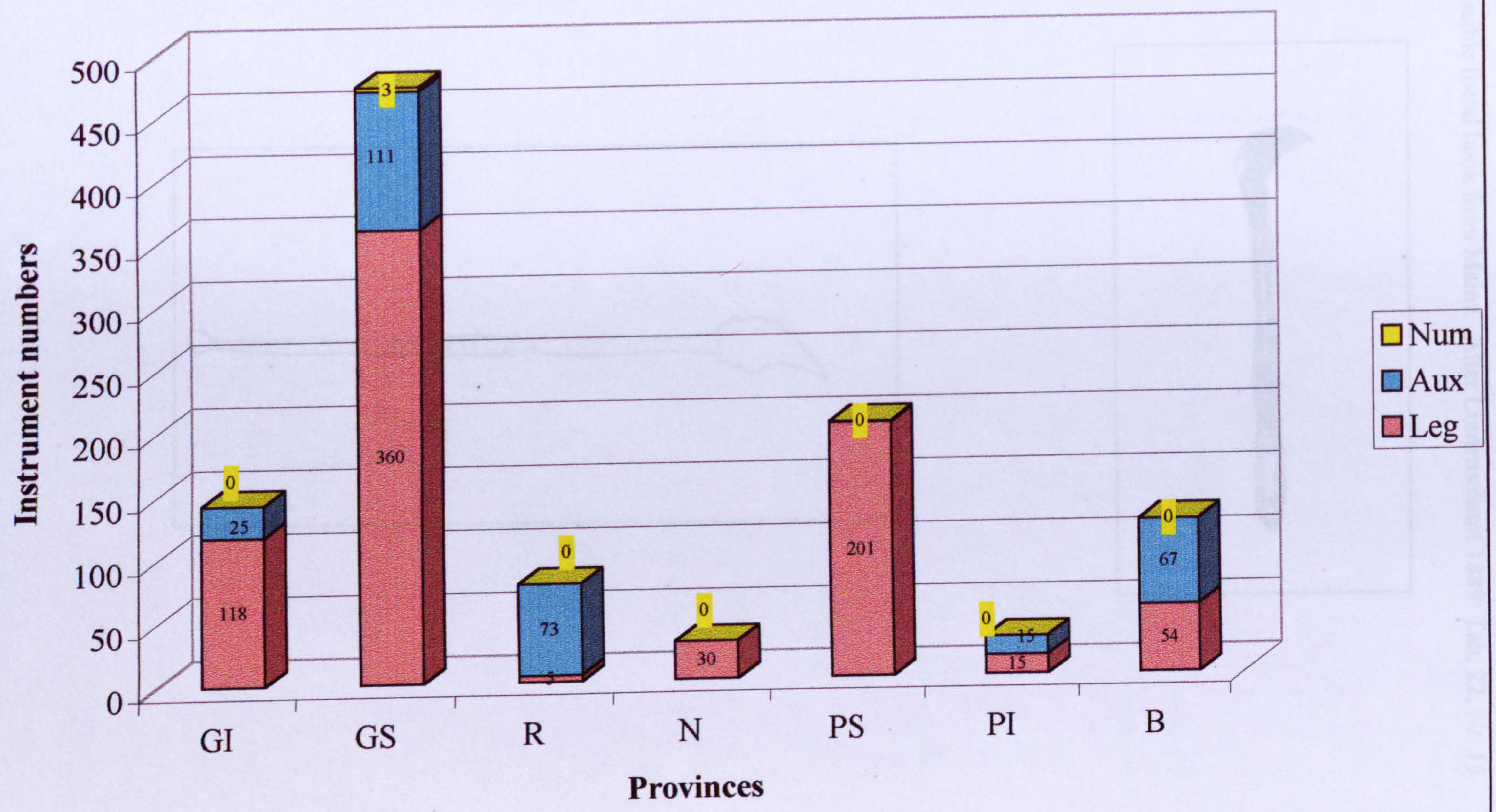
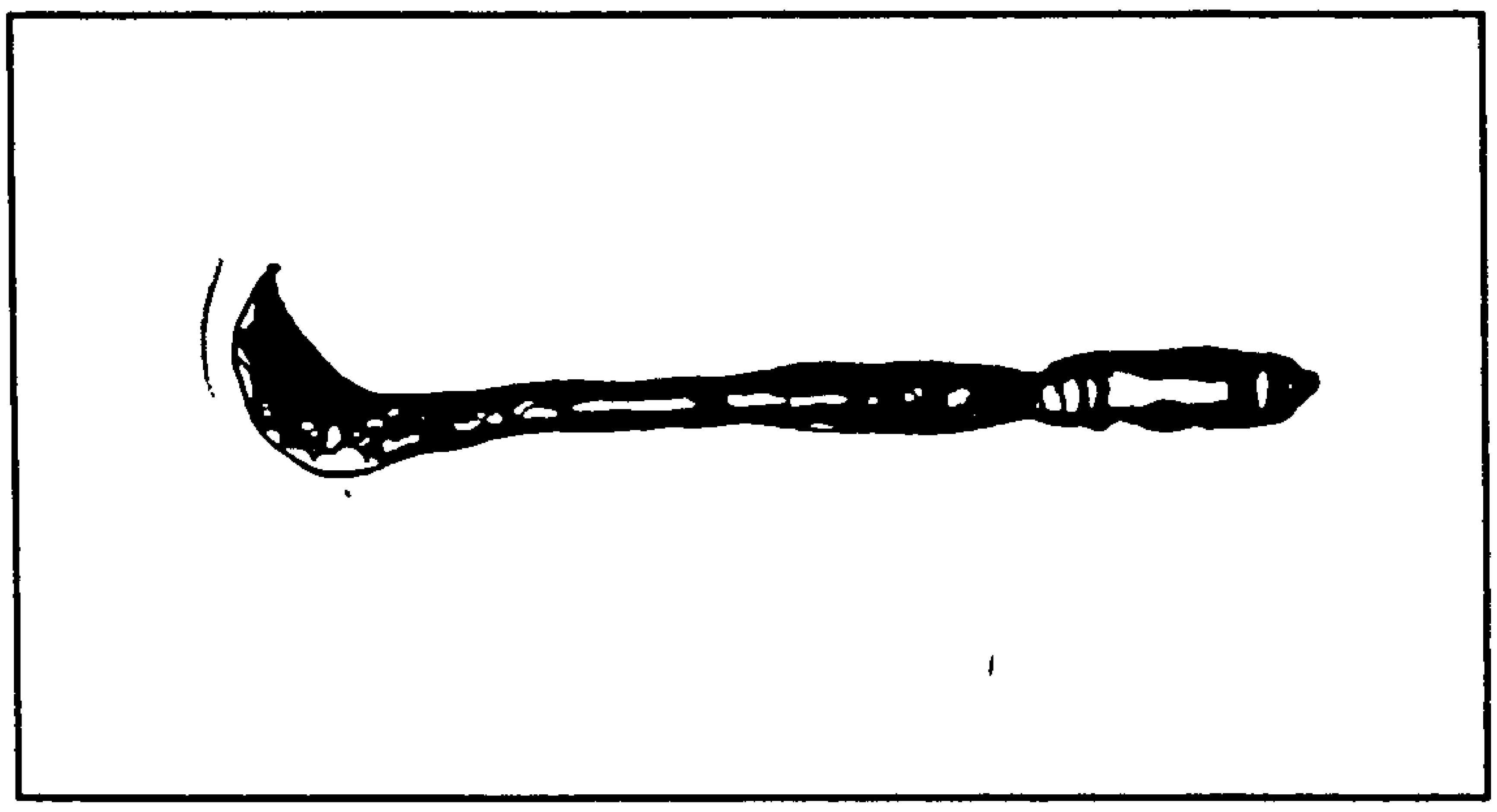


Fig. 59. Possible foetal hook from Mainz. After Lindenschmit 1889: Tab. 22, Nr. 13.



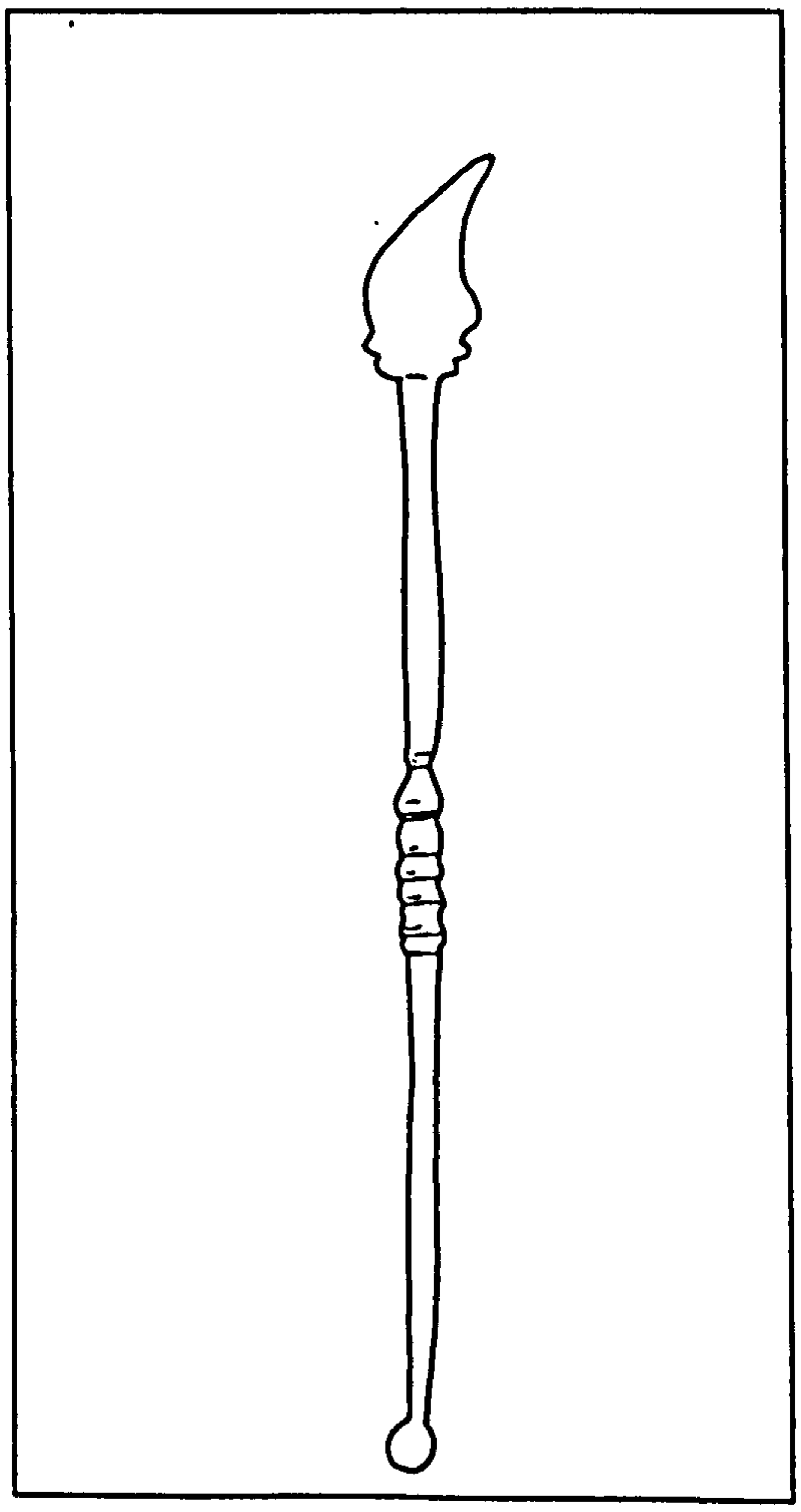


Fig. 60. Possible pterygotum. After Deringer 1954: 149, fig. 81, Nr. 1.

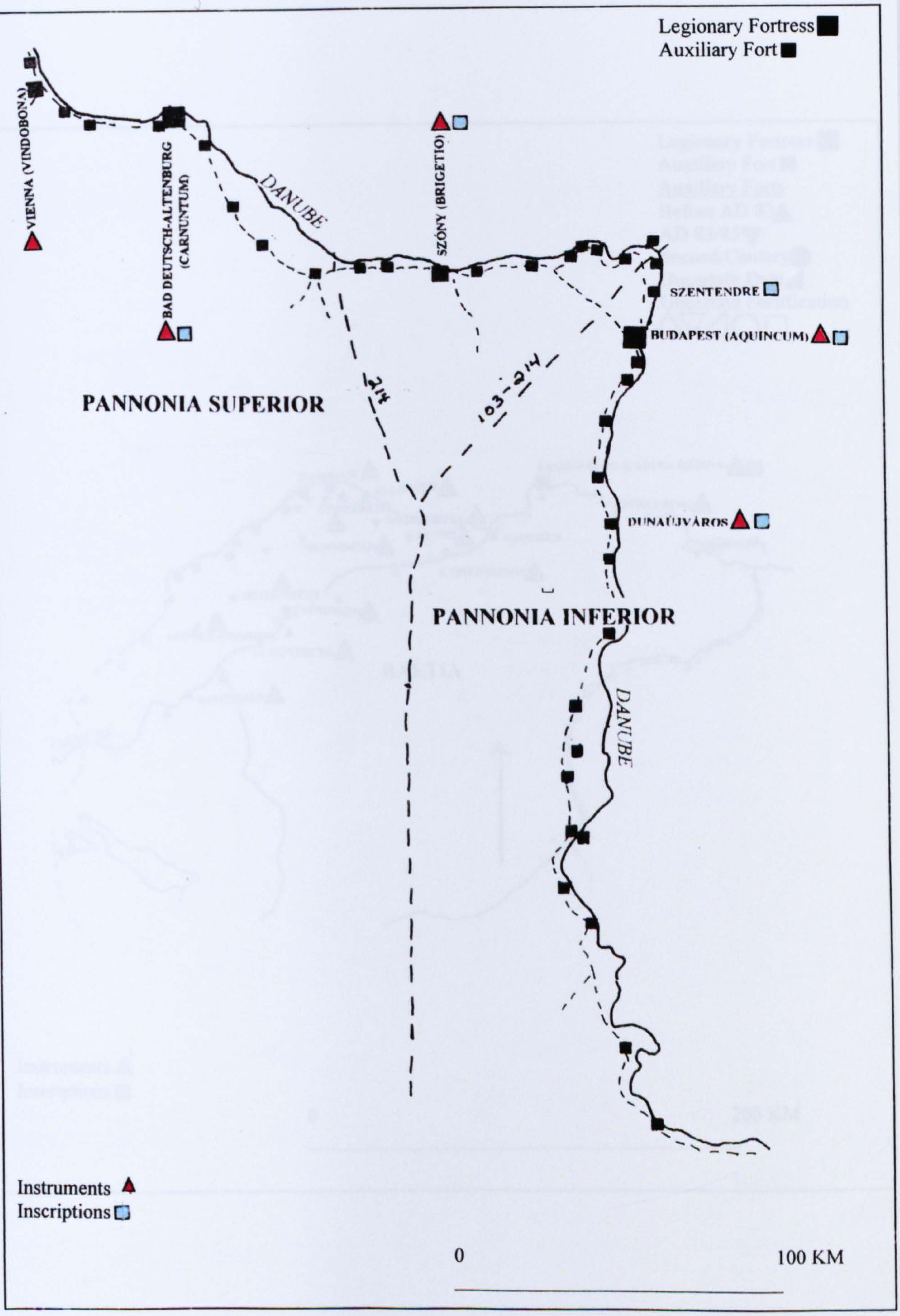


Fig. 61. Distribution map of instruments and inscriptions from fortifications in Pannonia Inferior and Superior. After Mócsy 1974.

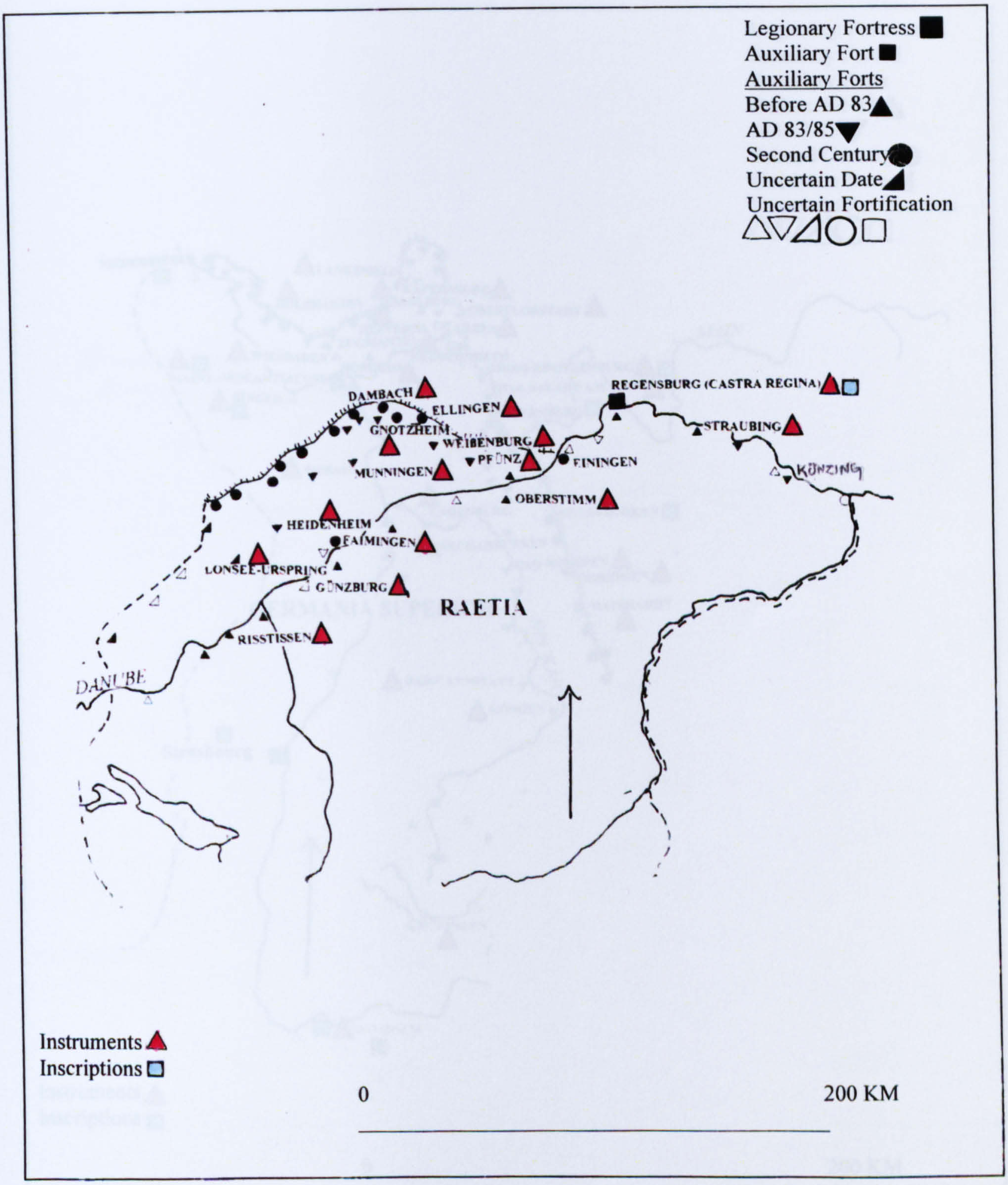


Fig. 62. Distribution map of instruments and inscriptions from fortifications in Raetia. After Schönberger 1969: Fig 20.

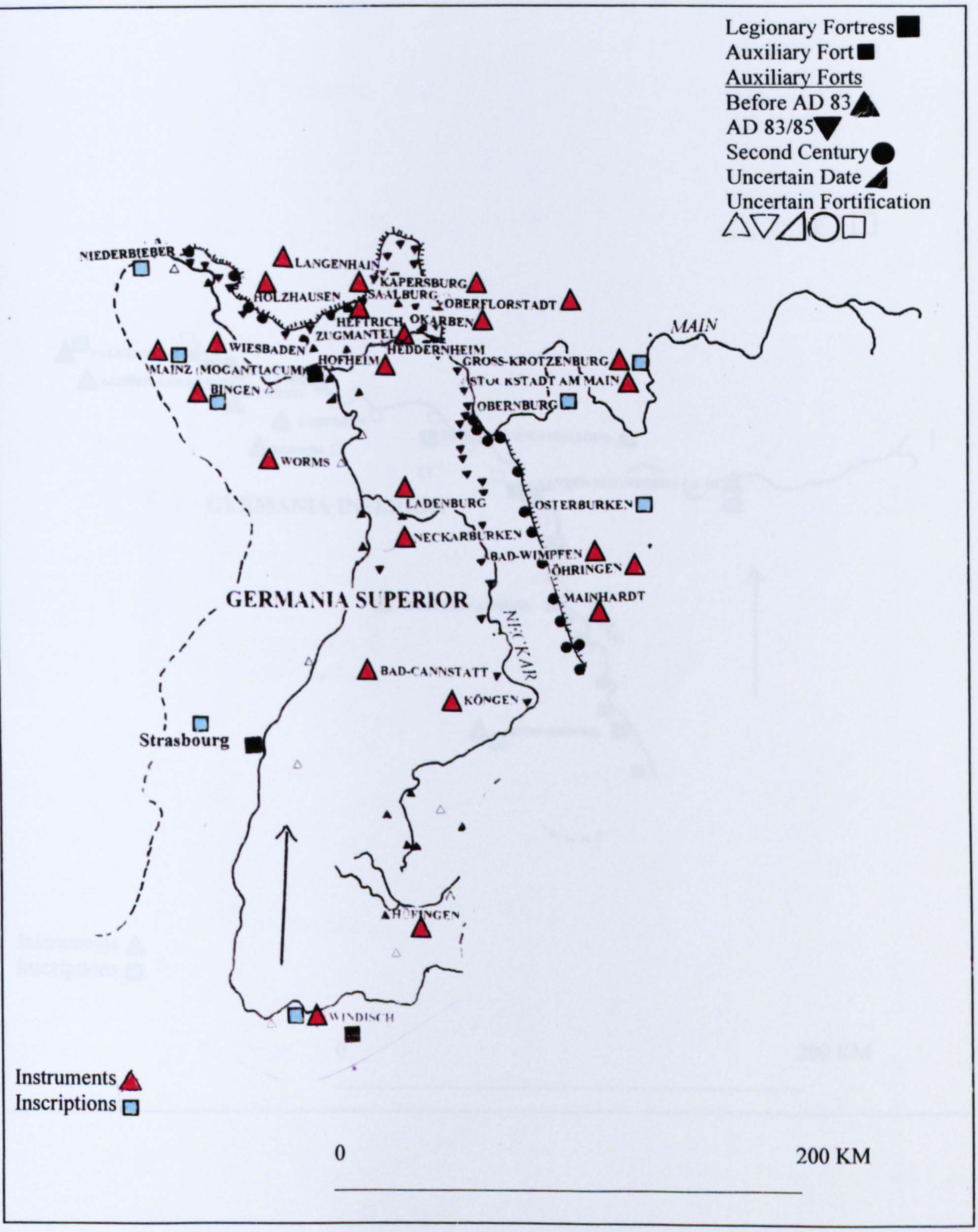


Fig. 63. Distribution map of instruments and inscriptions from fortifications in Germania Superior. After Schönberger 1969: Fig 20.

Fig. 64. Distribution map of instruments and inscriptions from fortifications in Germania Inferior. After Schönberger 1969: Fig 20.

Fig. 65. Distribution map of instruments and inscriptions from fortifications on Hadrian's Wall.

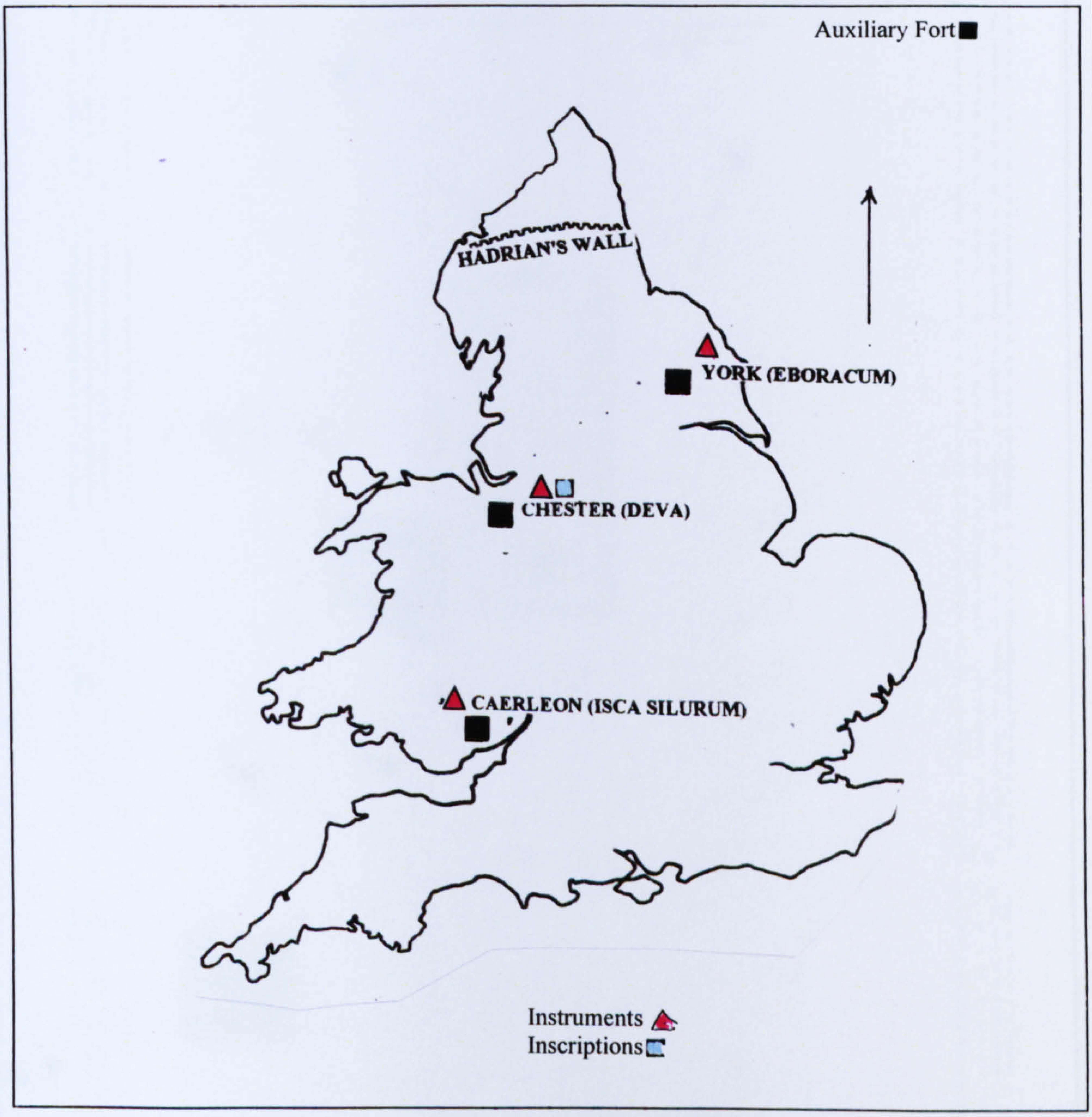


Fig. 65a. Distribution map of instruments and inscriptions from legionary fortresses in Britain.

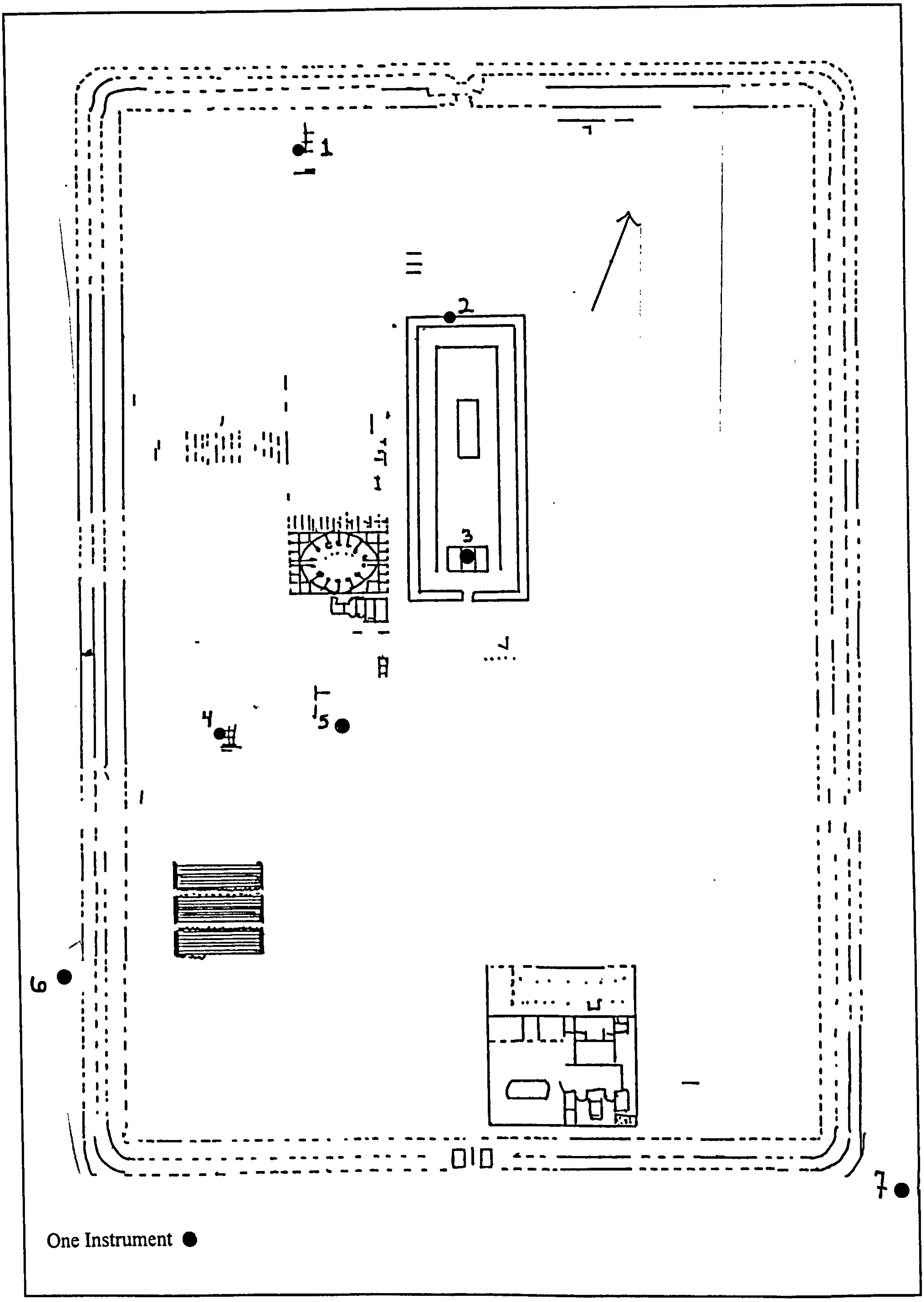


Fig. 66. Distribution of medical instruments found in the fortress of Chester. After Mason 2000: 410.

Fig. 67. Distribution of medical instruments from Caerleon. After Boon and Williams 1967.

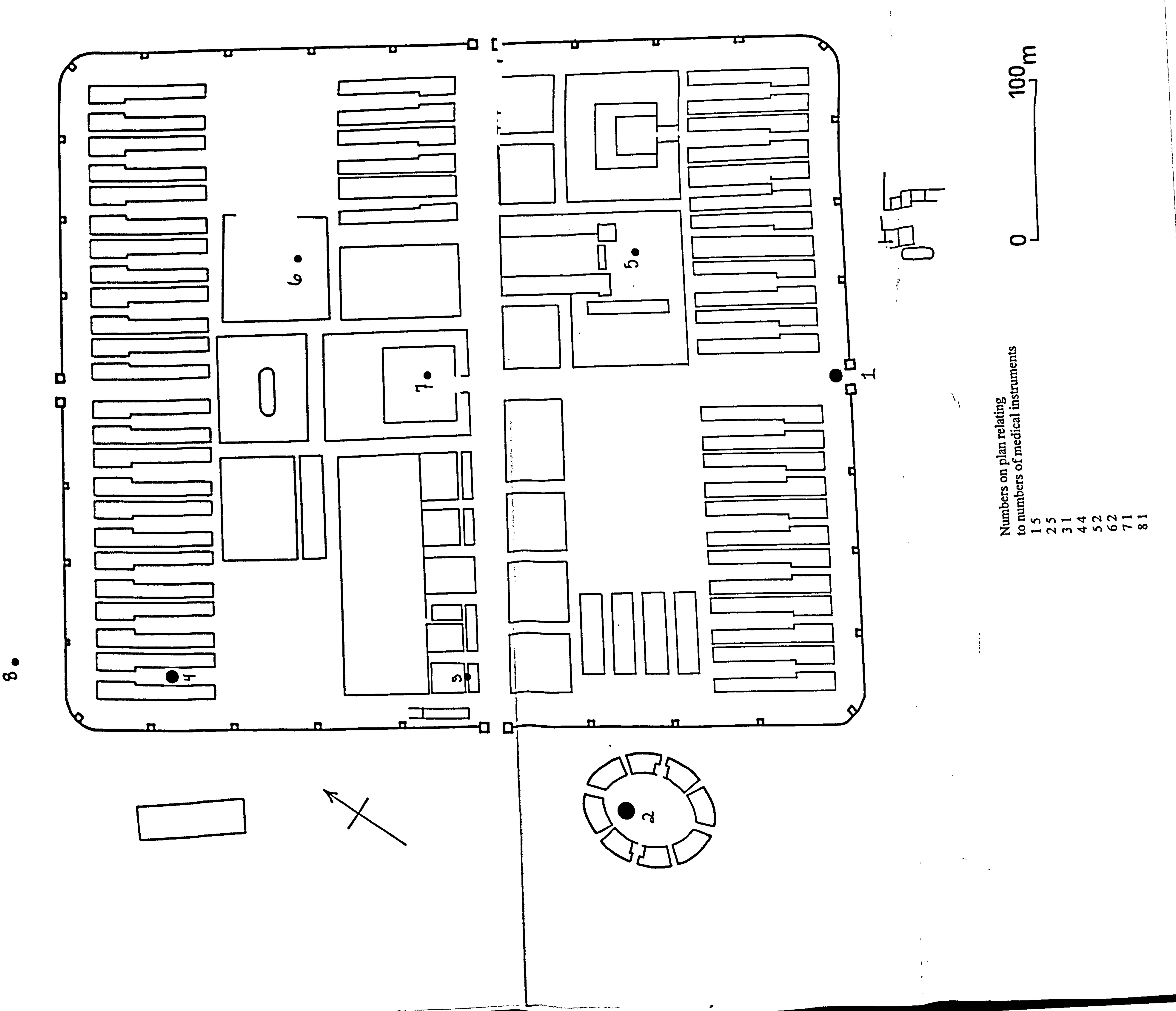
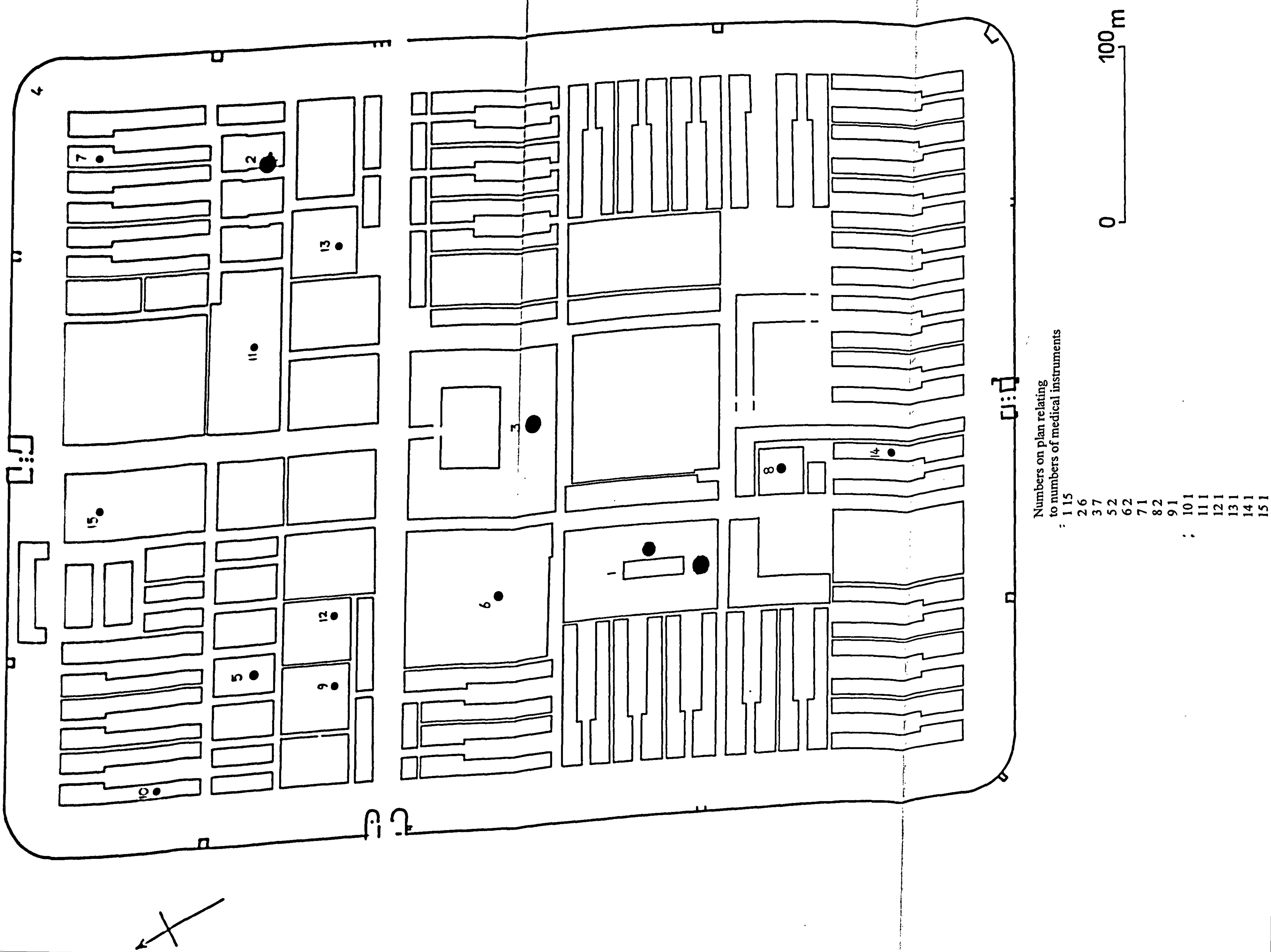


Fig. 68. Distribution of medical instruments from Neuss. After Johnson 1983.



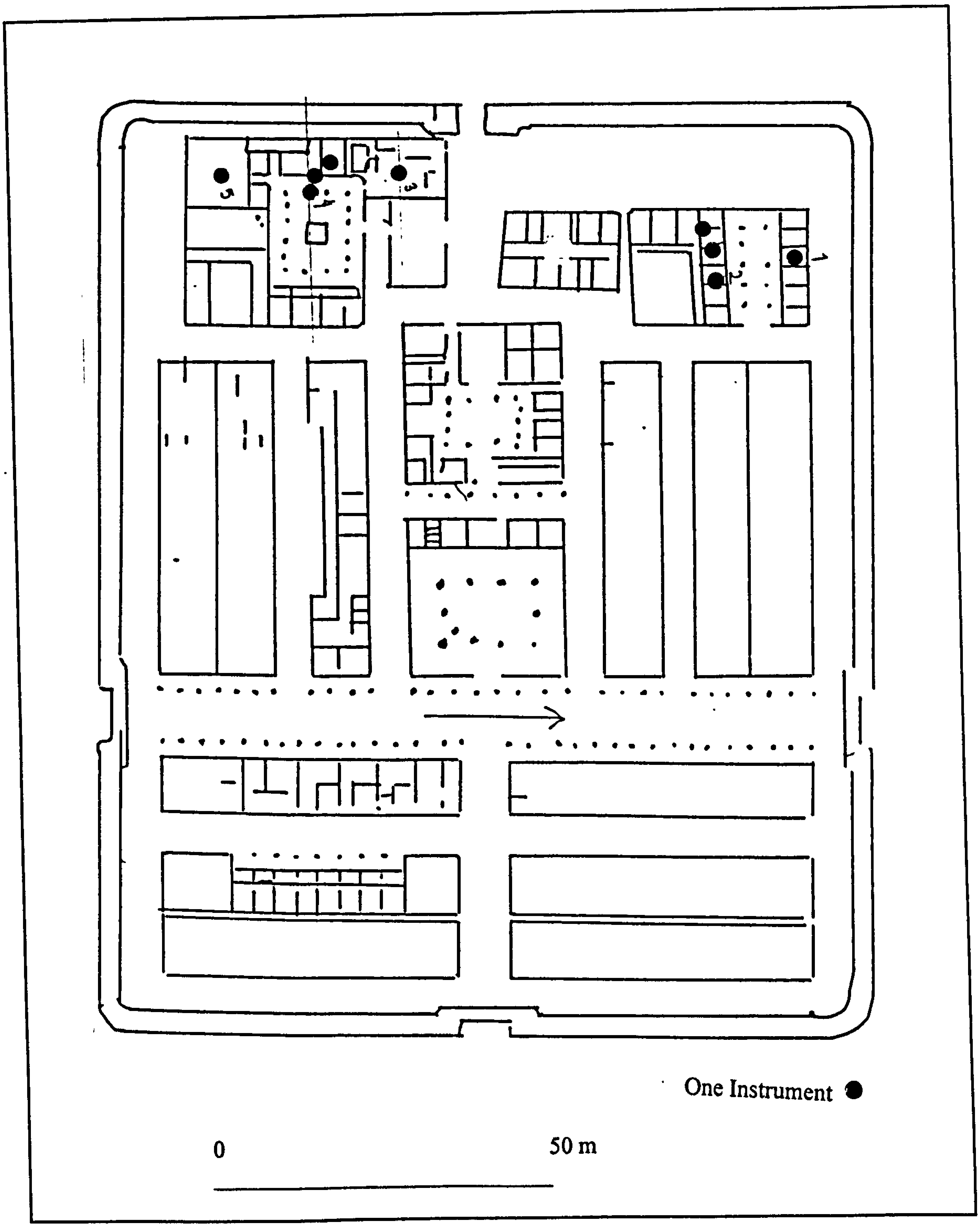


Fig. 69. Distribution of medical instruments from Oberstimm. After Johnson 1983.

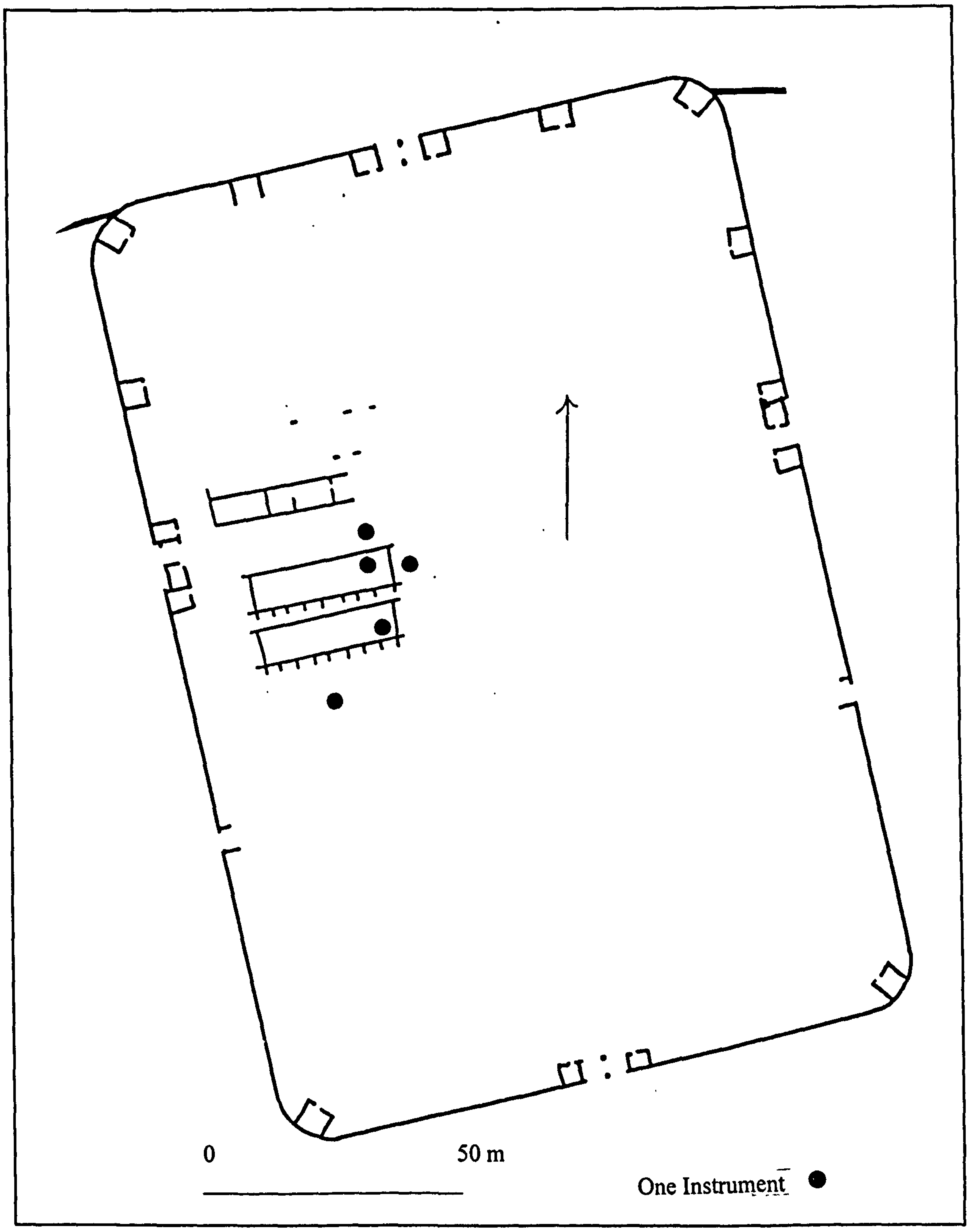
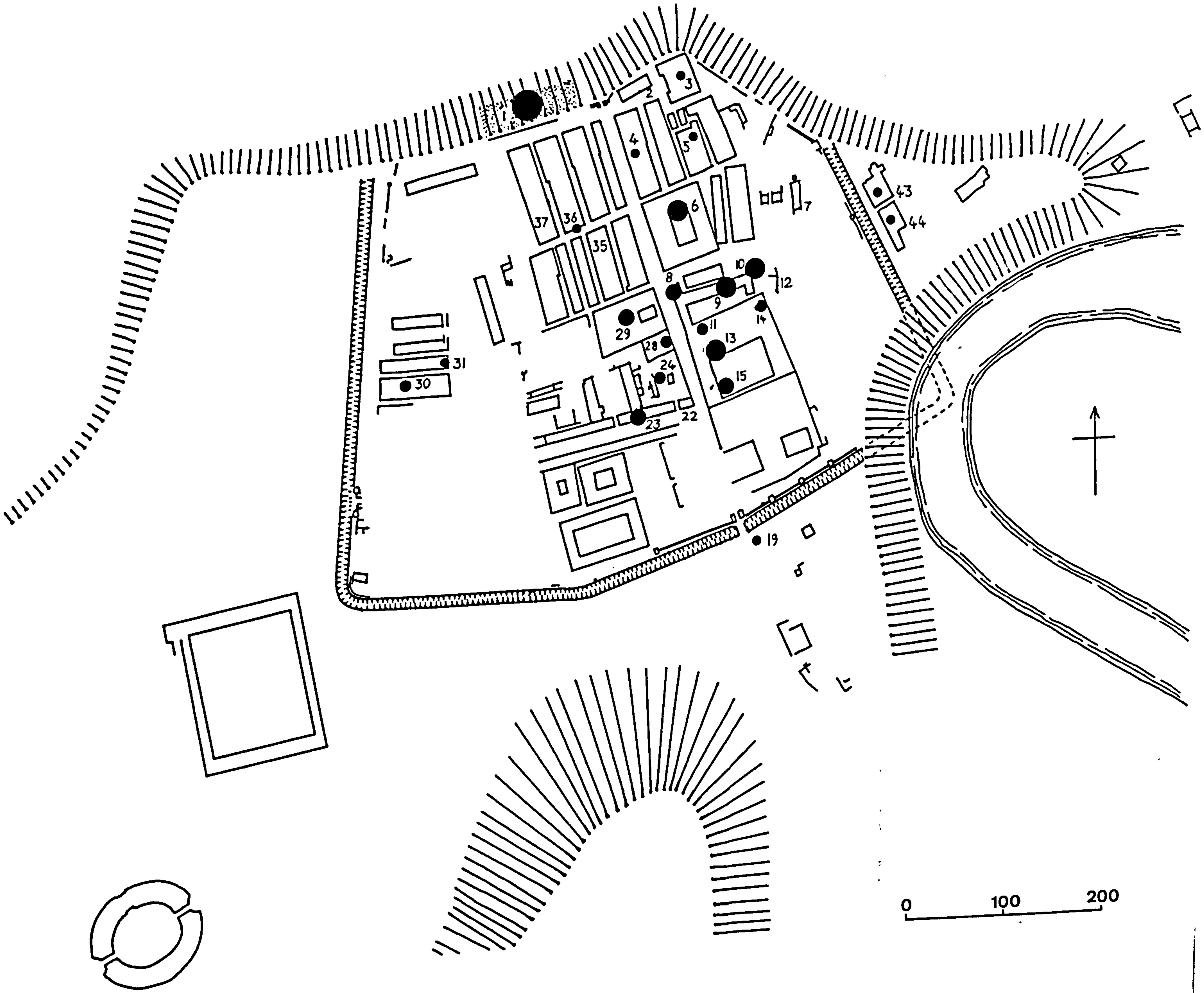


Fig. 70. Distribution of medical instruments from Birdoswald. After Wilmott 1997.

Fig. 71. Distribution of medical instruments from Housesteads. After Johnson 1983: Fig. 199.

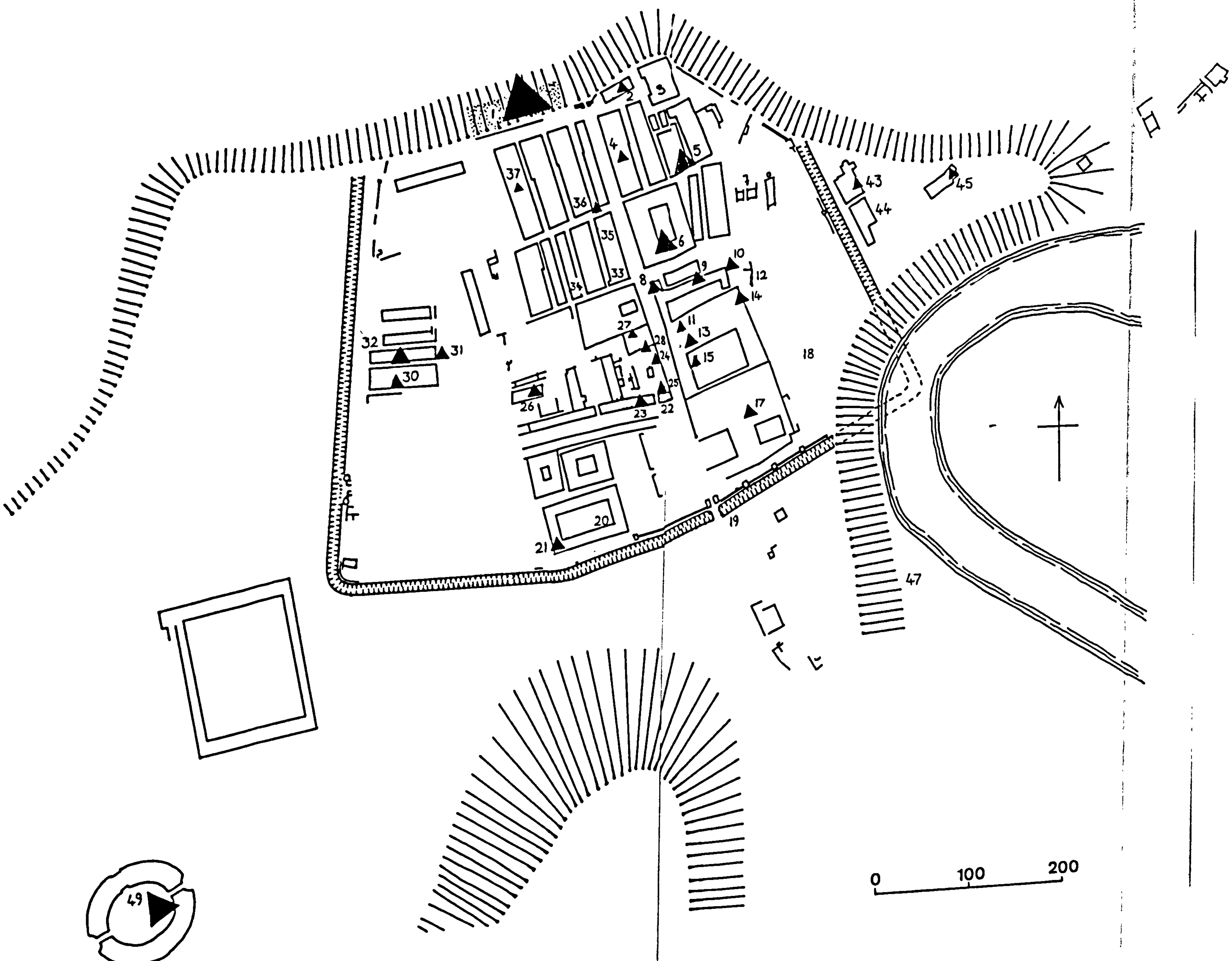
Fig. 72. Distribution of medical instruments from Vindonissa. After Unz and Deschler-Erb 1997.



Numbers on plan relating to numbers of medical instruments

1	60
3	1
4	1
5	1
6	13
8	3
9	7
10	13
11	2
13	10
14	2
15	5
19	1
23	4
24	4
28	2
29	6
30	3
31	1
35	1
43	1
44	1

Fig. 73. Distribution of horse-trappings from Vindonissa. After Unz and Deschler-Erb 1997.



Numbers on plan relating
to numbers of horse trappings

1 91
2 2
4 2
5 13
6 13
8 6
9 5
10 6
11 3
13 7
14 4
15 3
17 4
21 5
23 2
24 3
25 2
26 7
27 1
28 3
30 4
31 6
32 9
35 2
37 1
43 3
45 2
49 18

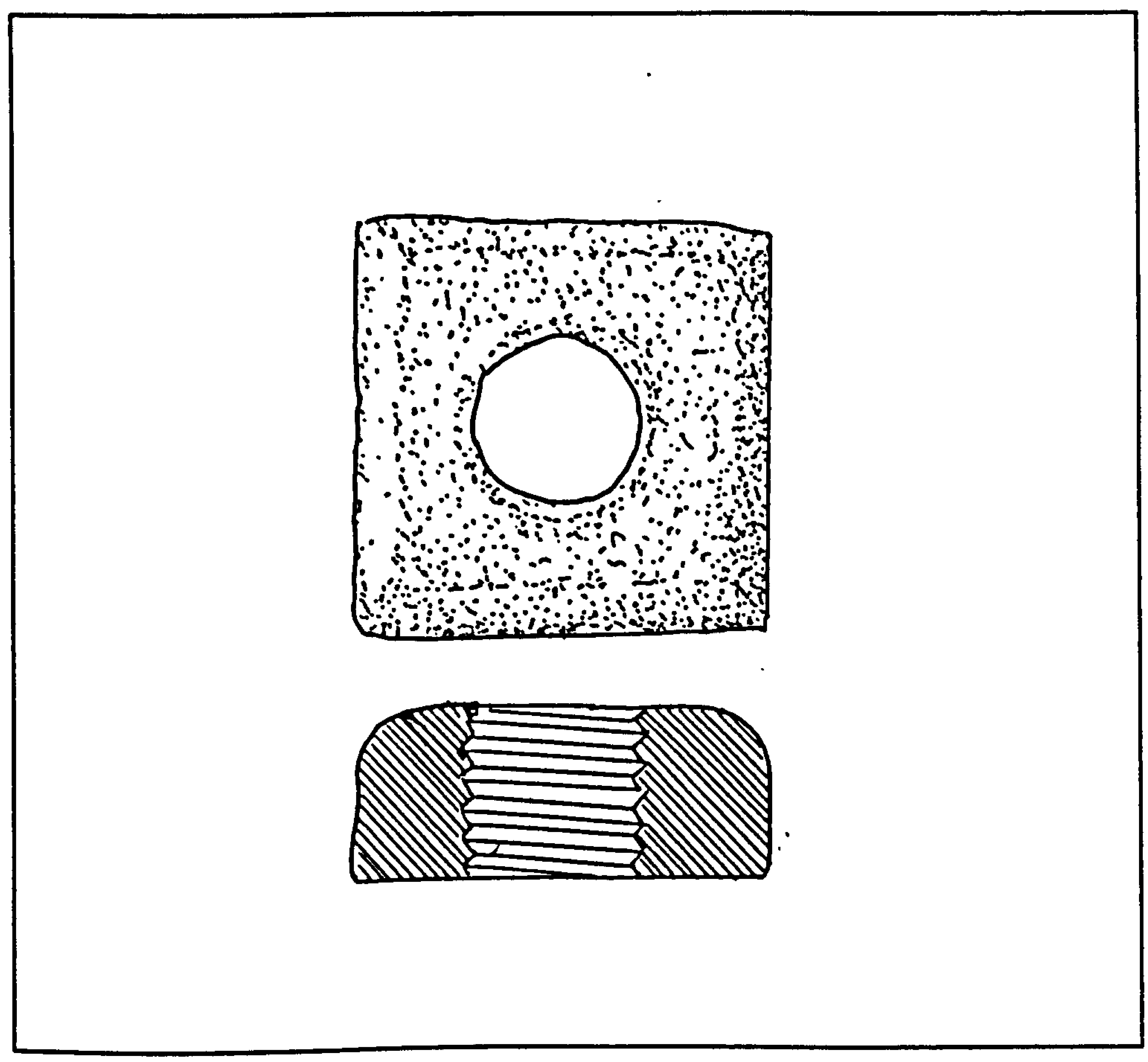


Fig. 74. Possible screw-bolt of a vaginal speculum from Niederbieber. After Gaitzsch 1983.

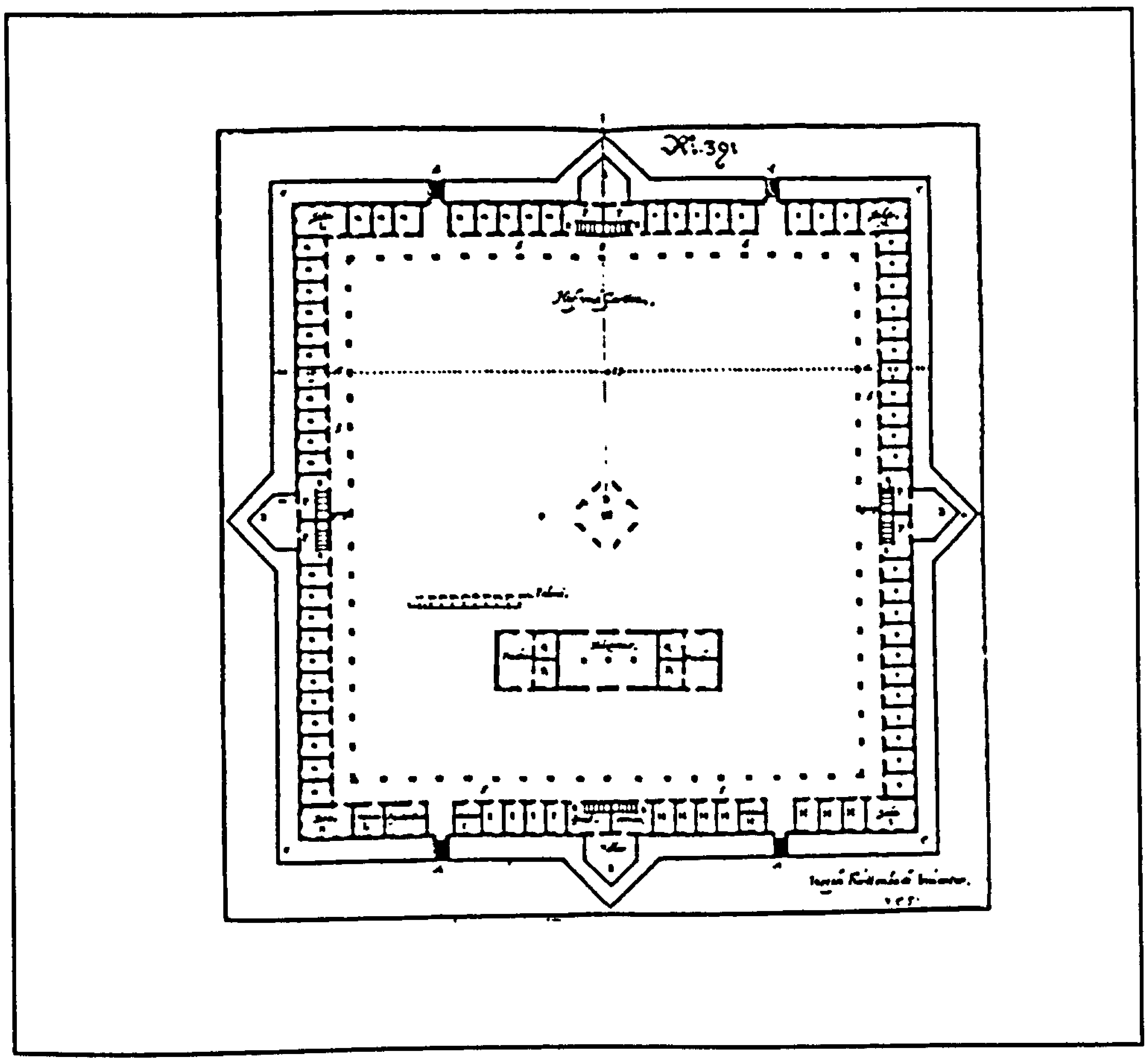


Fig. 75. Plan of a 17th century hospital or poor-house from Germany. From Jettner 1966: 76, Fig, 37.

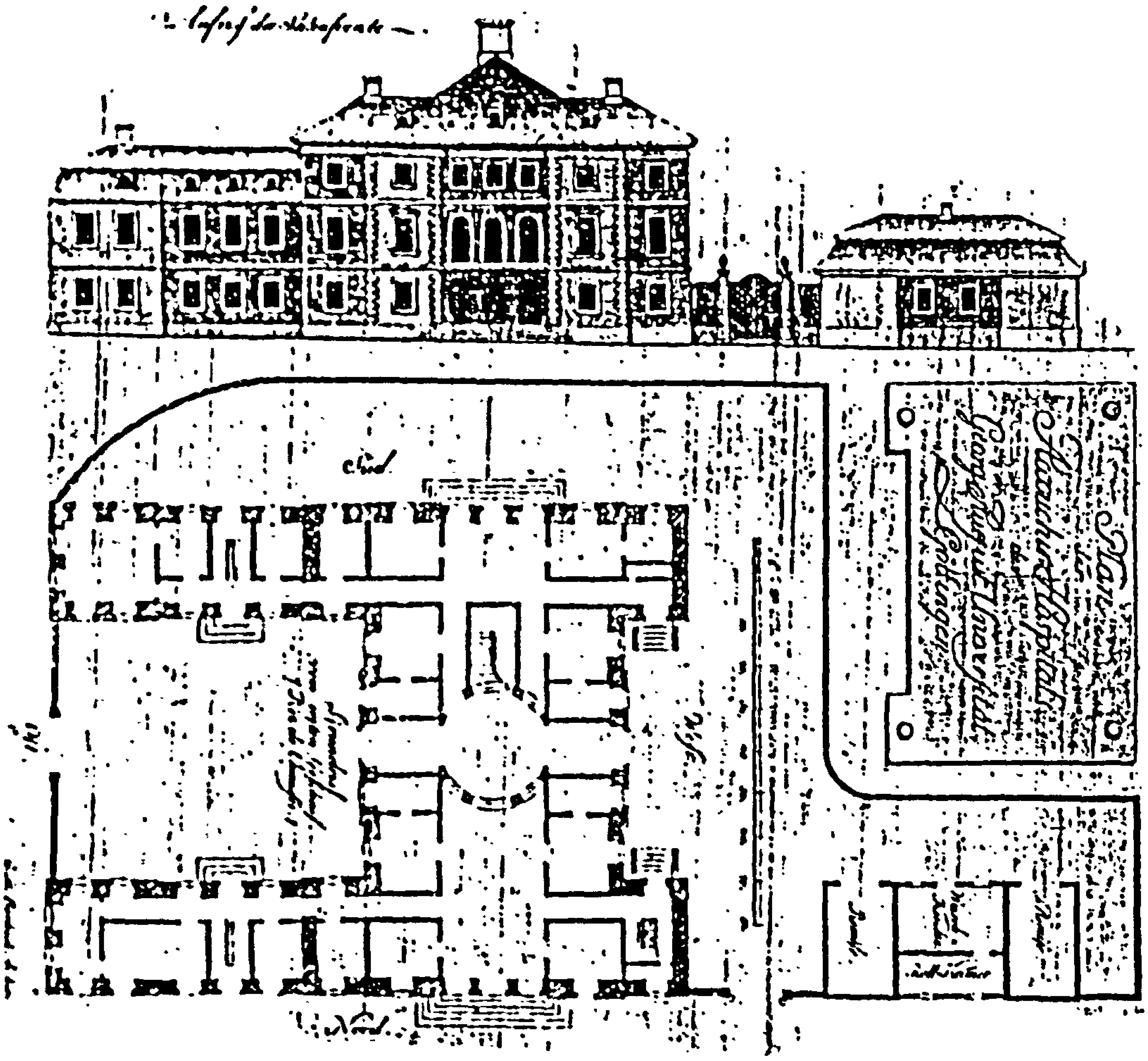


Fig. 76. Plan of an 18th century hospital from Göttingen. From Jettner 1966: 144, Fig. 75.

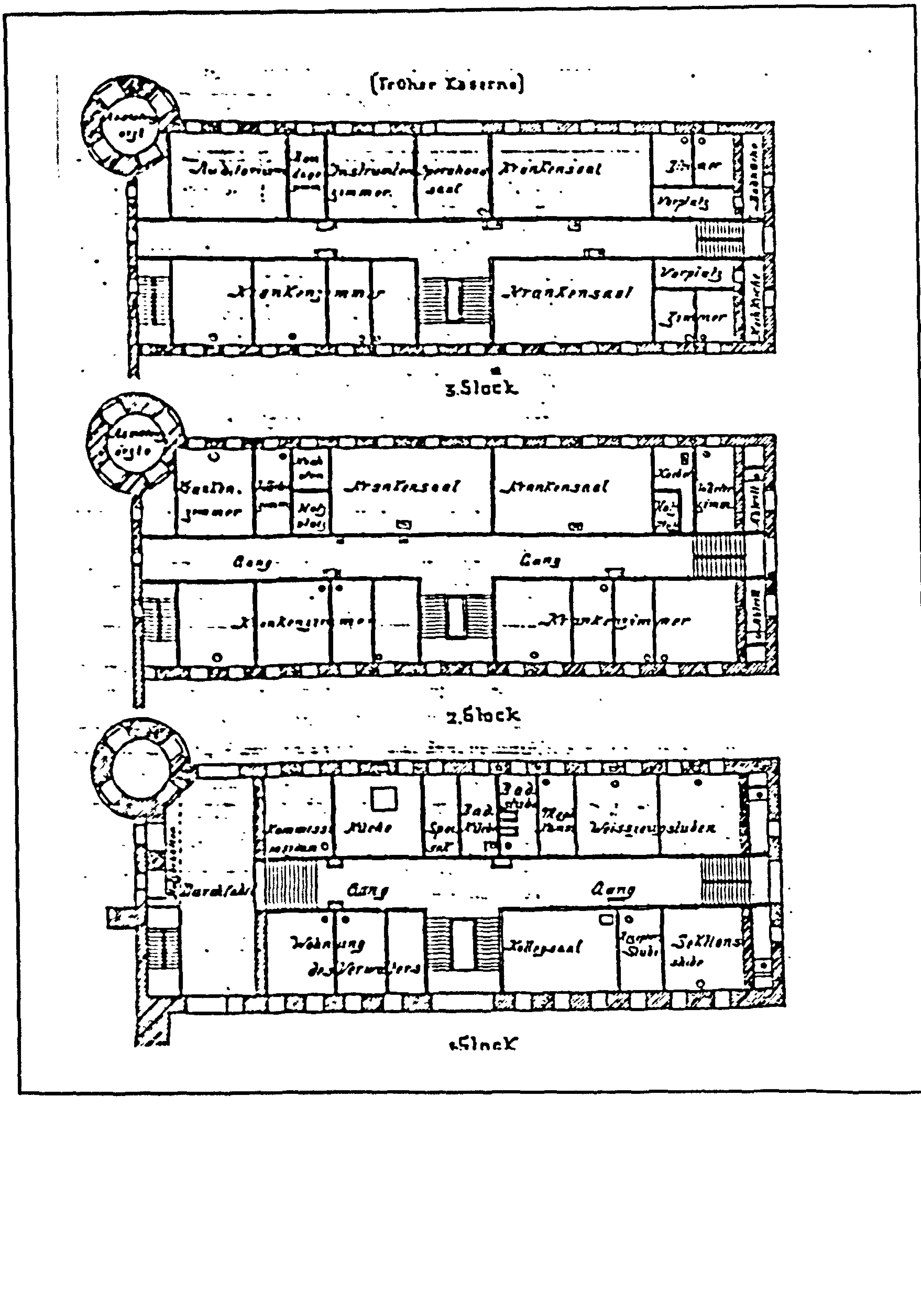
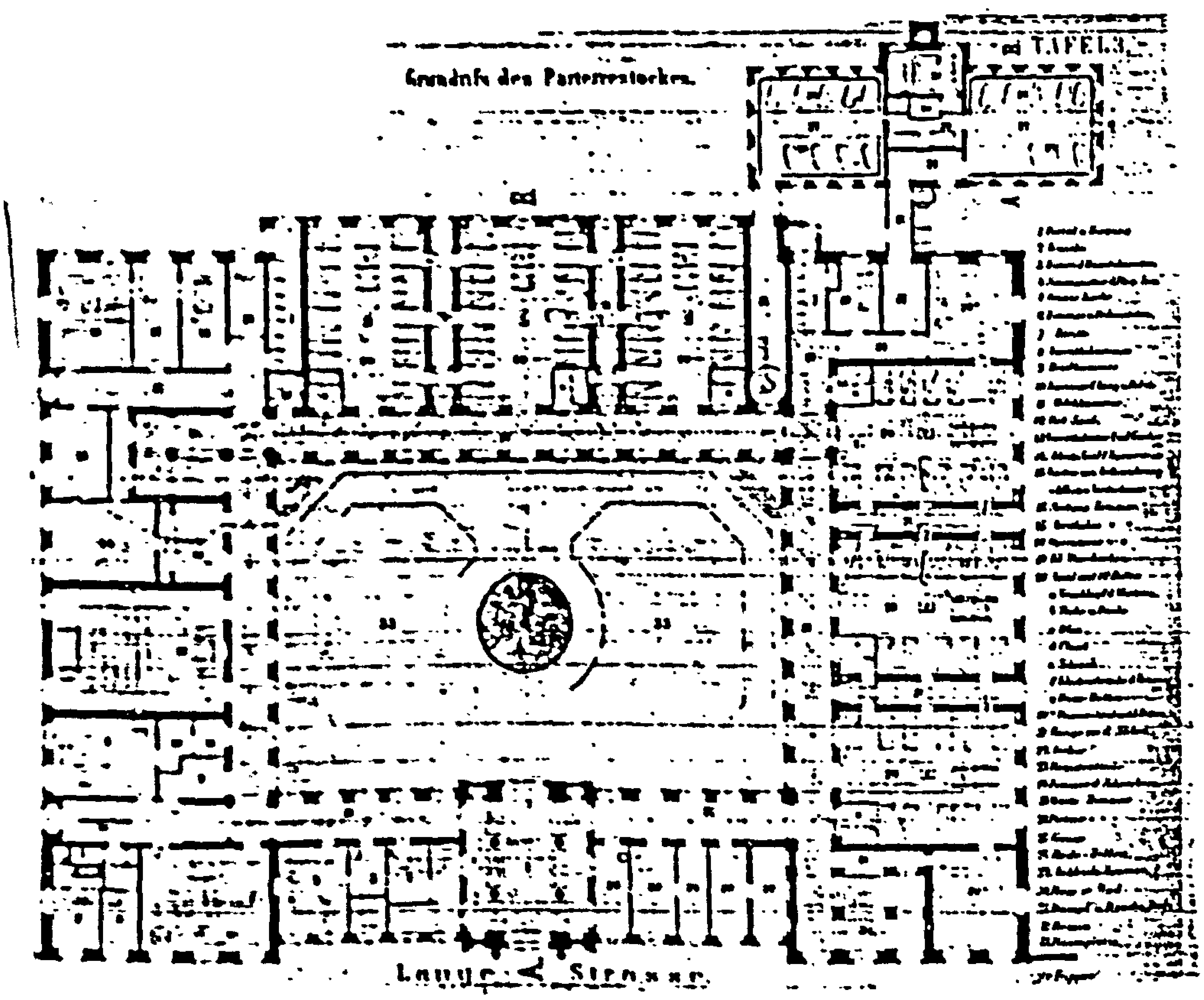
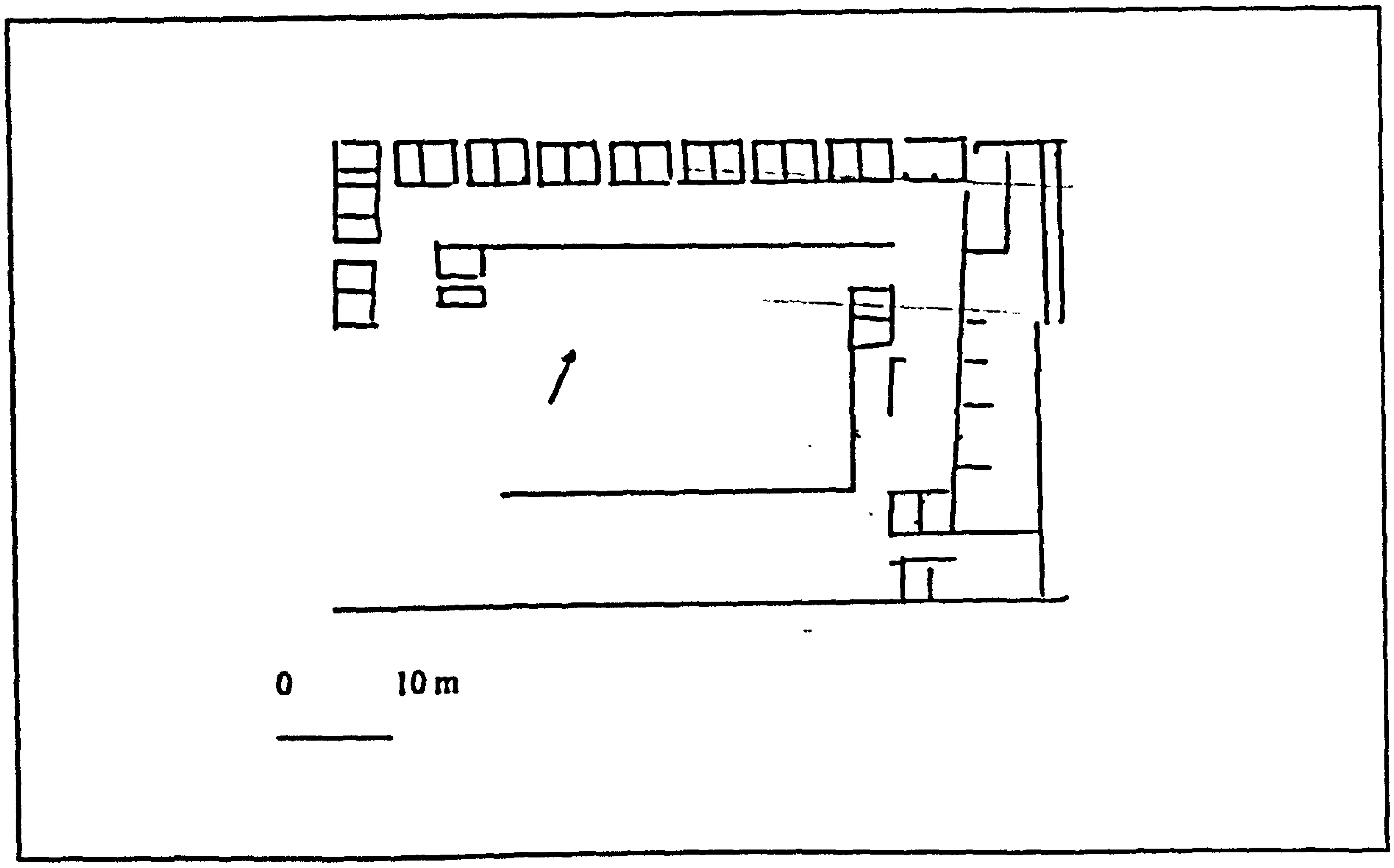


Fig. 77. Plan of a 19th century hospital from Heidelberg. From Jettner 1966: 172, Fig. 83.



Fig, 78. Plan of a 19th century hospital from Frankfurt. From Jettner 1966: 198, Fig. 92.

Fig. 79. Plan of the 'hospital' at Haltern. From Jettner 1966: Fig. 1.



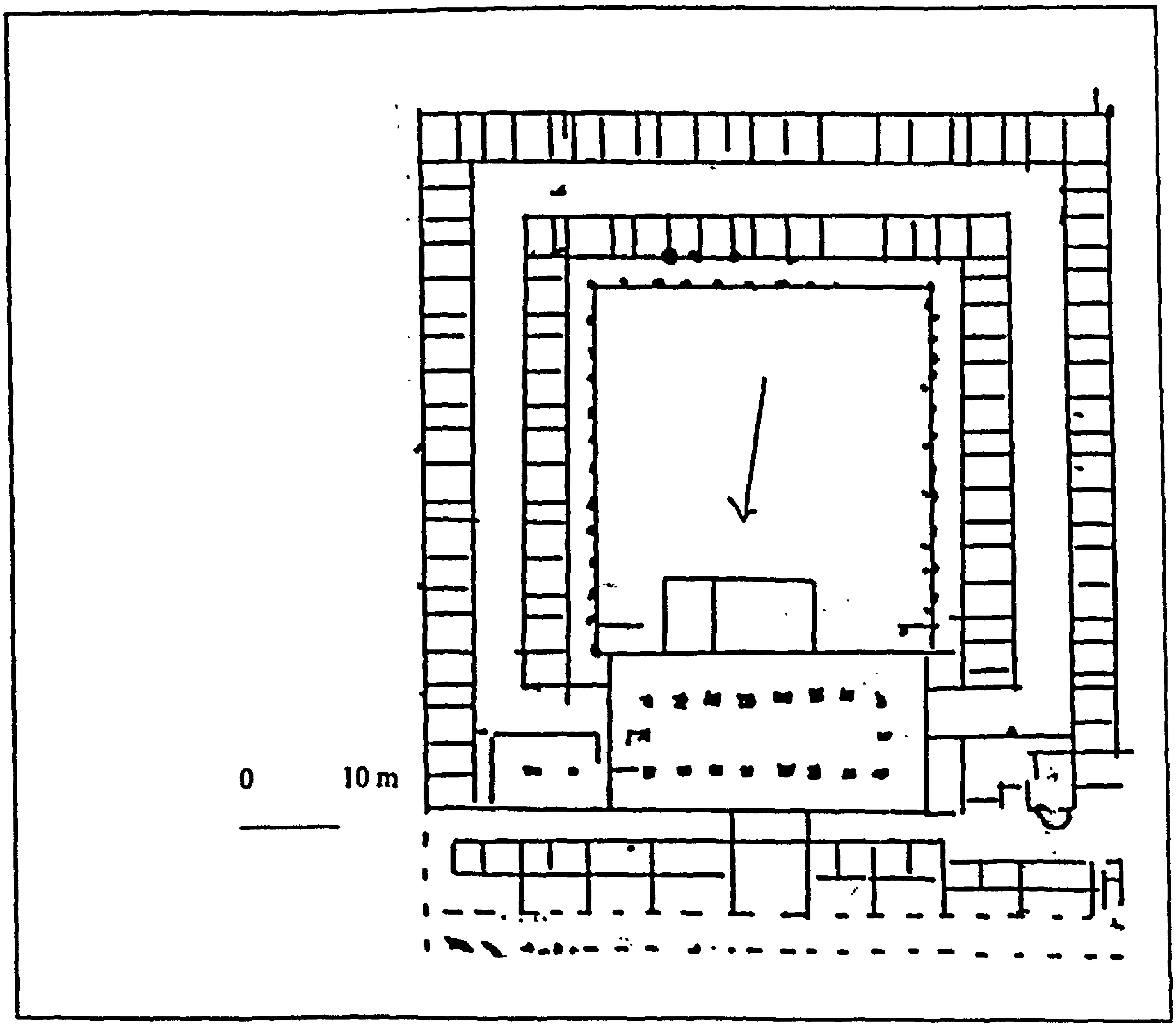
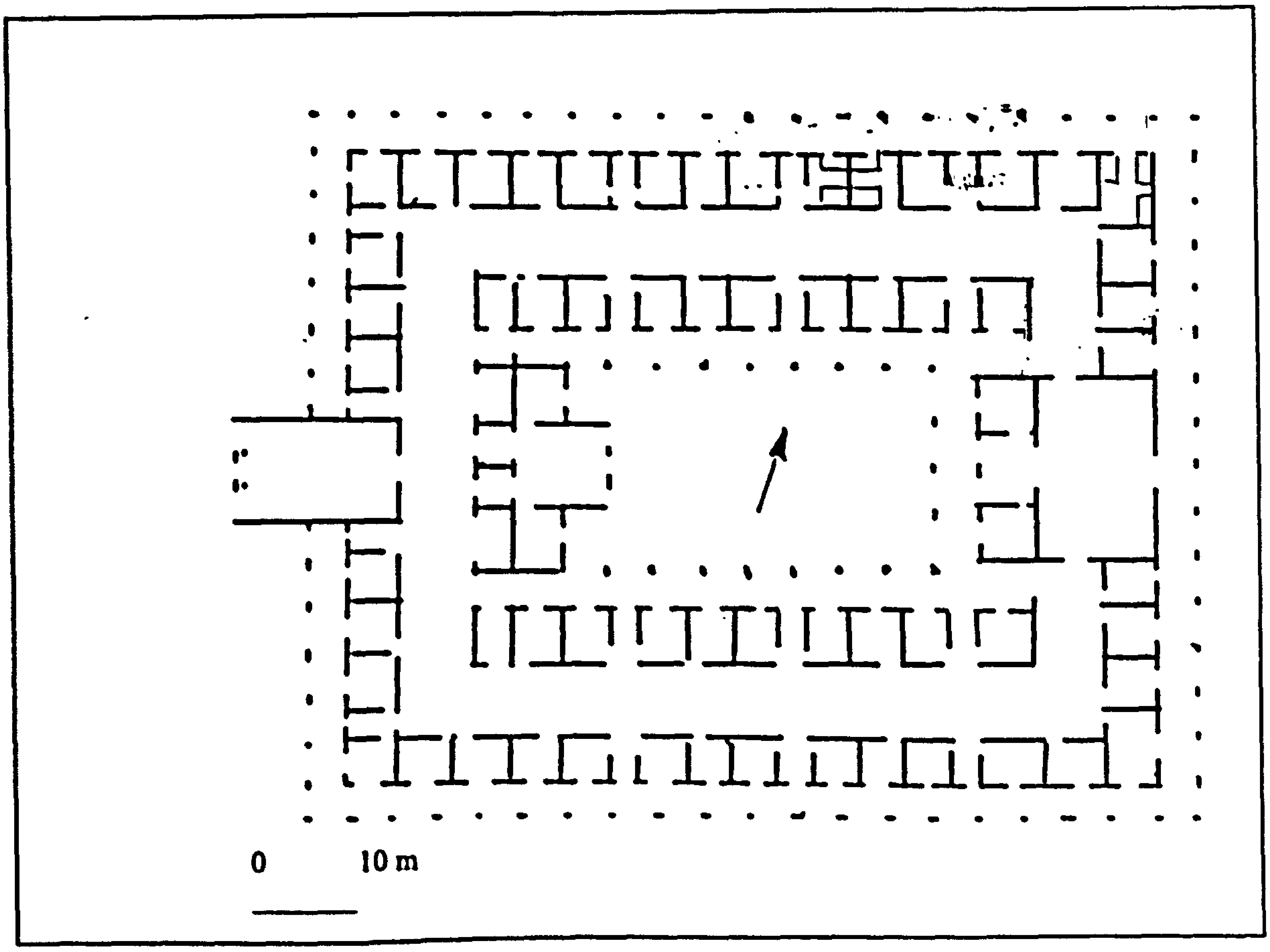


Fig. 80. Plan of 'hospital' at Vetera I. After Johnson 1983: Fig. 117.

Fig. 81. Plan of the 'hospital' at Vetera II. After Majno 1975: 385: Fig. 9. 36.



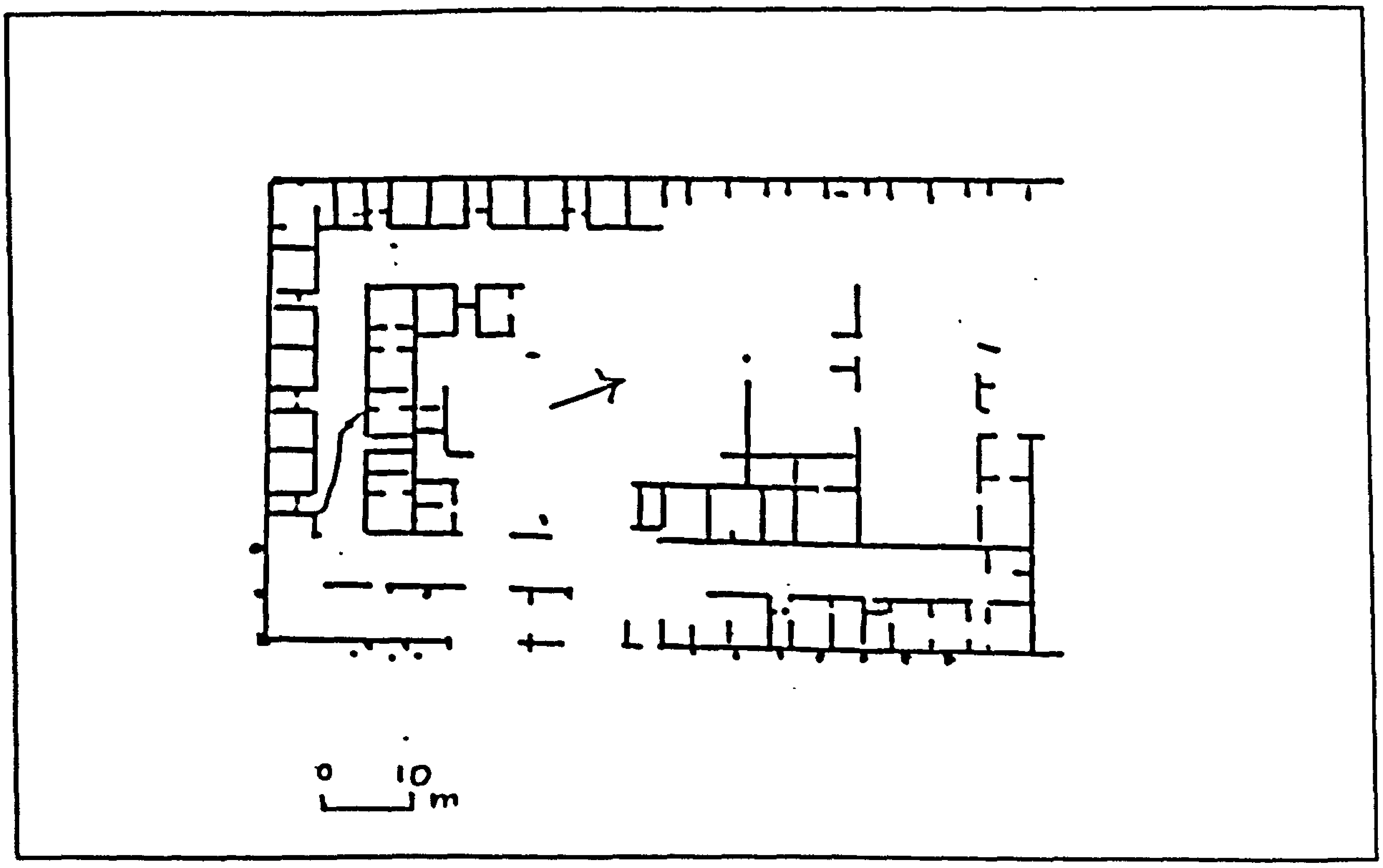
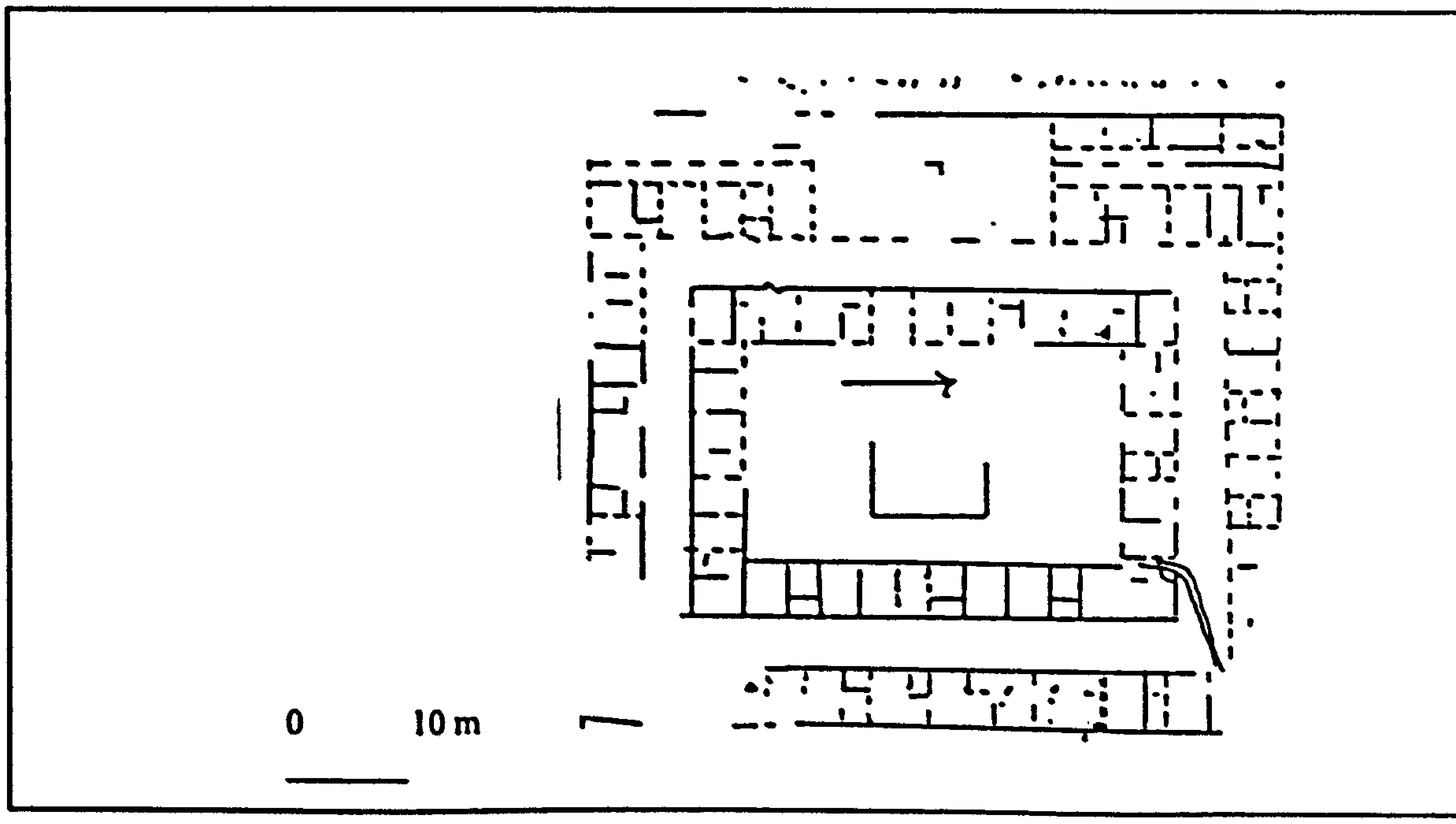


Fig. 82. Plan of the 'hospital' at Neuss. After Johnson 1983: 160.

Fig. 83. Plan of the 'hospital' at Vindonissa. After Johnson 1983: Figs 117.



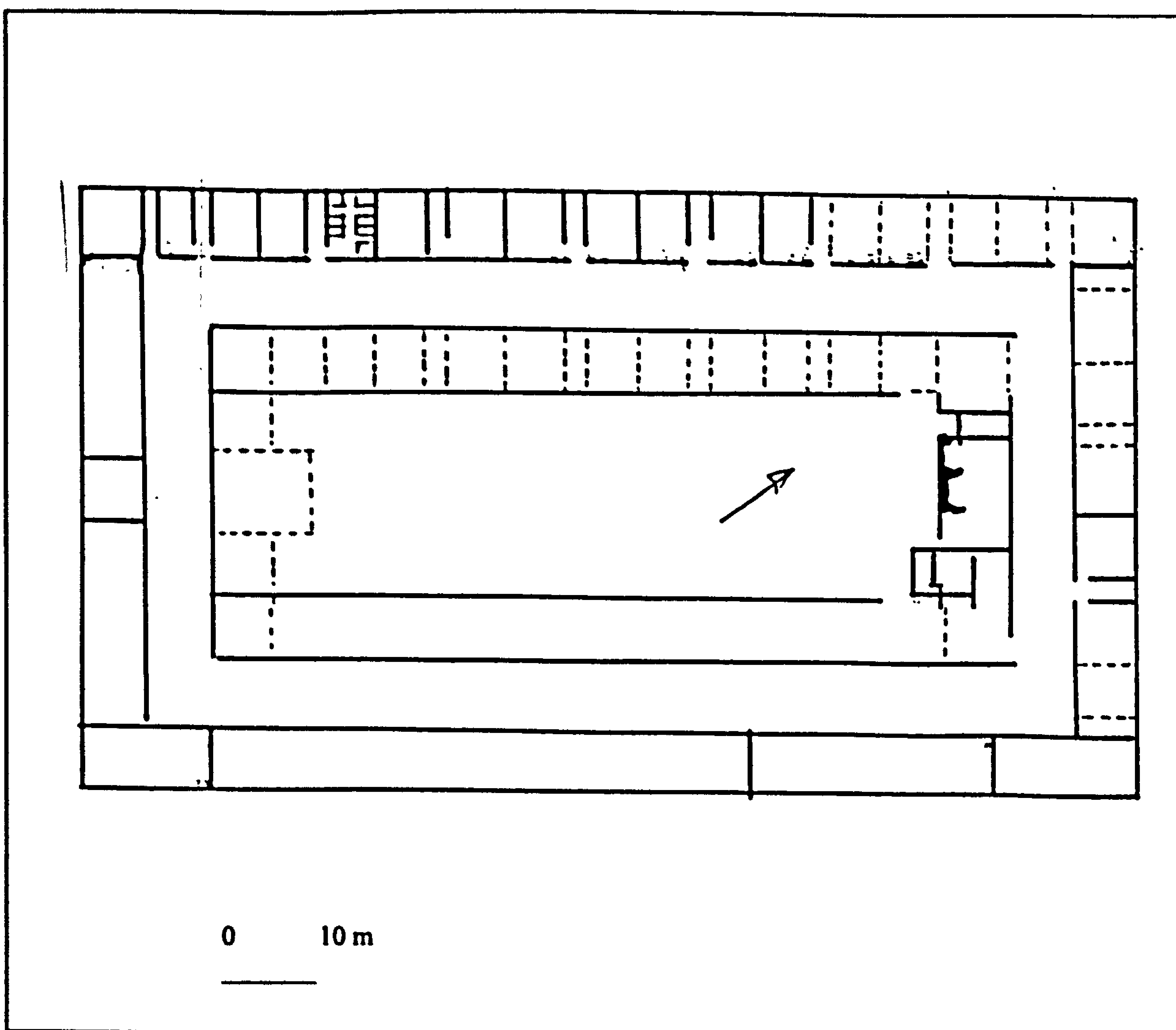
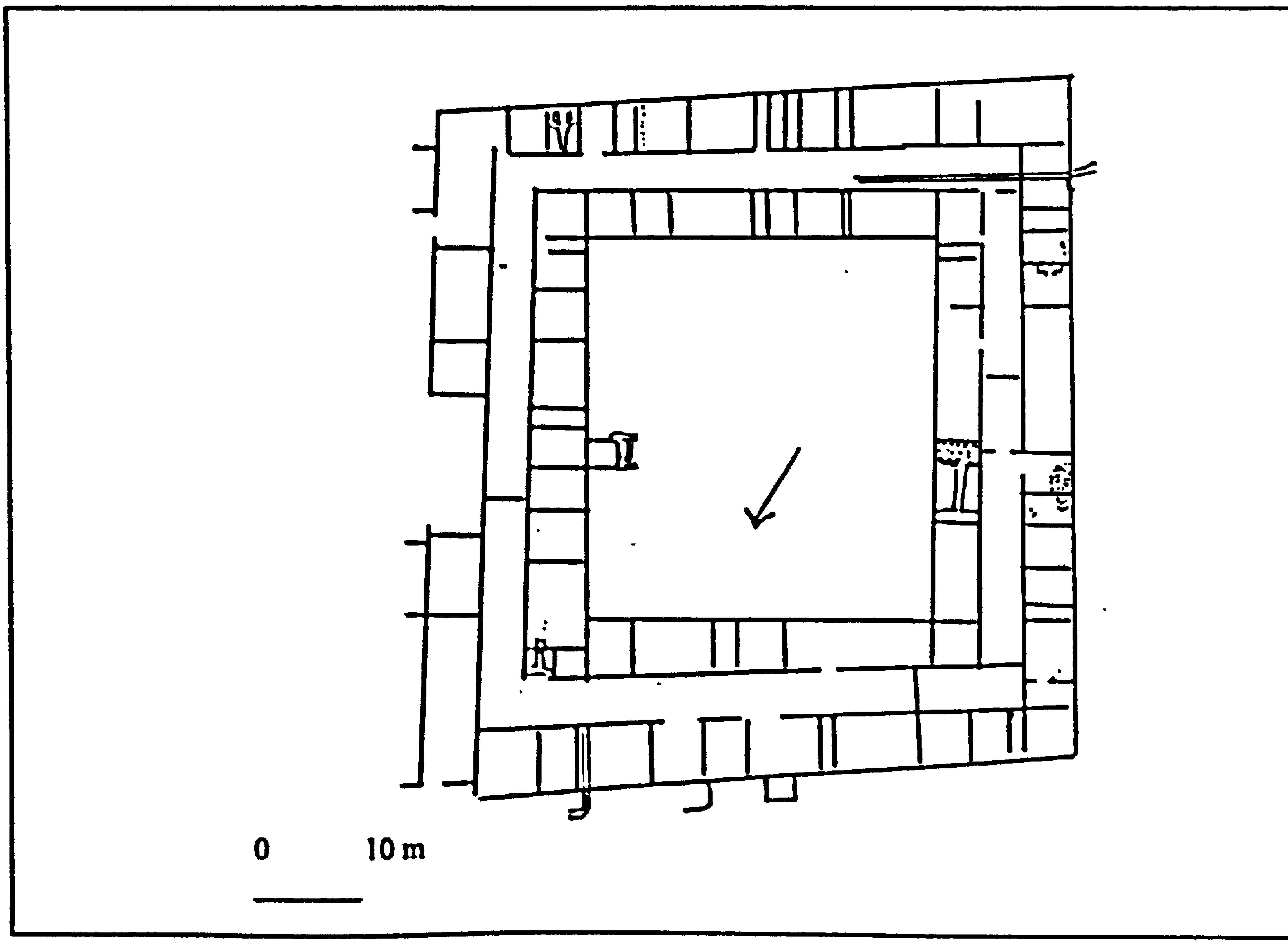


Fig. 84. Plan of the 'hospital' at Lotschitz. After Majno 1975: 385: Fig. 9. 36.

Fig. 85. Plan of the 'hospital' at Carnuntum. After Haberling 1909: Fig. 4.



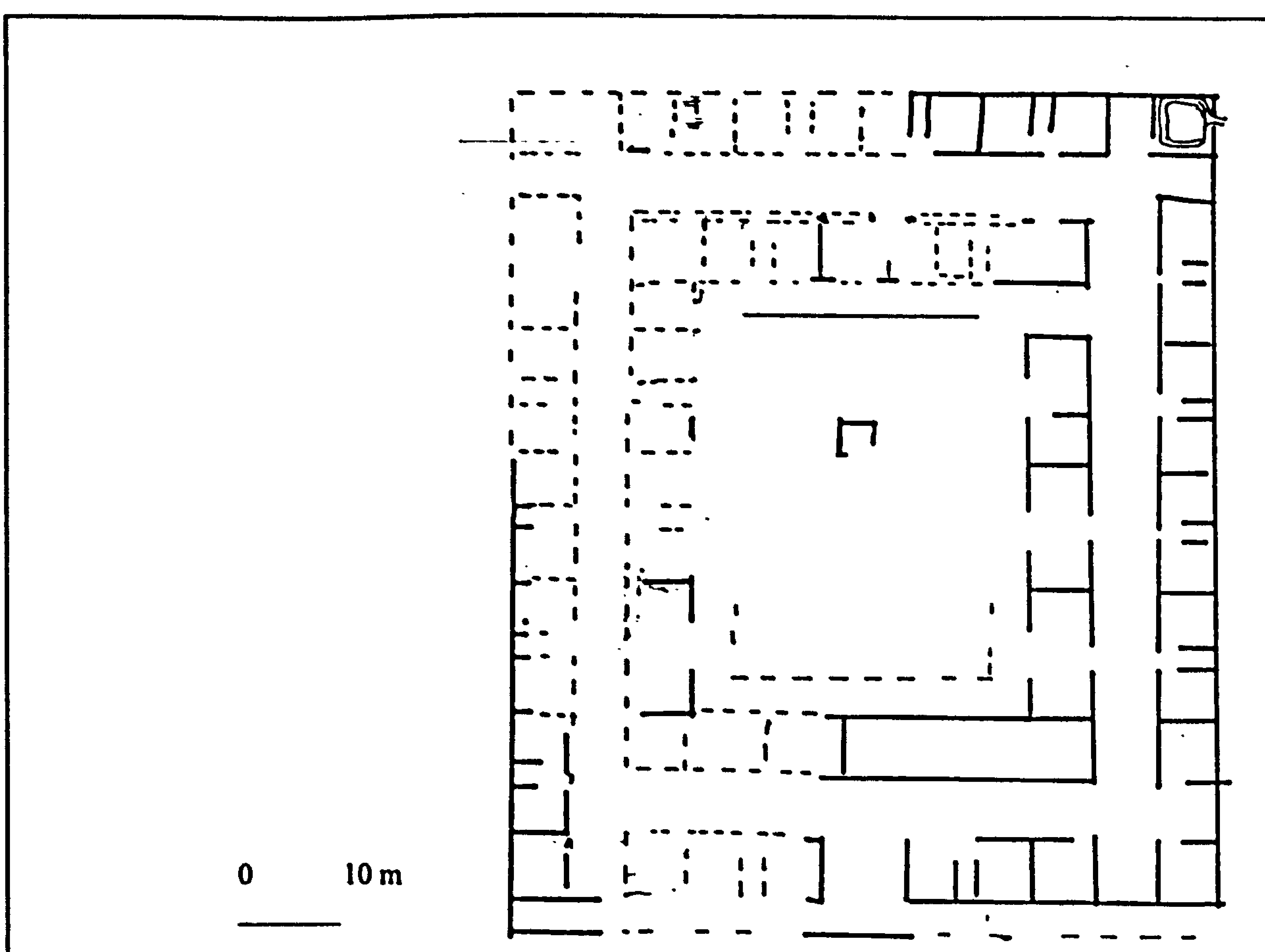


Fig. 86. Plan of the 'hospital' at Novae. After Dyzcek 1988: Fig. 1.

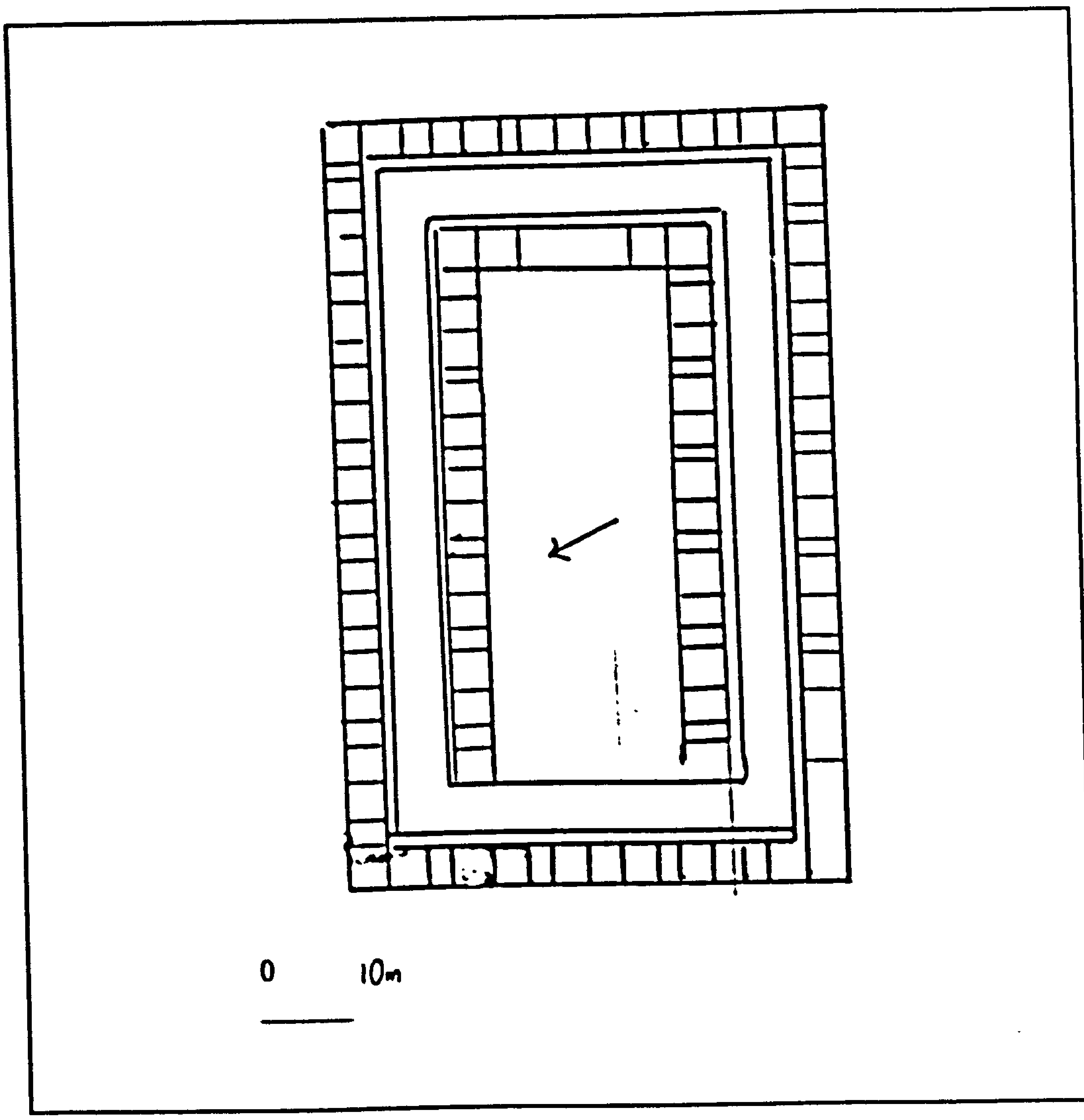
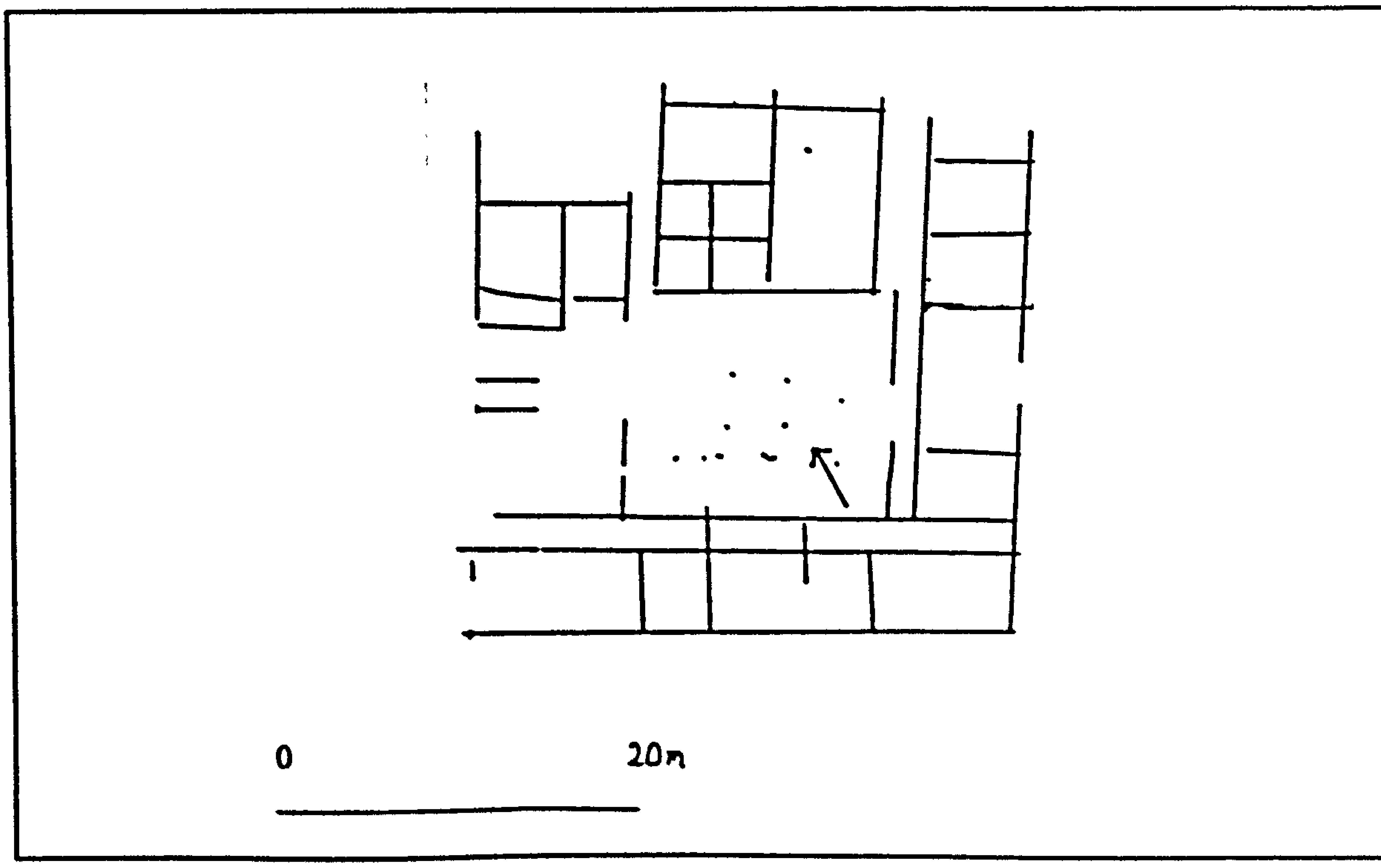


Fig. 87. Plan of the 'hospital' at Inchtuthil. After Johnson 1983: Fig. 117.

Fig. 88. Plan of the 'hospital' or *fabrica* at Valkenburg. After Johnson 1983: 186, Fig. 140.



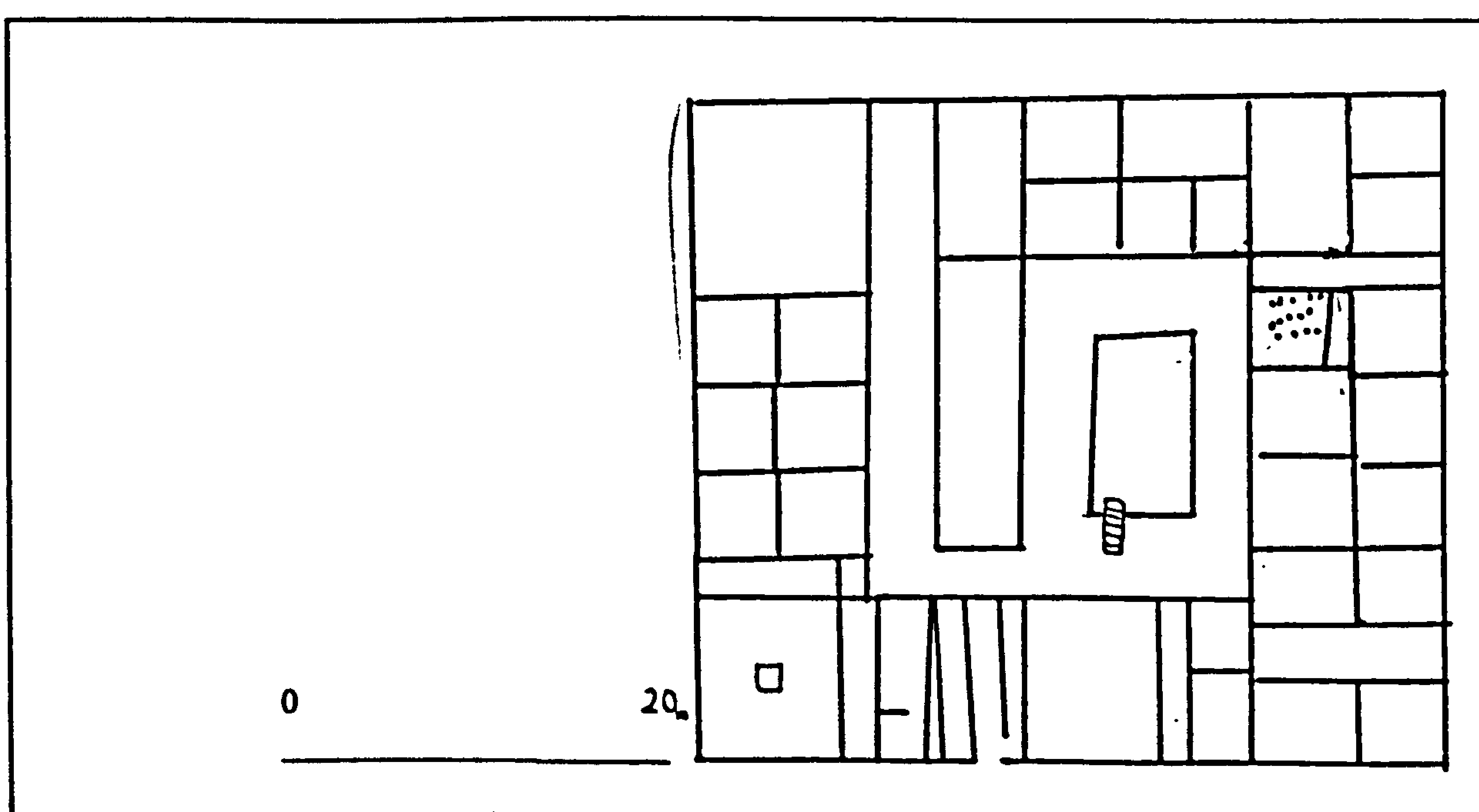


Fig. 89. Plan of the 'hospital' or *fabrica* at Wiesbaden. After Johnson 1983: 186, Fig. 140.

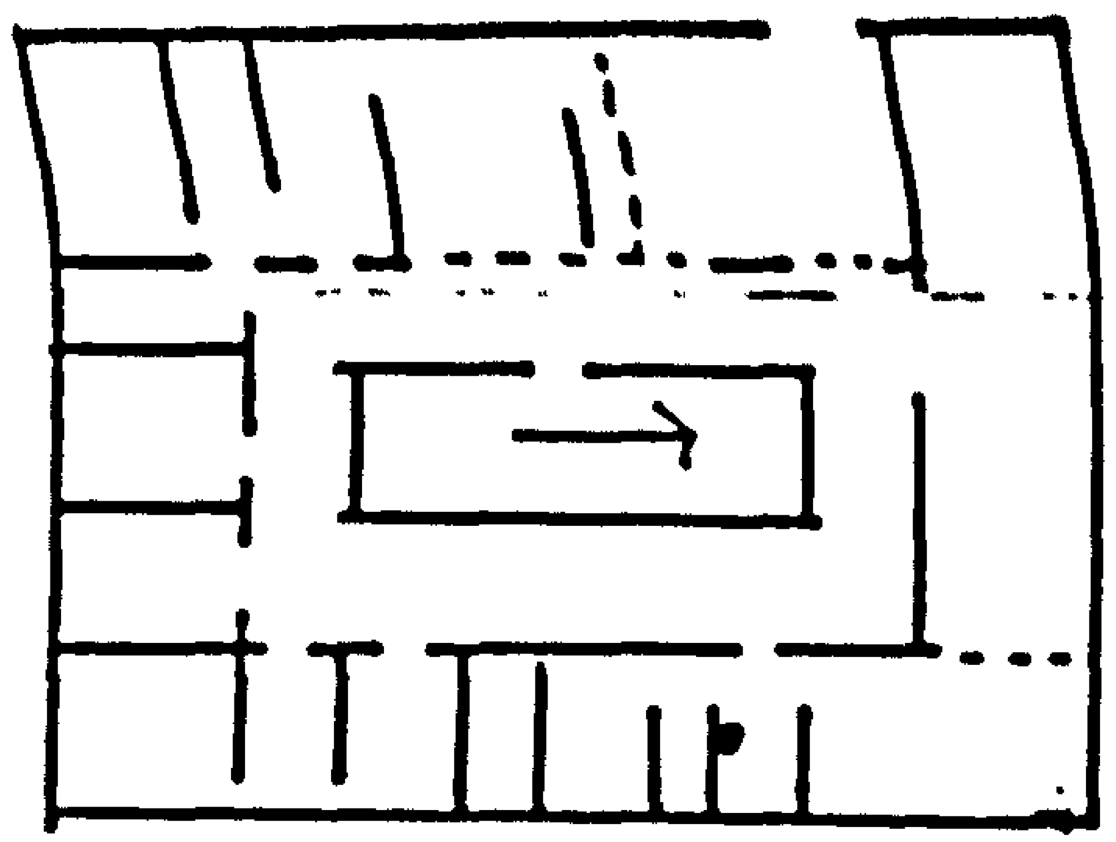


Fig. 93

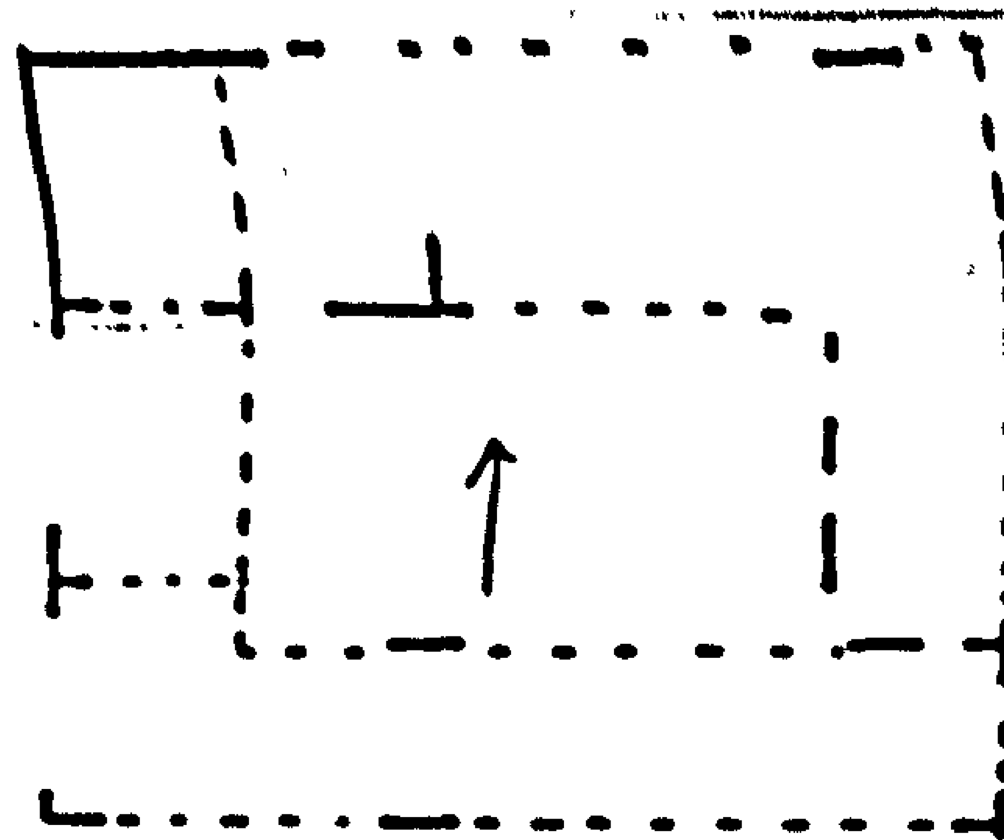


Fig. 95

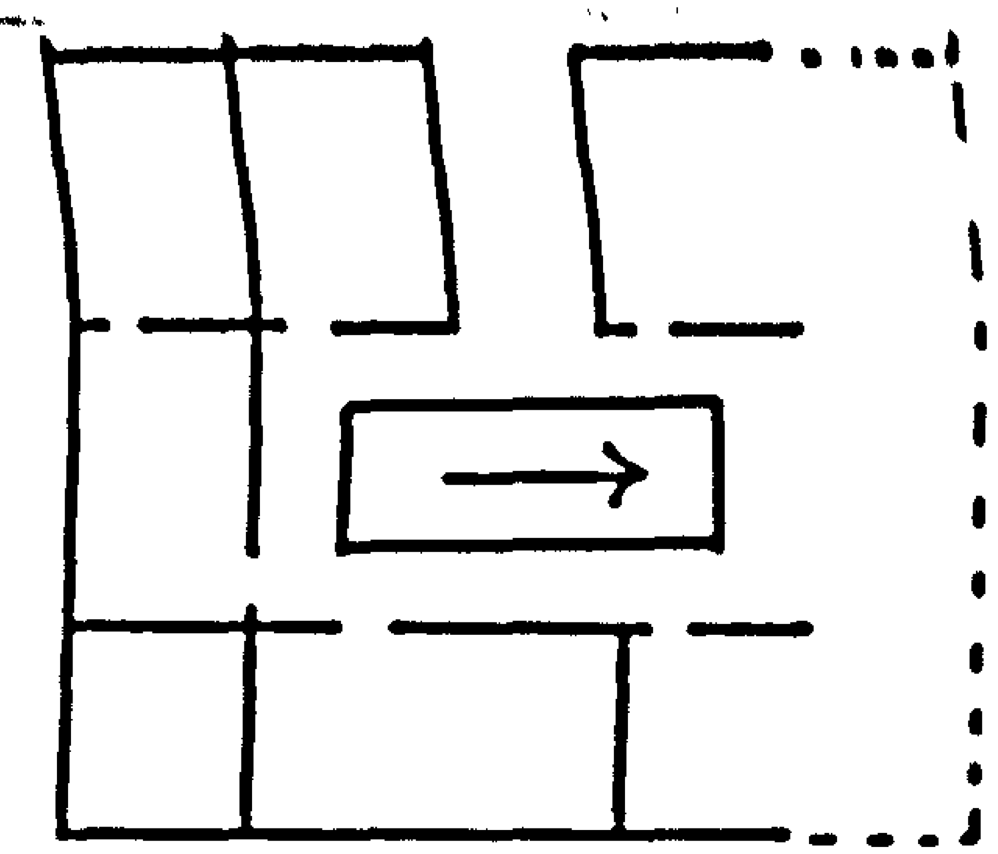


Fig. 96

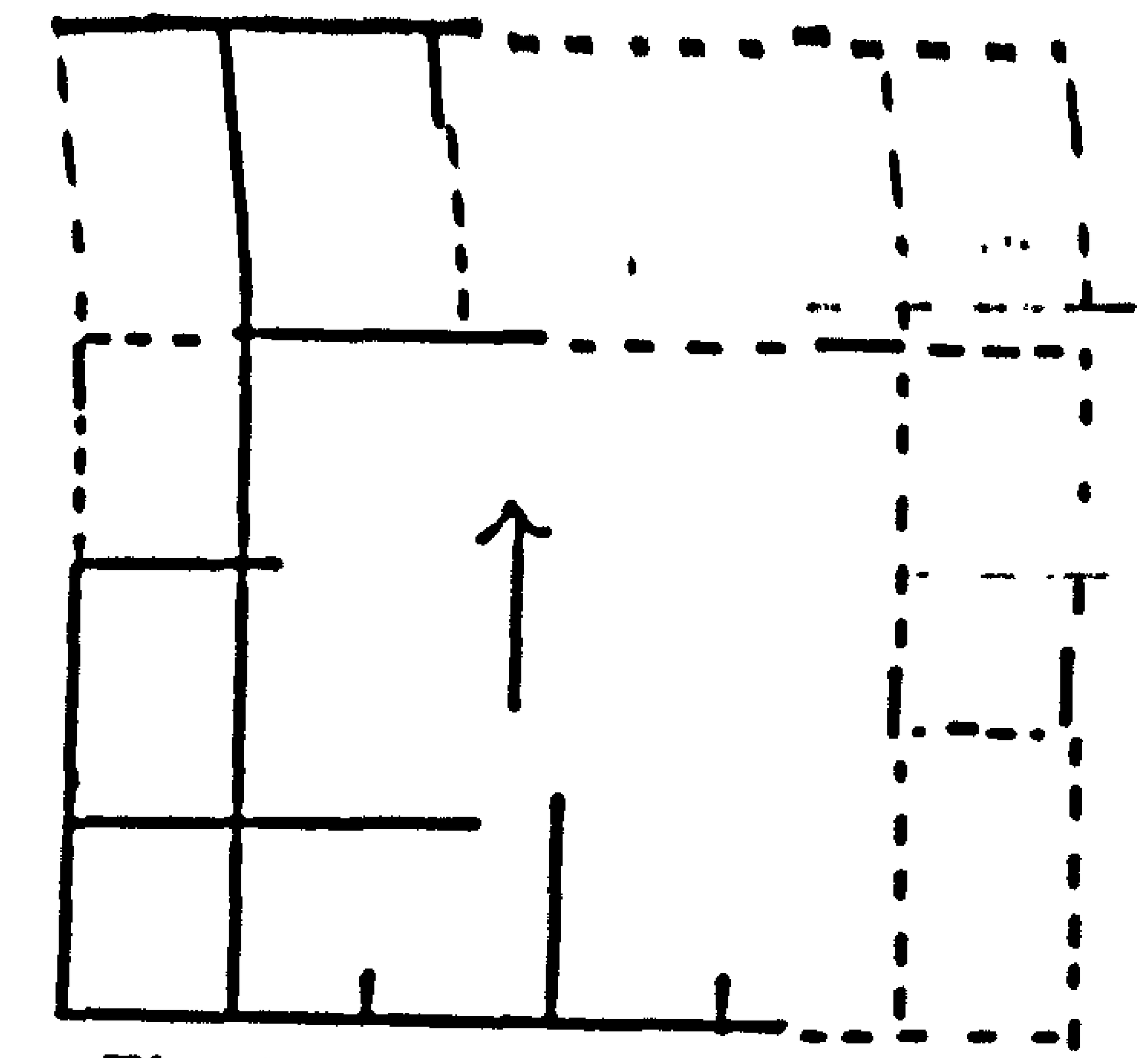


Fig. 94

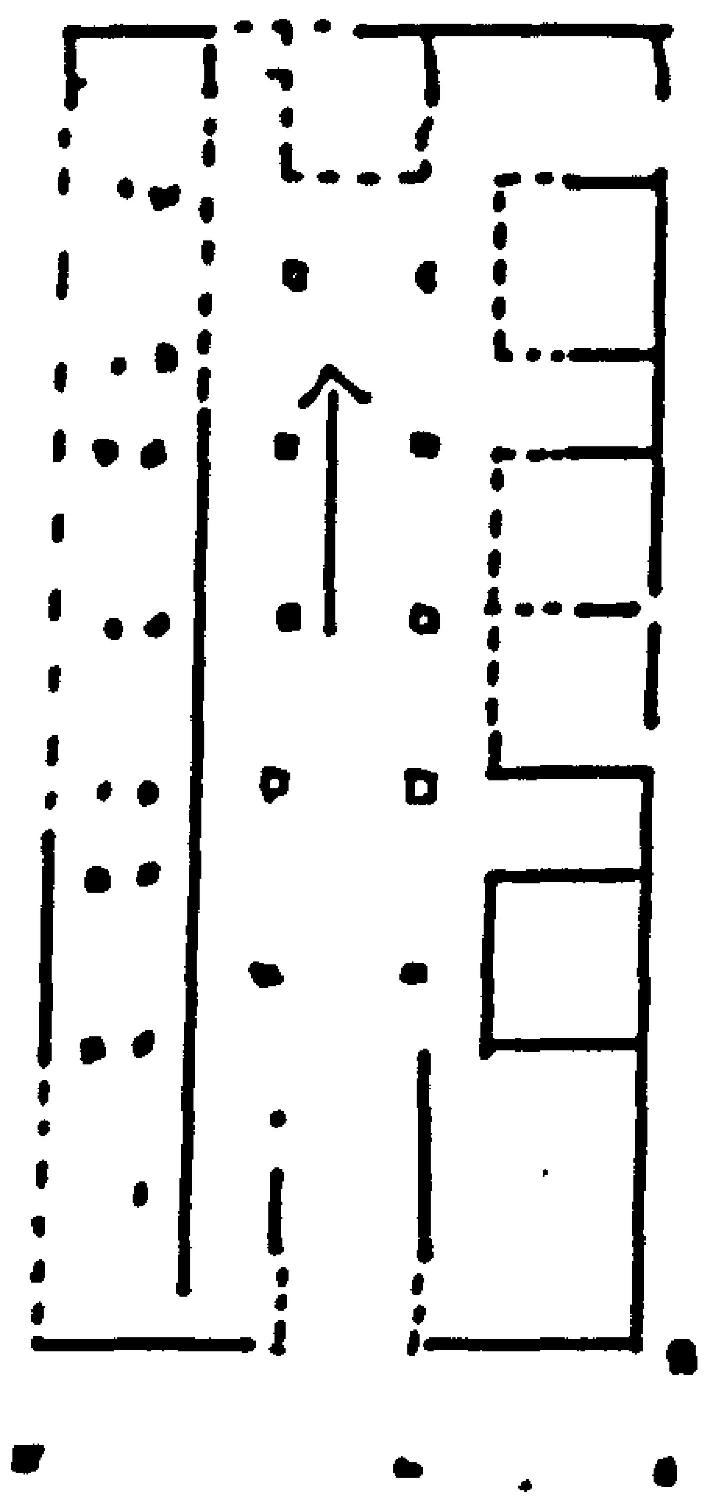


Fig. 91

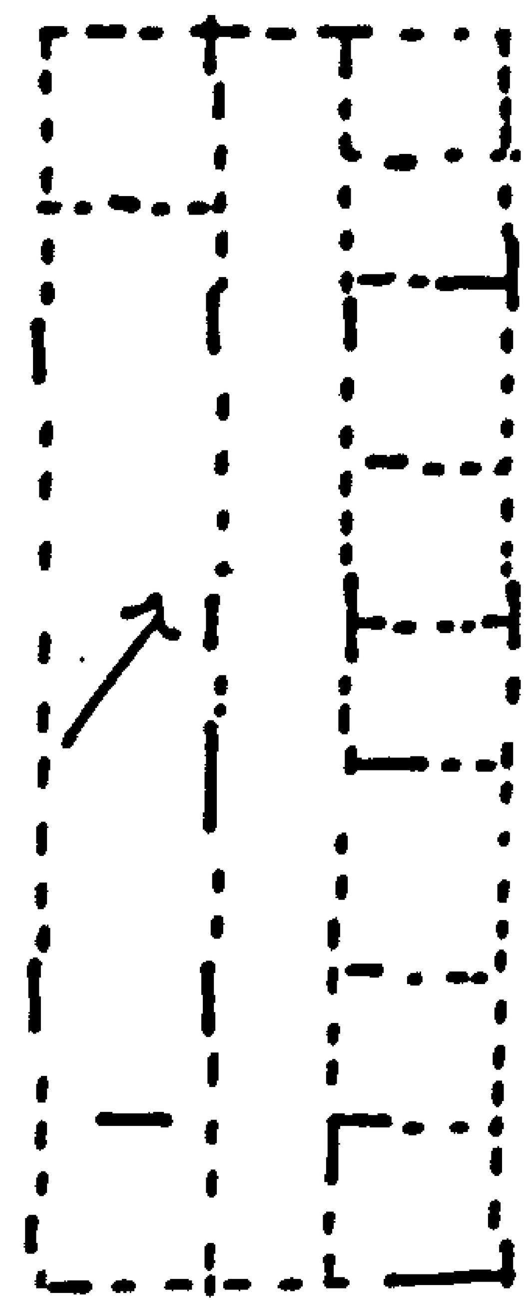


Fig. 97

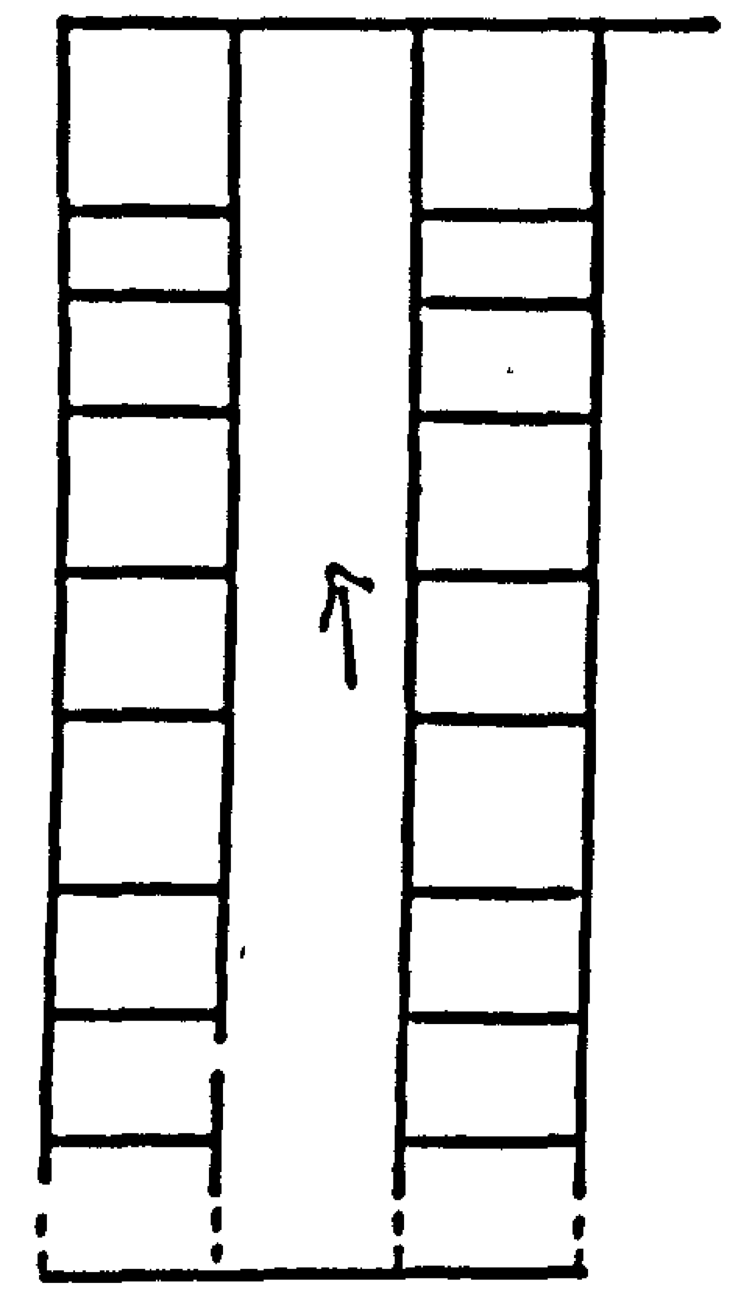


Fig. 92

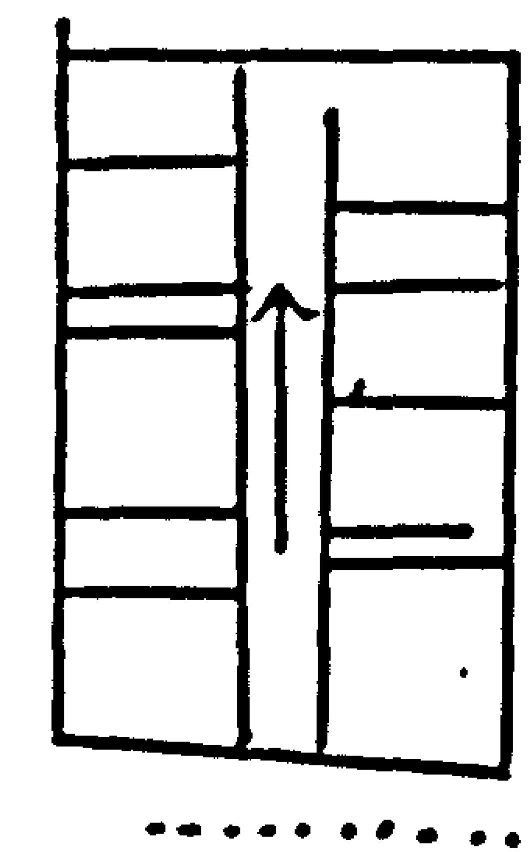
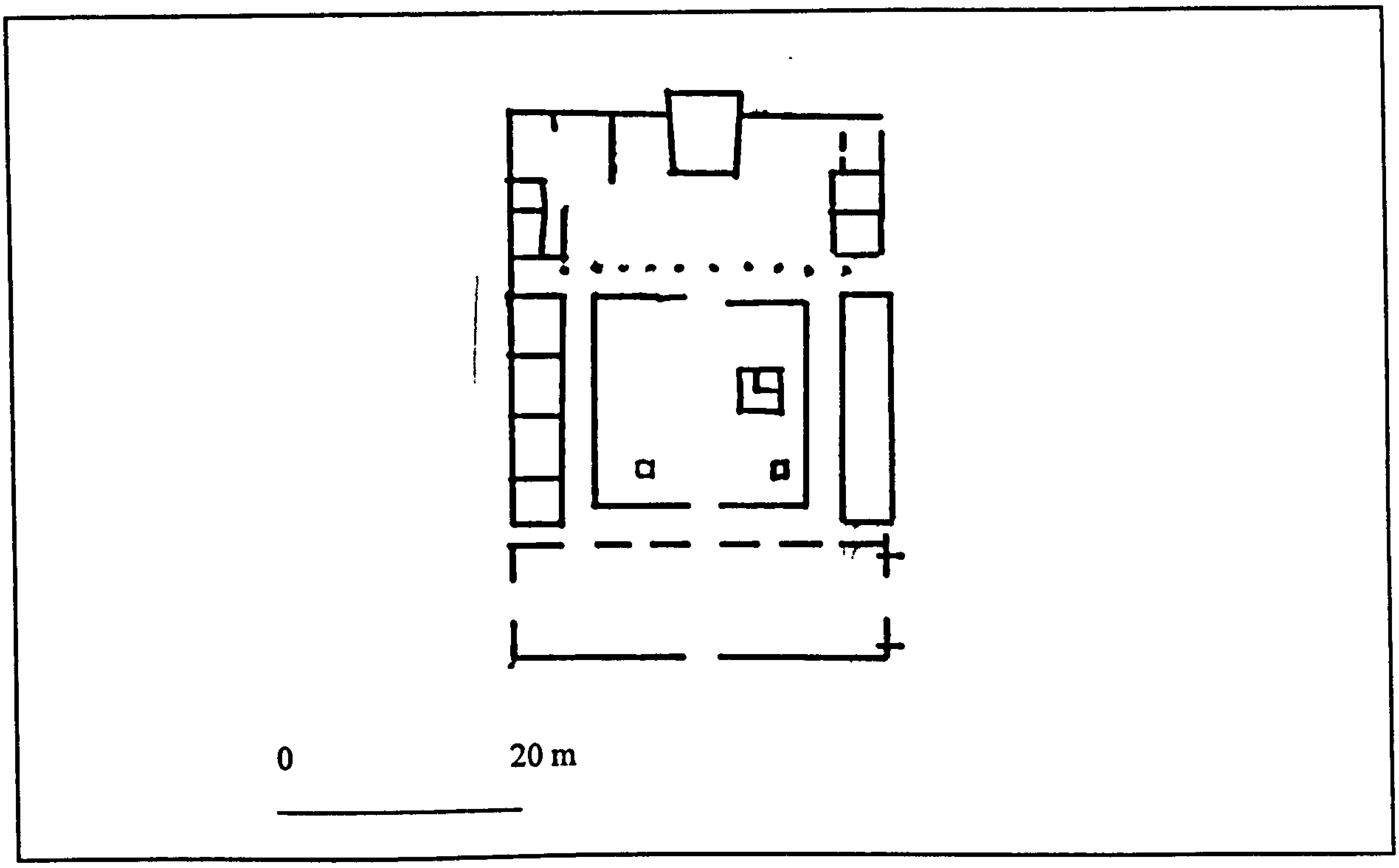


Fig. 90

0 20 m

Fig. 90. Plan of the 'hospital' at Oberstimm. After Johnson 1983: 163, Fig. 121; Fig. 91. Plan of the 'hospital' at Künzing. After Johnson 1983: 163, Fig. 121.
Fig. 92. Plan of the 'hospital' at Corbridge. After Johnson 1983: 163, Fig. 121. Fig. 93. Plan of the 'hospital' at Housesteads. After Johnson 1983: 163, Fig. 121.
Fig. 94. Plan of the 'hospital' at Benwell. After Johnson 1983: 163, Fig. 121.; Fig. 95. Plan of the 'hospital' at Hod Hill. After Johnson 1983: 163, Fig. 121.
Fig. 96. Plan of the 'hospital' at Wallsend. After Johnson 1983: 163, Fig. 121.; Fig. 97. Plan of the 'hospital' at Fendoch. After Johnson 1983: 163, Fig. 121.

Fig. 98. Plan of the principia at Saalburg. After Johnson 1983: 124, Fig. 95.



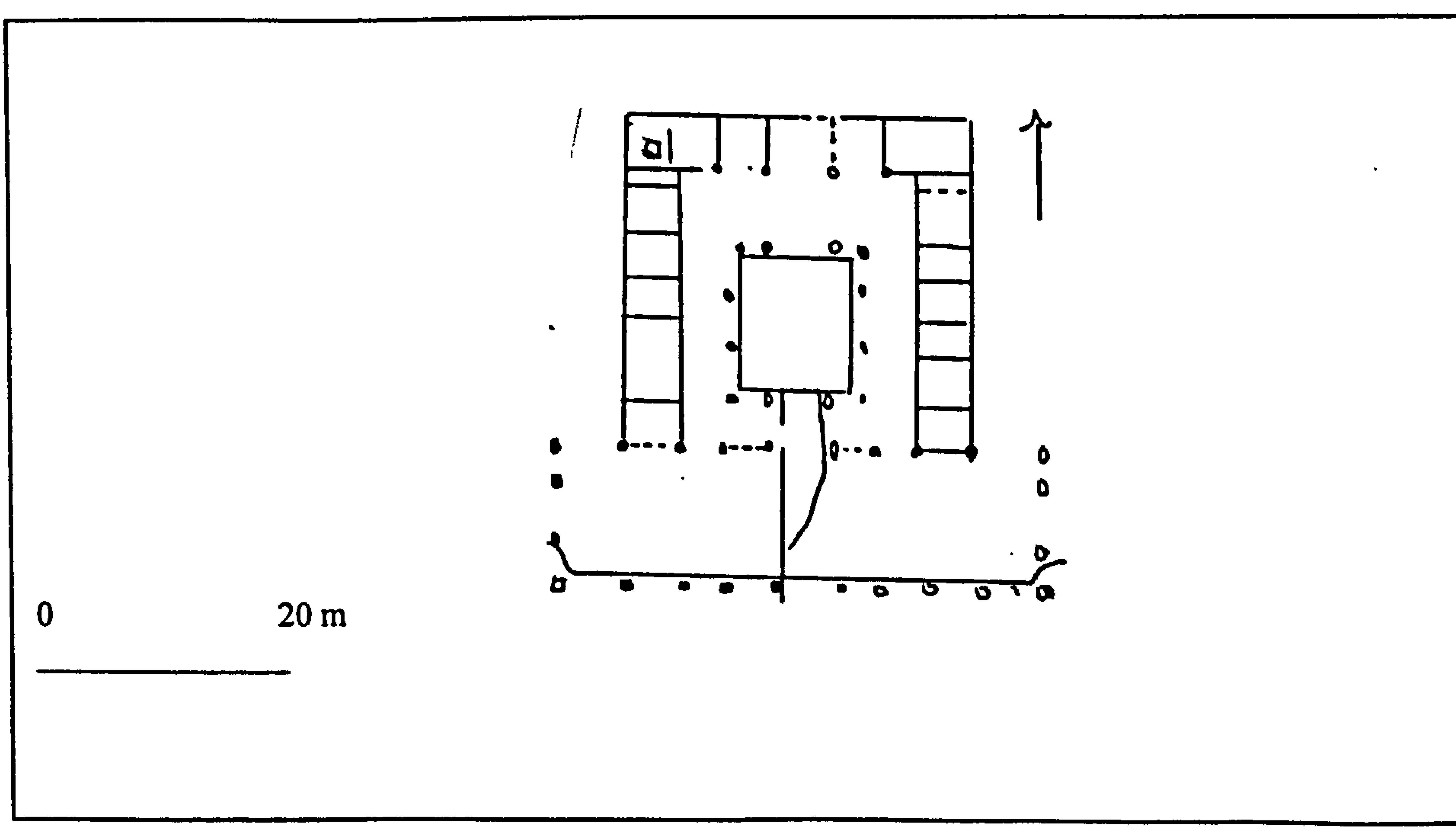


Fig. 99. Plan of the principia at Künzing. After Johnson 1983: 124: 95.

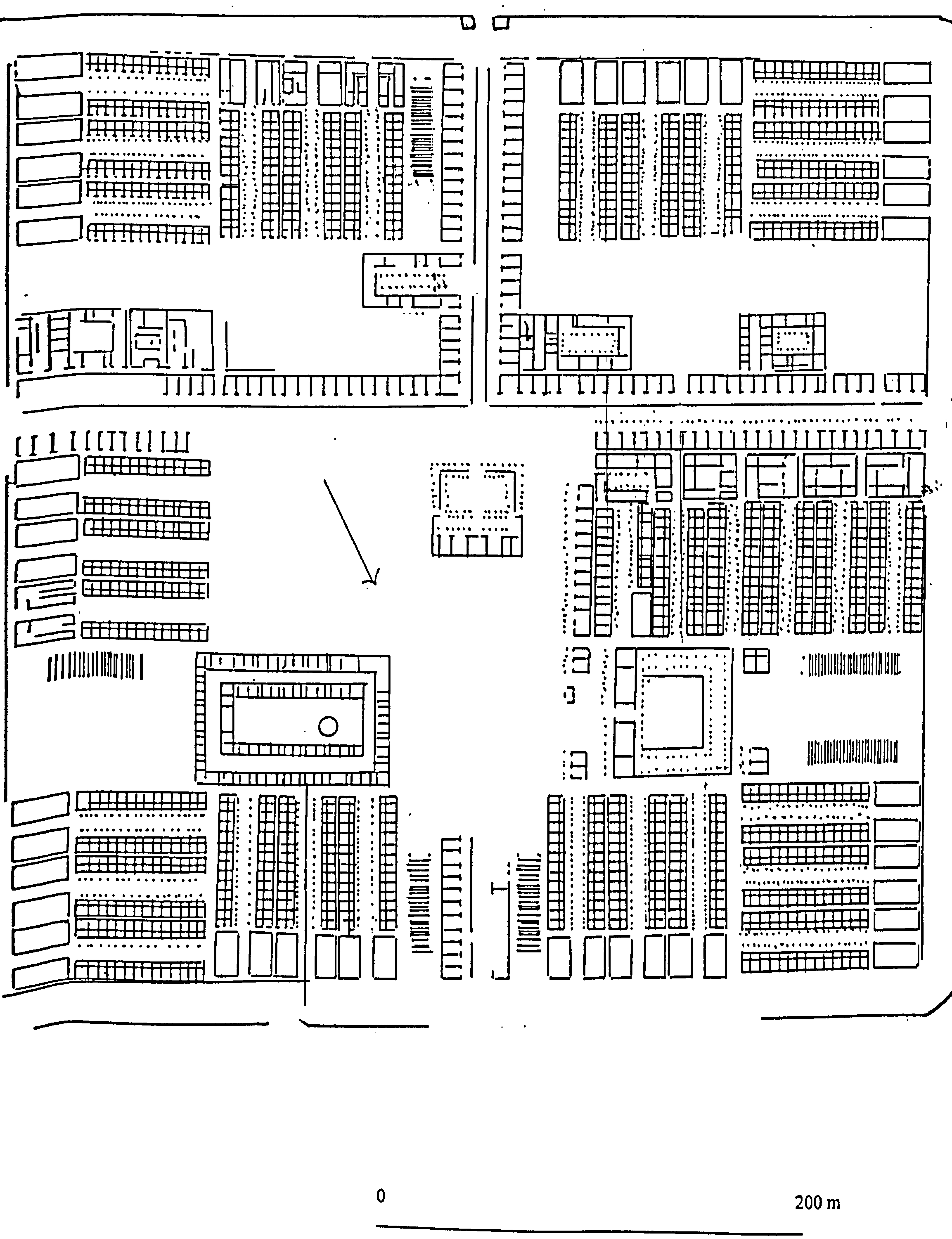


Fig. 100. Plan of Inchtuthil marking the 'hospital'. After Johnson 1983: 32, Fig. 17.

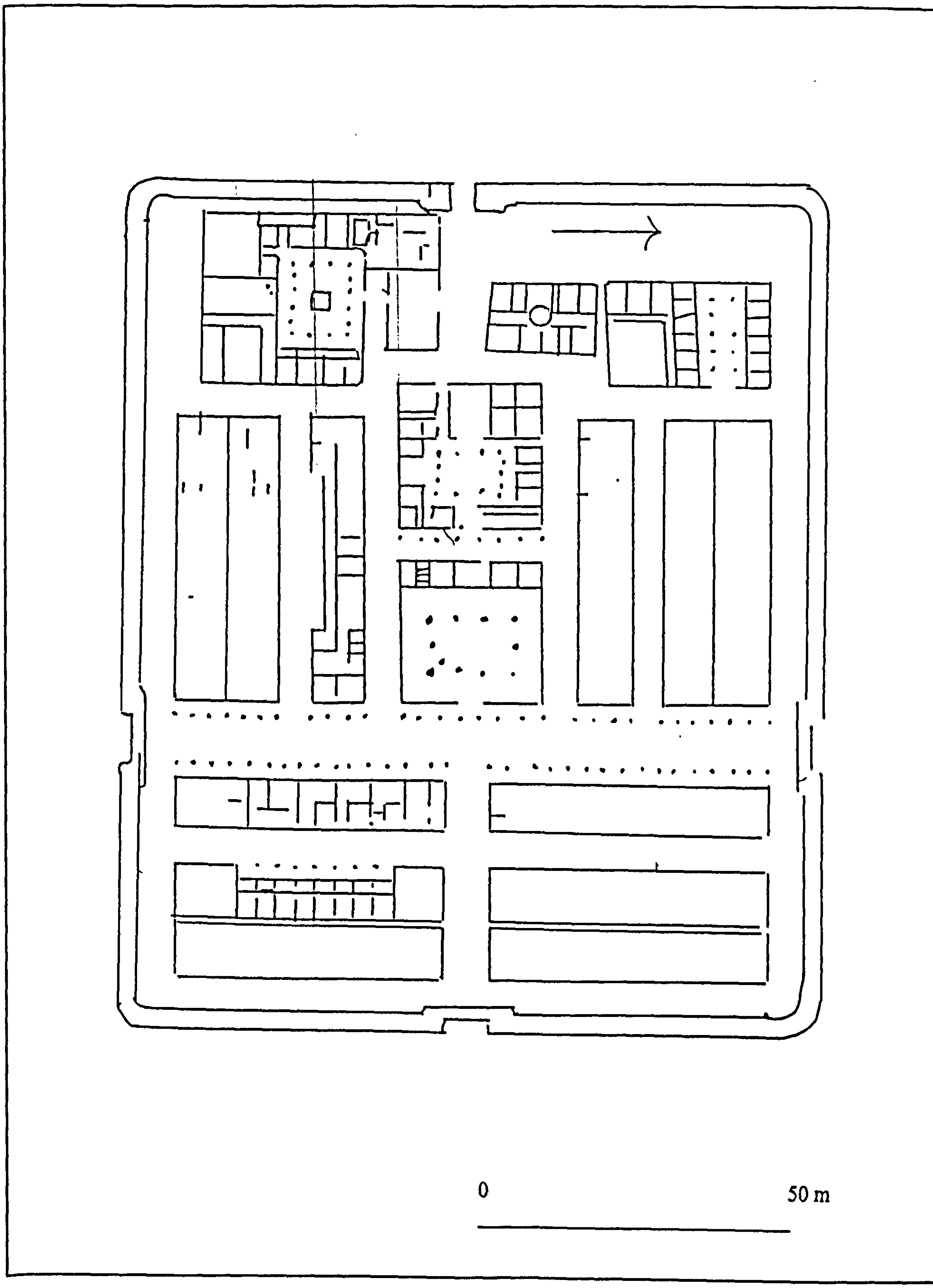


Fig. 101. Plan of Oberstimm marking the 'hospital'. After Johnson 1983: 238, Fig. 180.

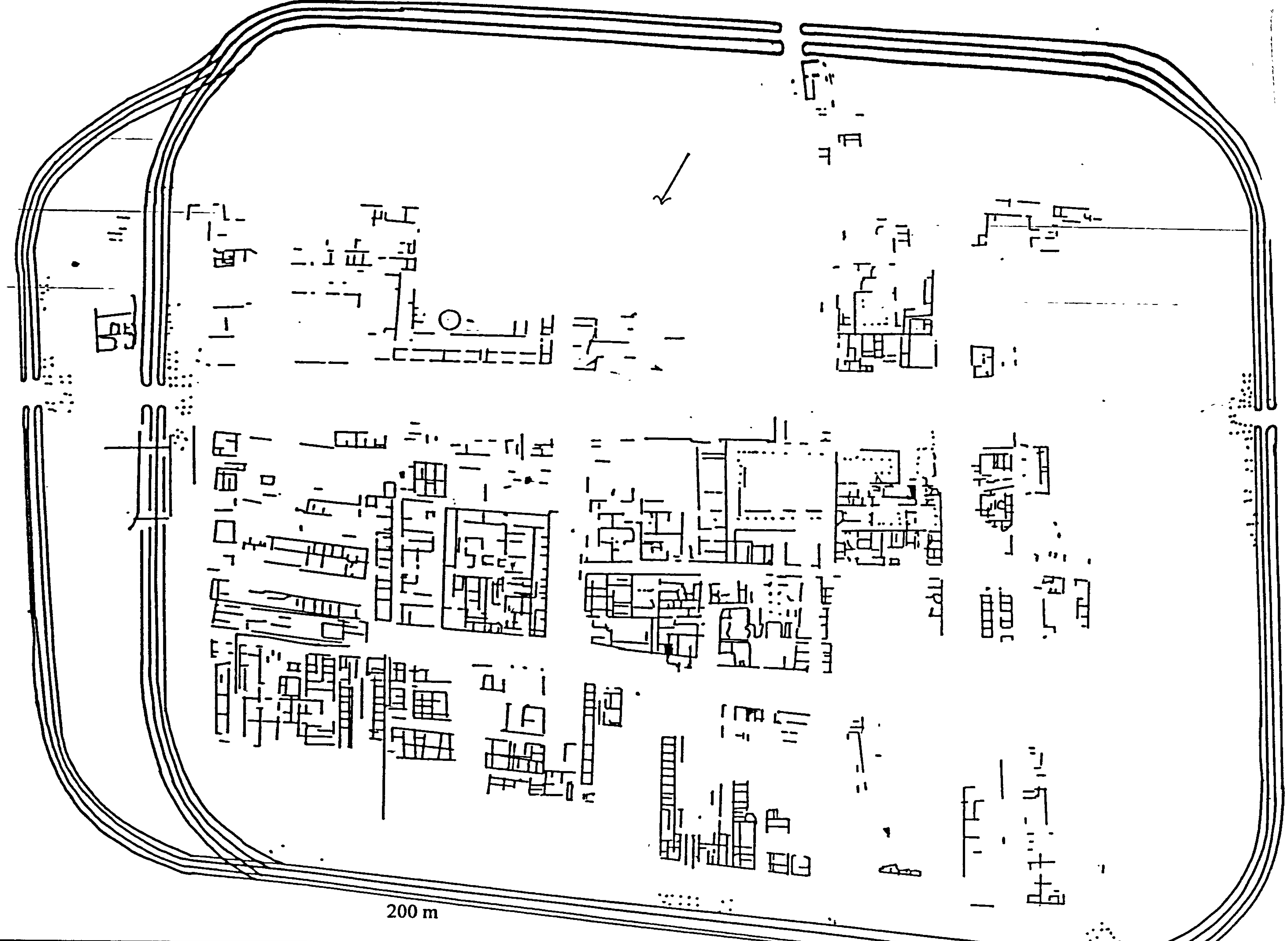


Fig. 102. Plan of Haltern marking the 'hospital'. After Johnson 1983: 233, Fig. 176.

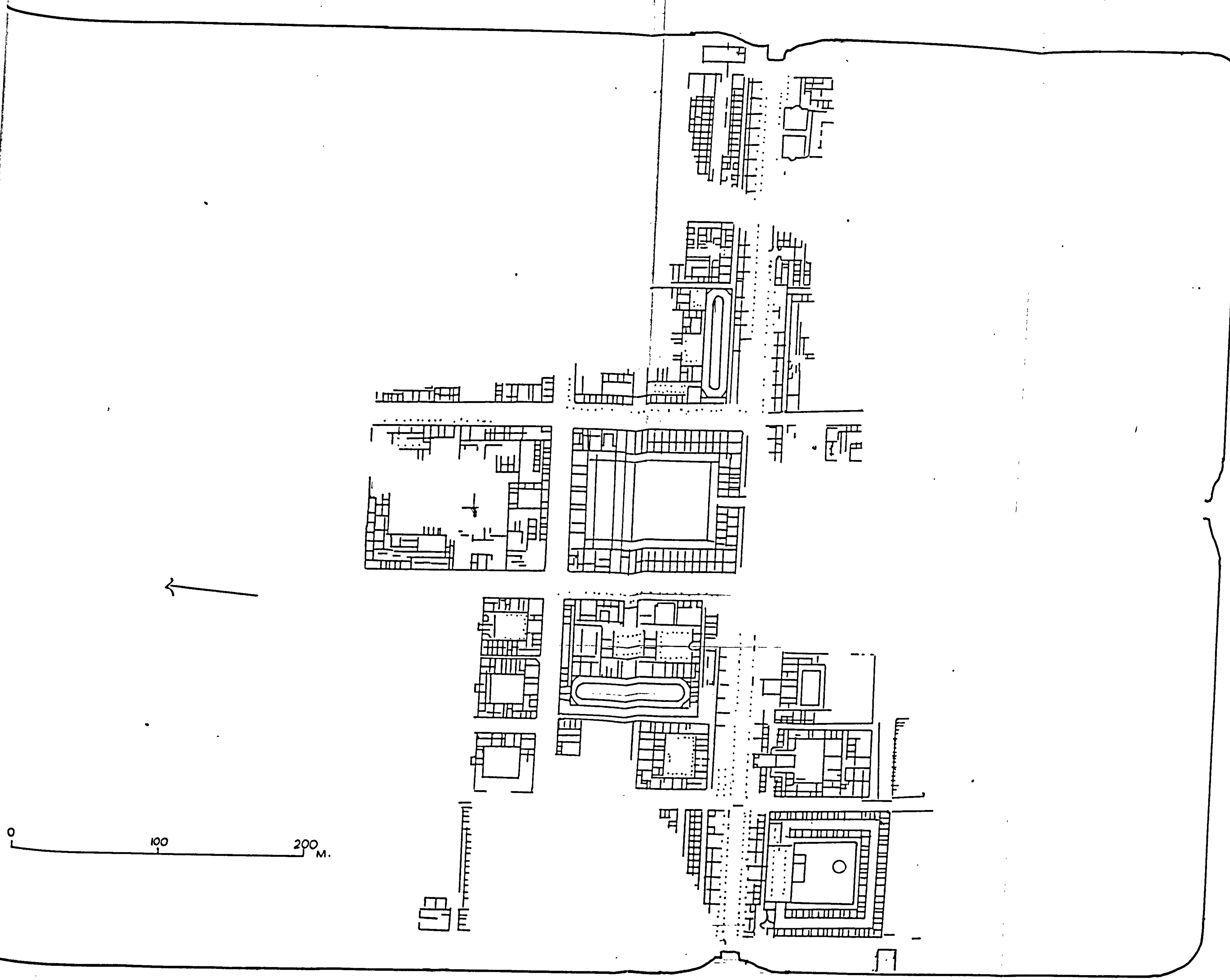


Fig. 103. Plan of Vetera I marking the 'hospital'. After Johnson 1983: 246, Fig. 186.

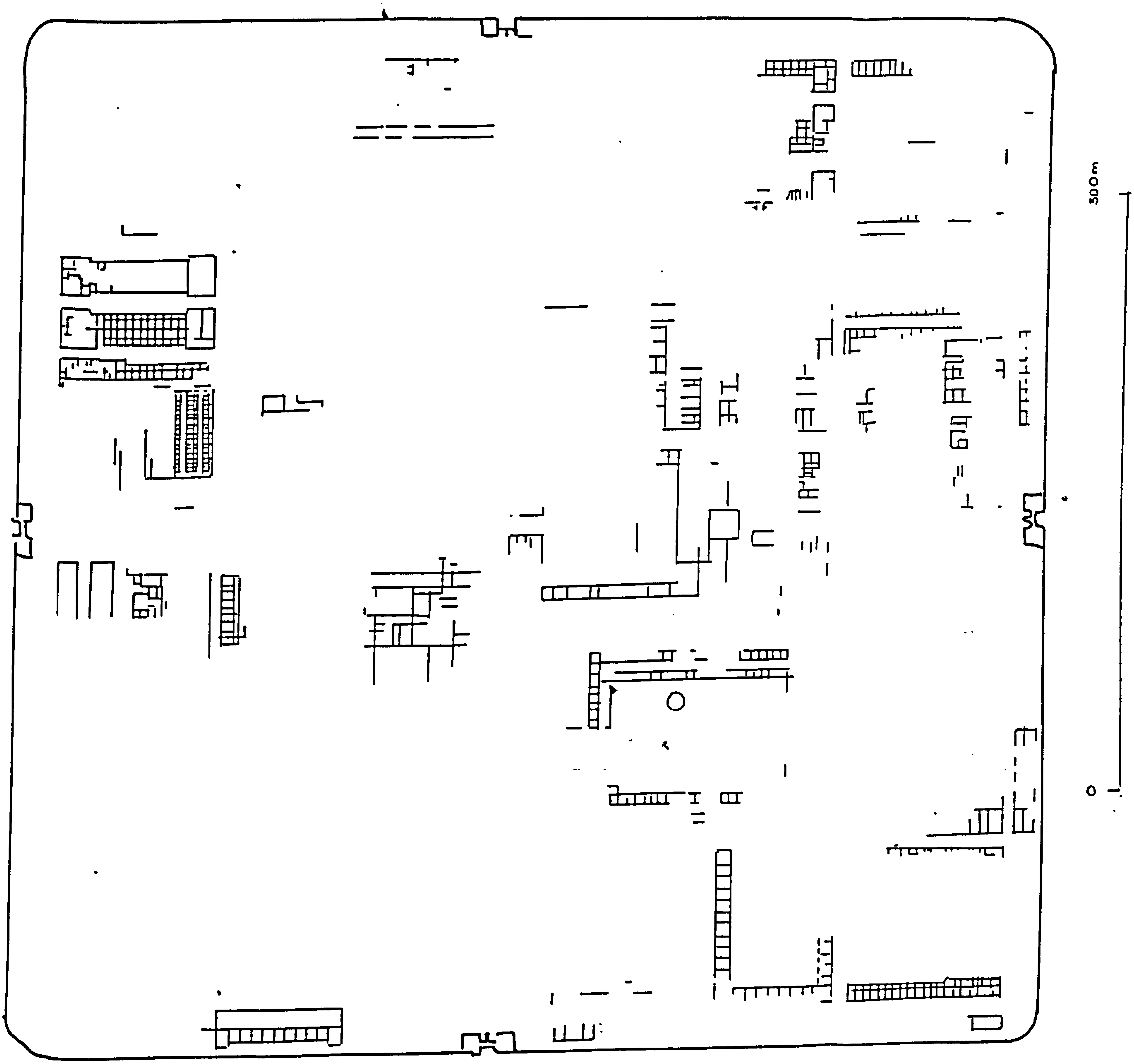


Fig. 104. Plan of Bonn marking the 'hospital'. After Boon 1967

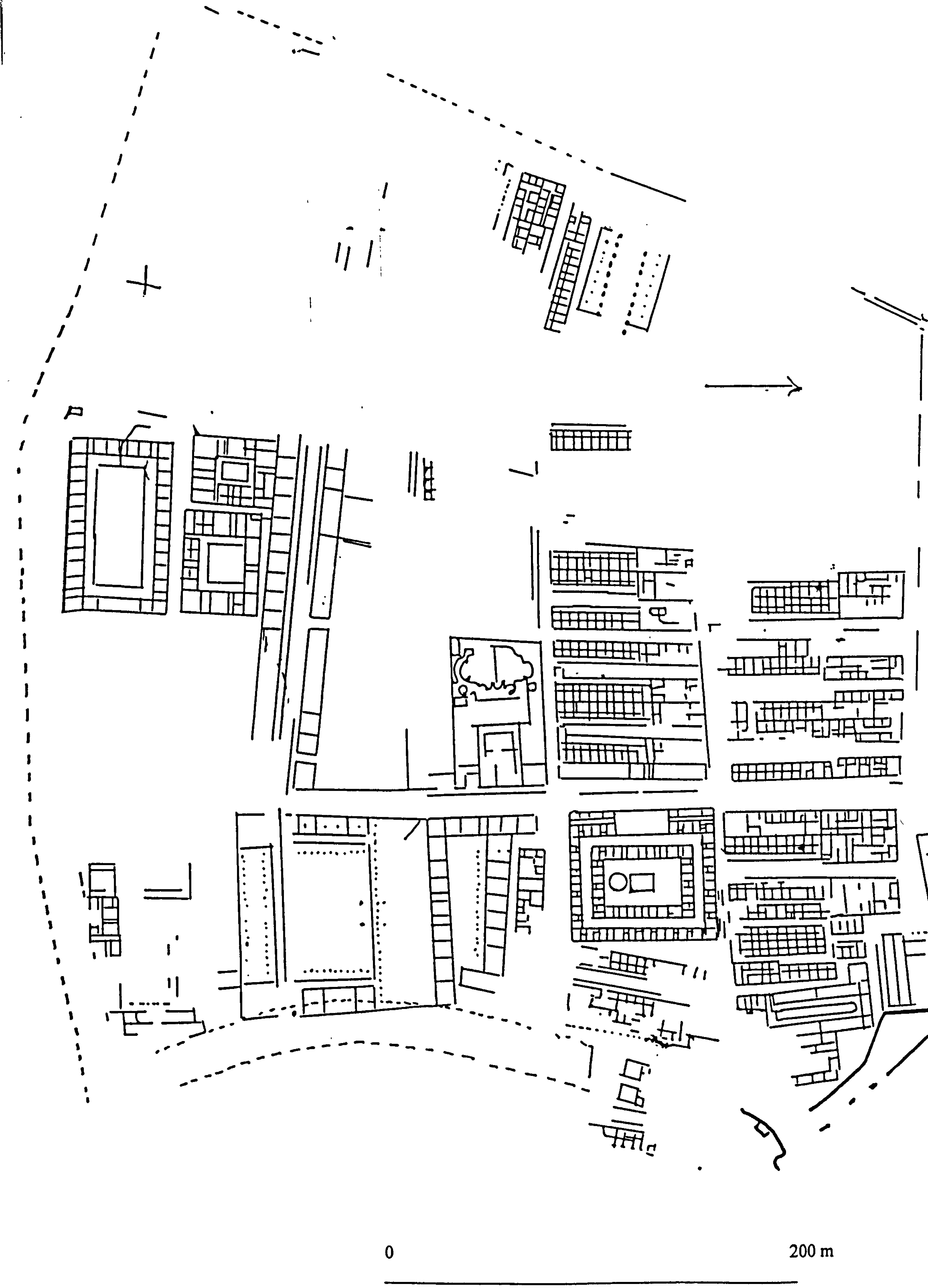


Fig. 105. Plan of Vindonissa marking the 'hospital'. After Johnson 1983: 236, Fig. 178.

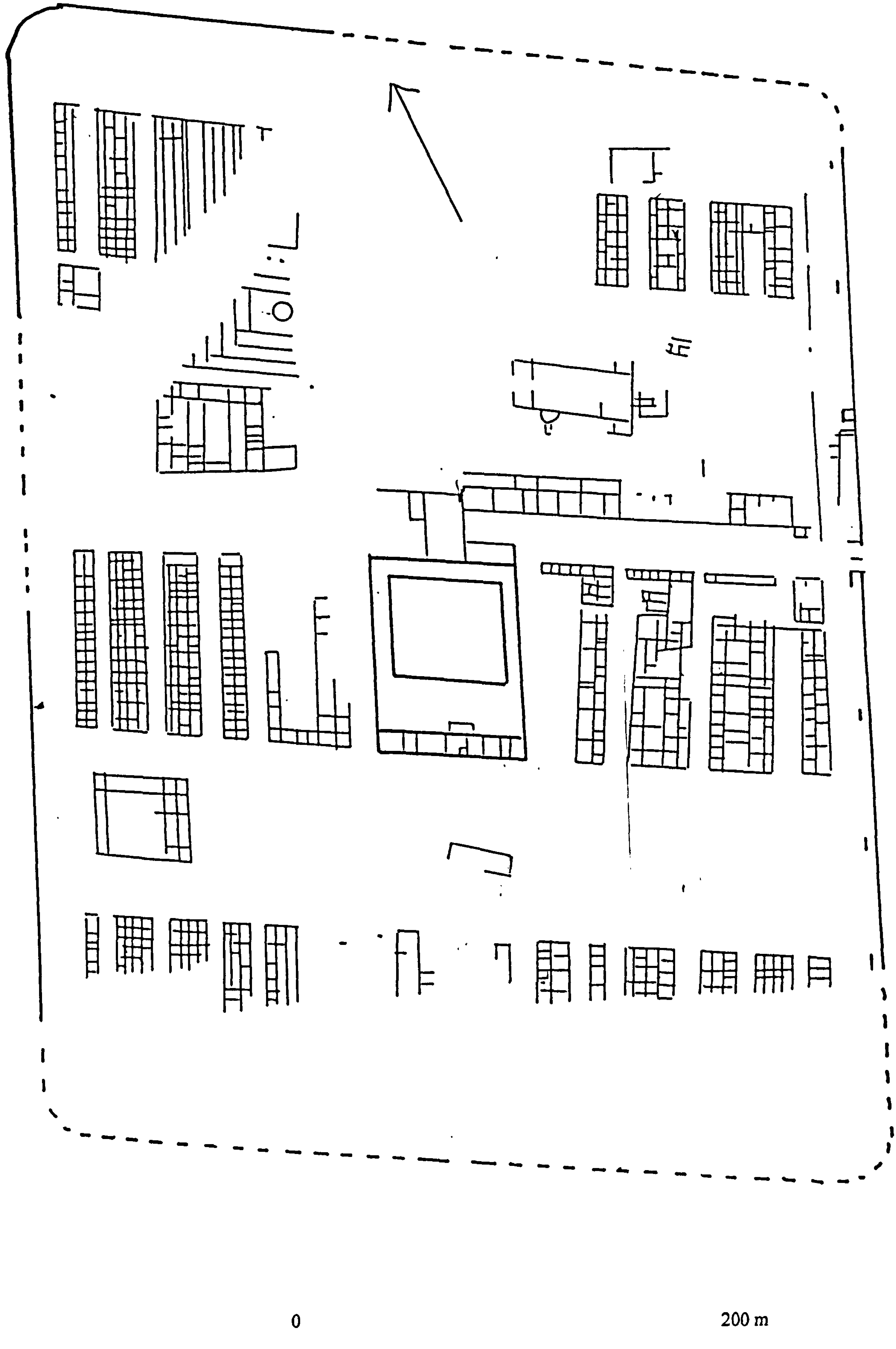


Fig. 106. Plan of Lauriacum marking the 'hospital'. After Boon 1967.

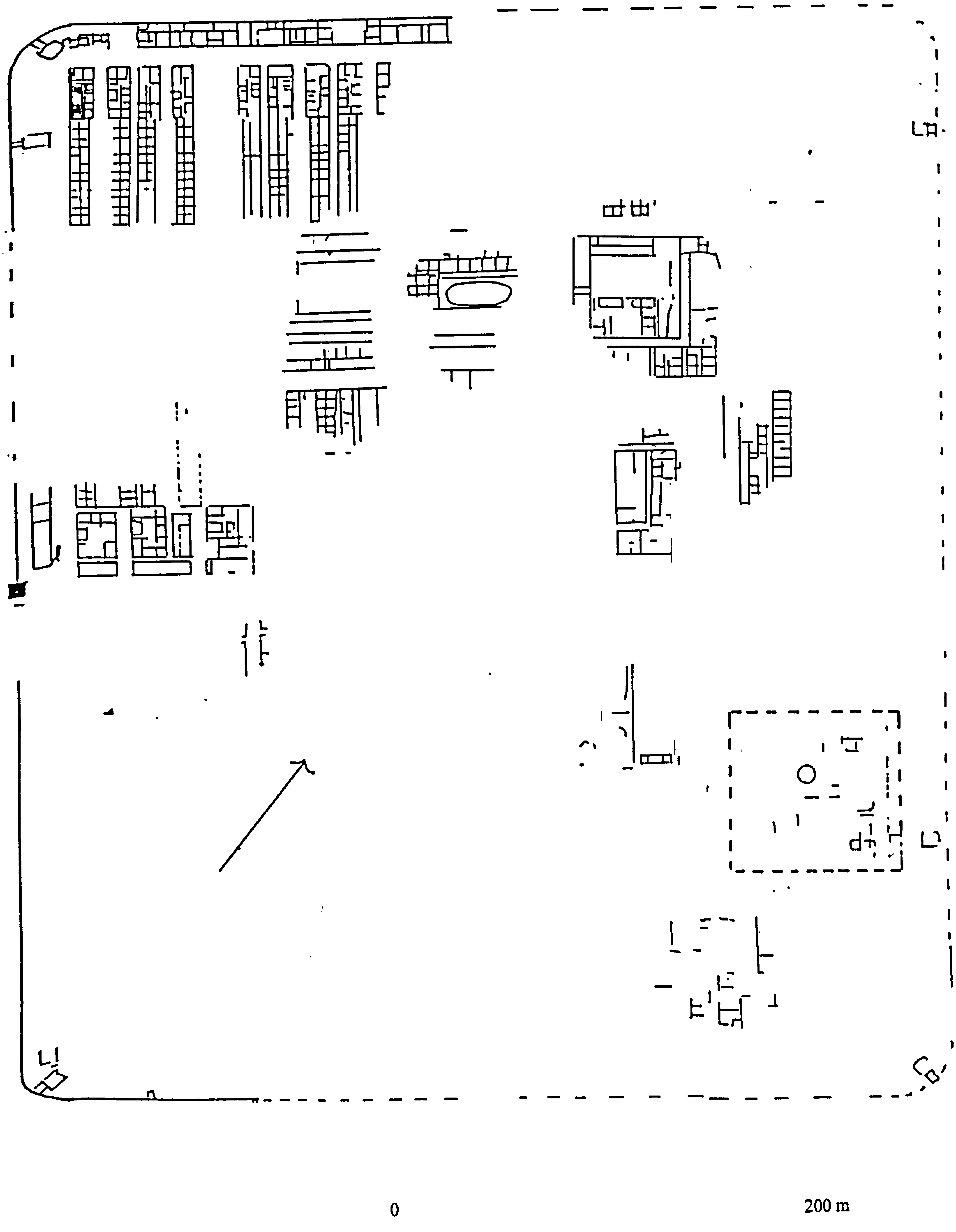


Fig. 107. Plan of Caerleon marking the ‘hospital’. After Johnson 1983: 267, Fig. 197.

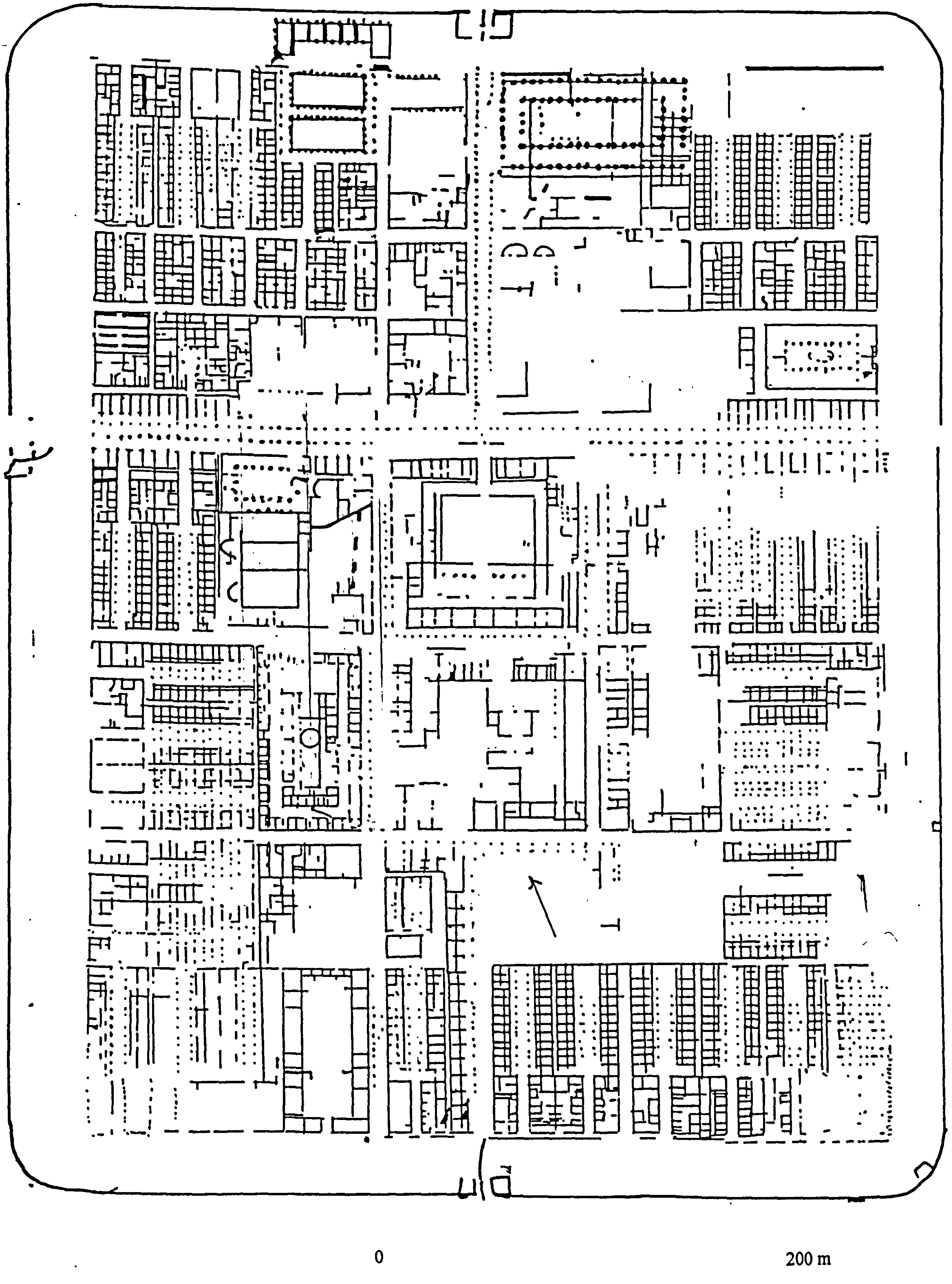


Fig. 108. Plan of Neuss marking the 'hospital'. After Johnson 1983: 33, Fig. 17b.

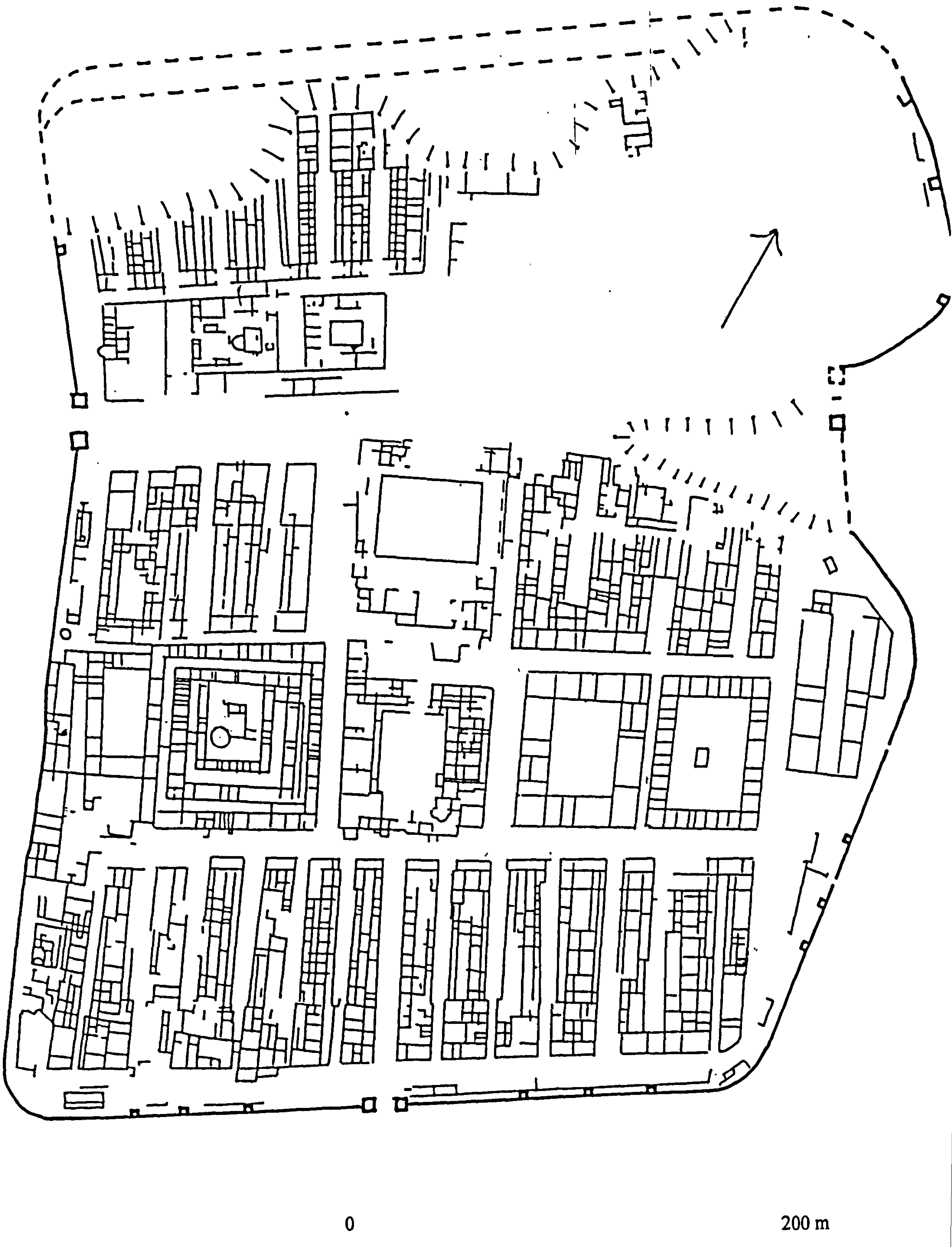


Fig. 109. Plan of Carnuntum marking the 'hospital'. After Boon 1967.

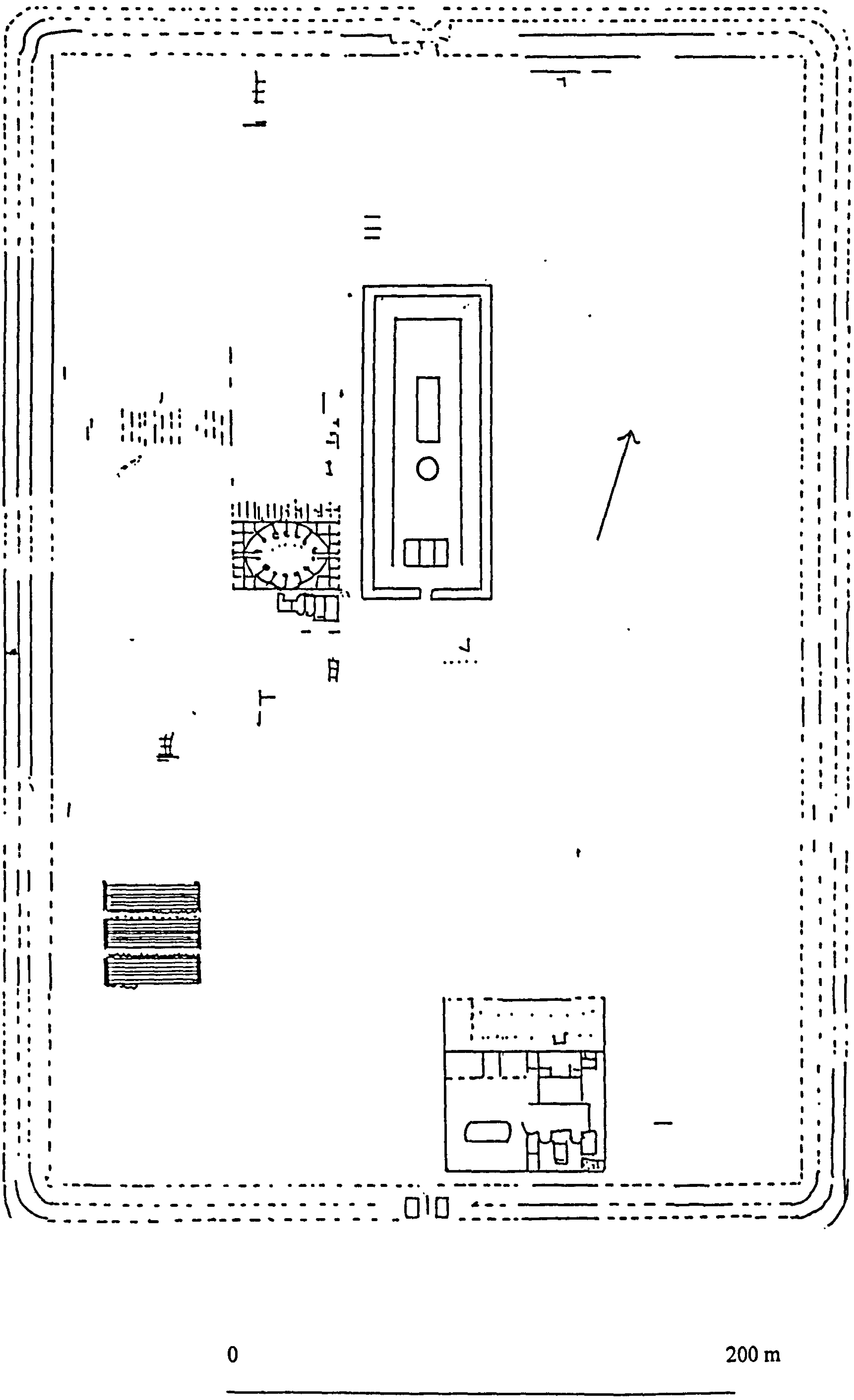


Fig. 110. Plan of Chester marking the 'hospital'. After Mason 2000: 410.

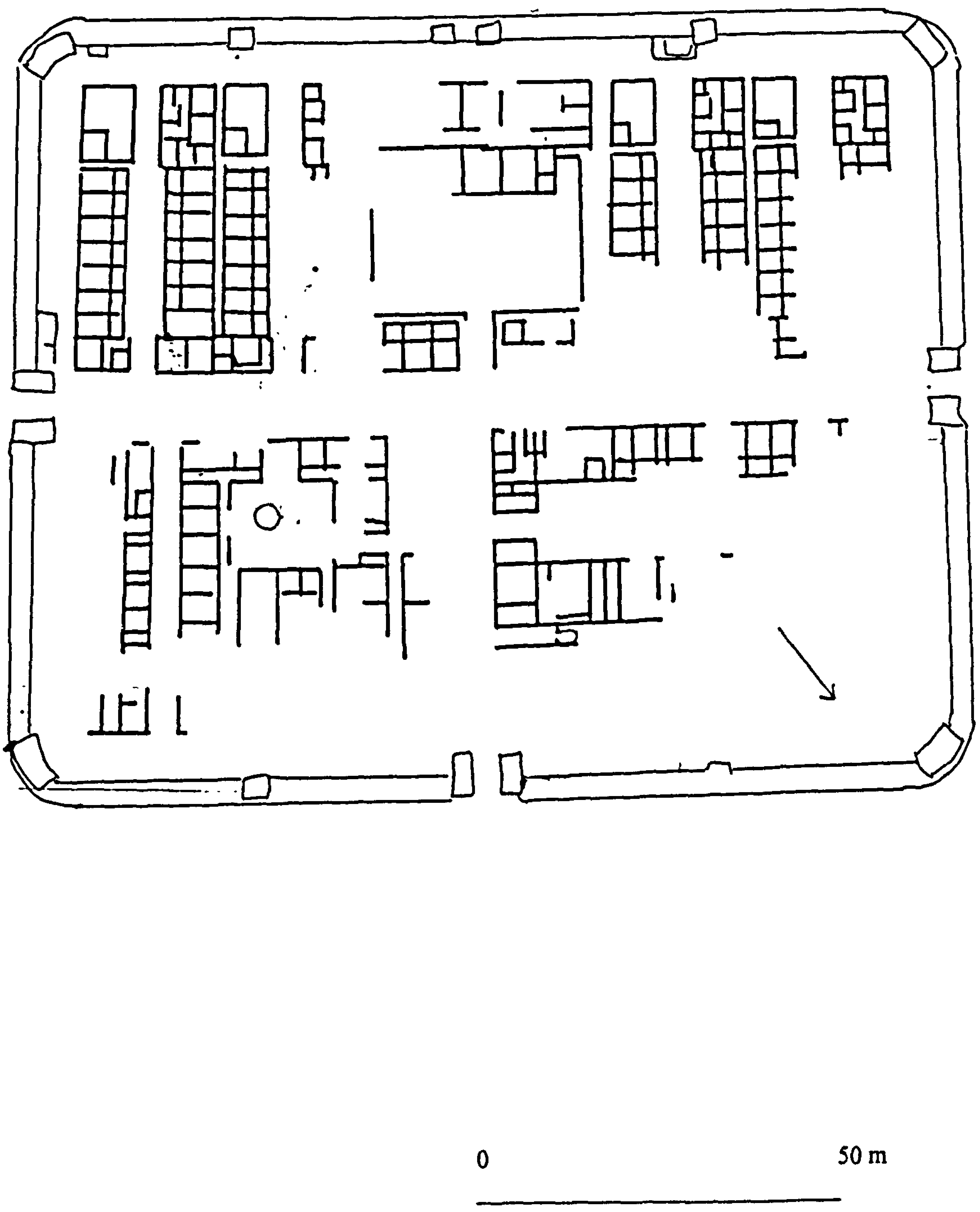


Fig. 111. Plan of Valkenburg marking the 'hospital'. After Johnson 1983: 236, Fig. 179.

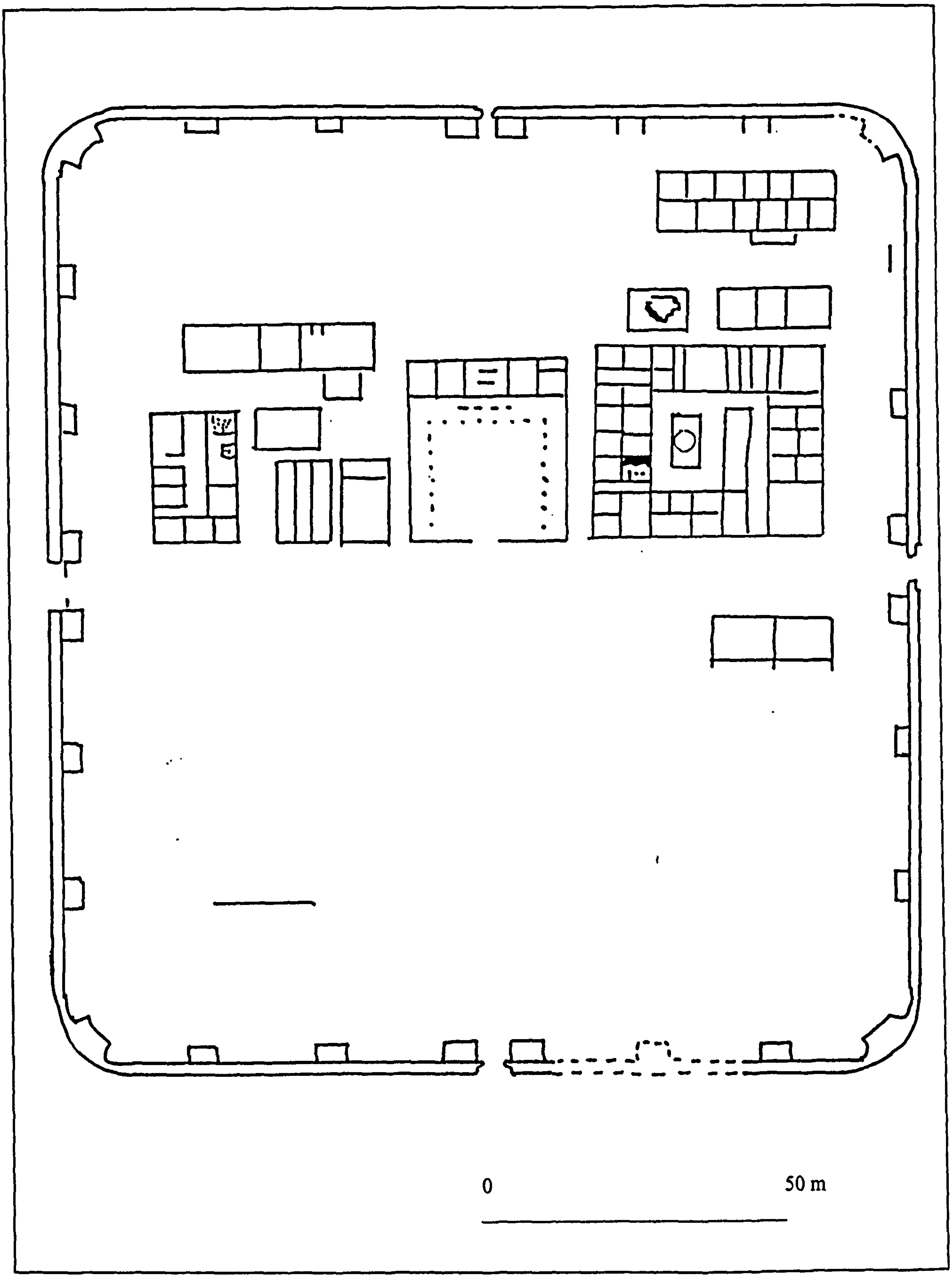


Fig. 112. Plan of Wiesbaden marking the 'hospital'. After Johnson 1983: 264, Fig. 195.

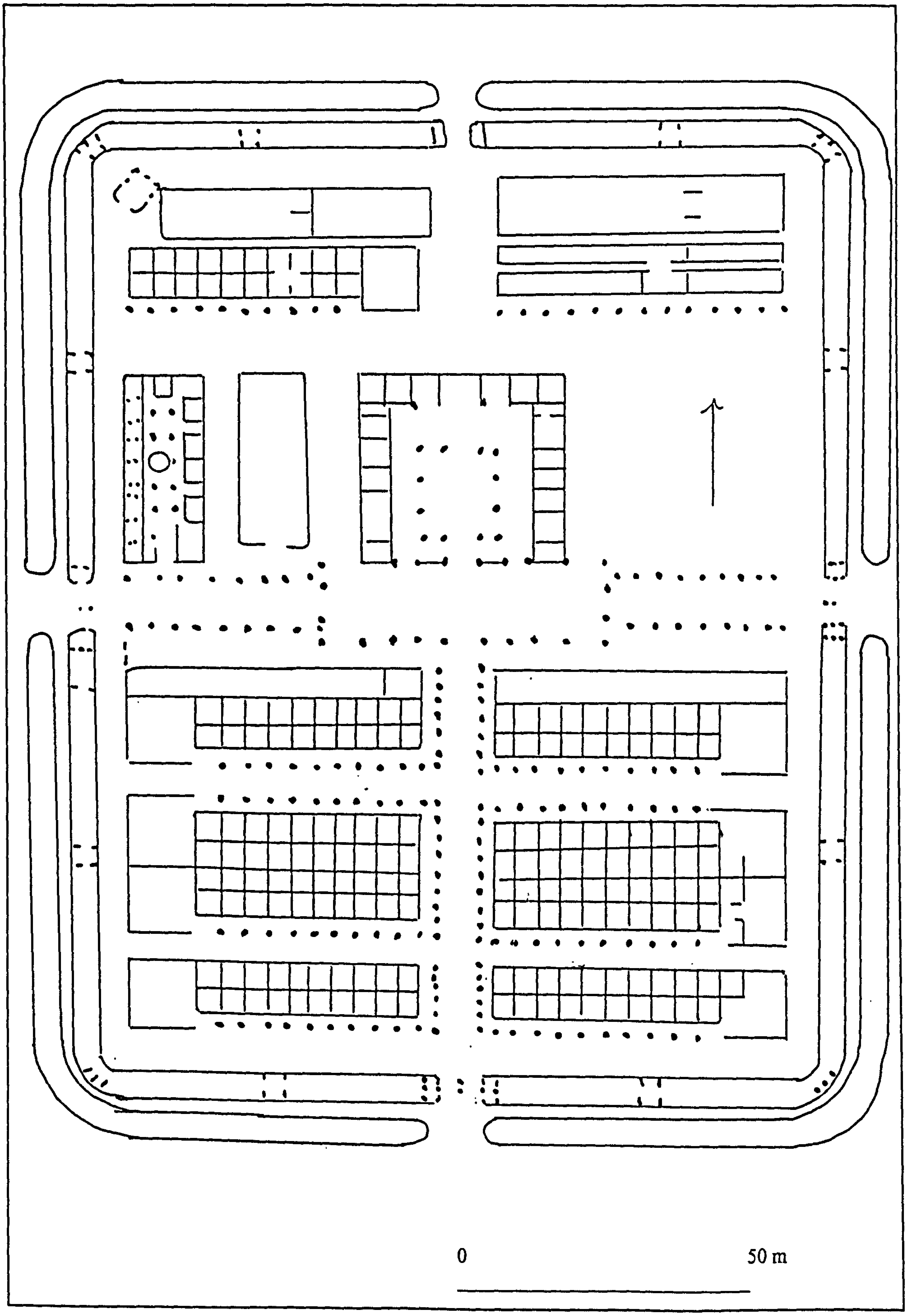


Fig. 113. Plan of Künzing marking the 'hospital'. After Johnson 1983: 264, Fig 194.

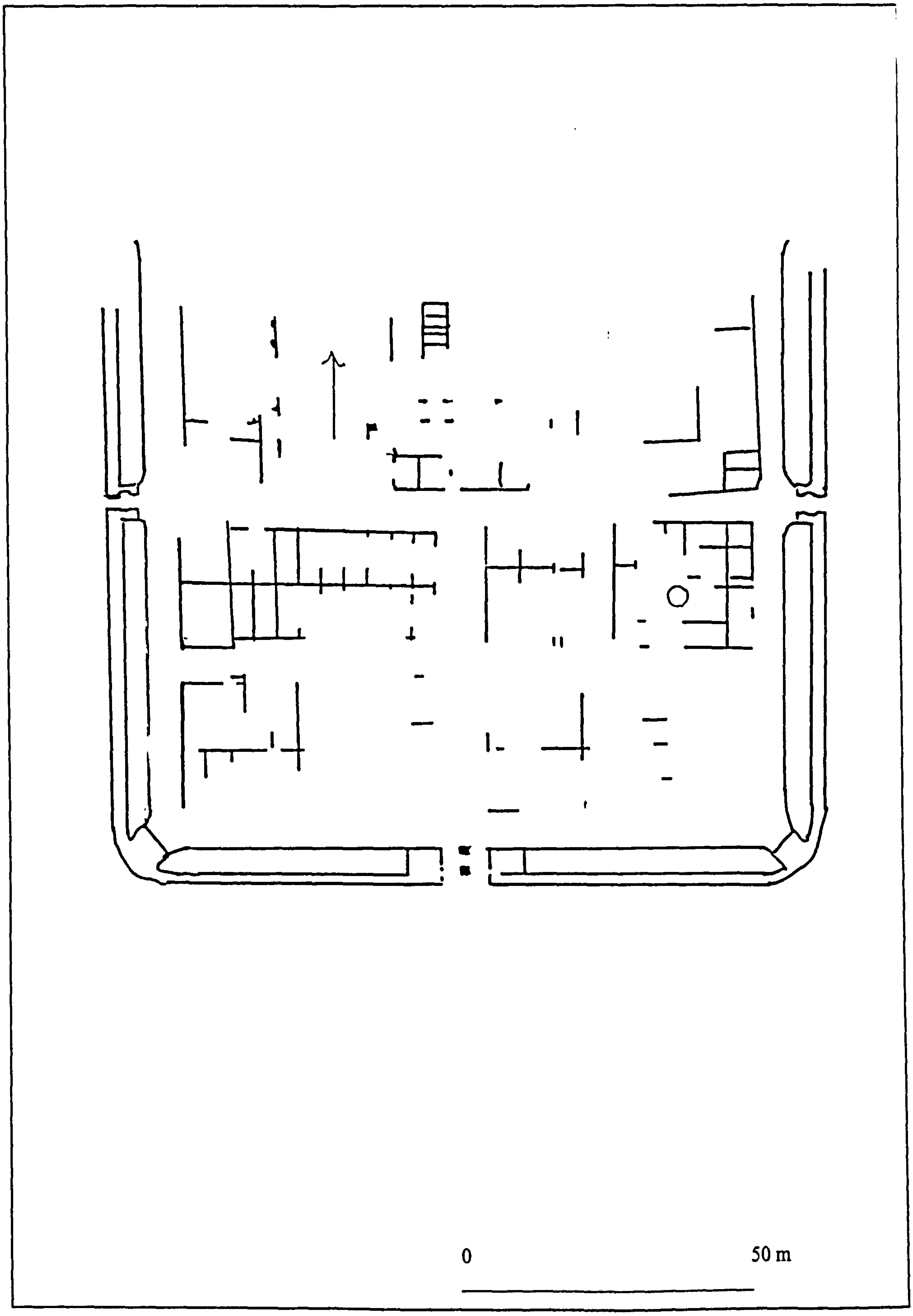


Fig. 114. Plan of Benwell marking the 'hospital'. After Johnson 1983: 272, Fig. 200.

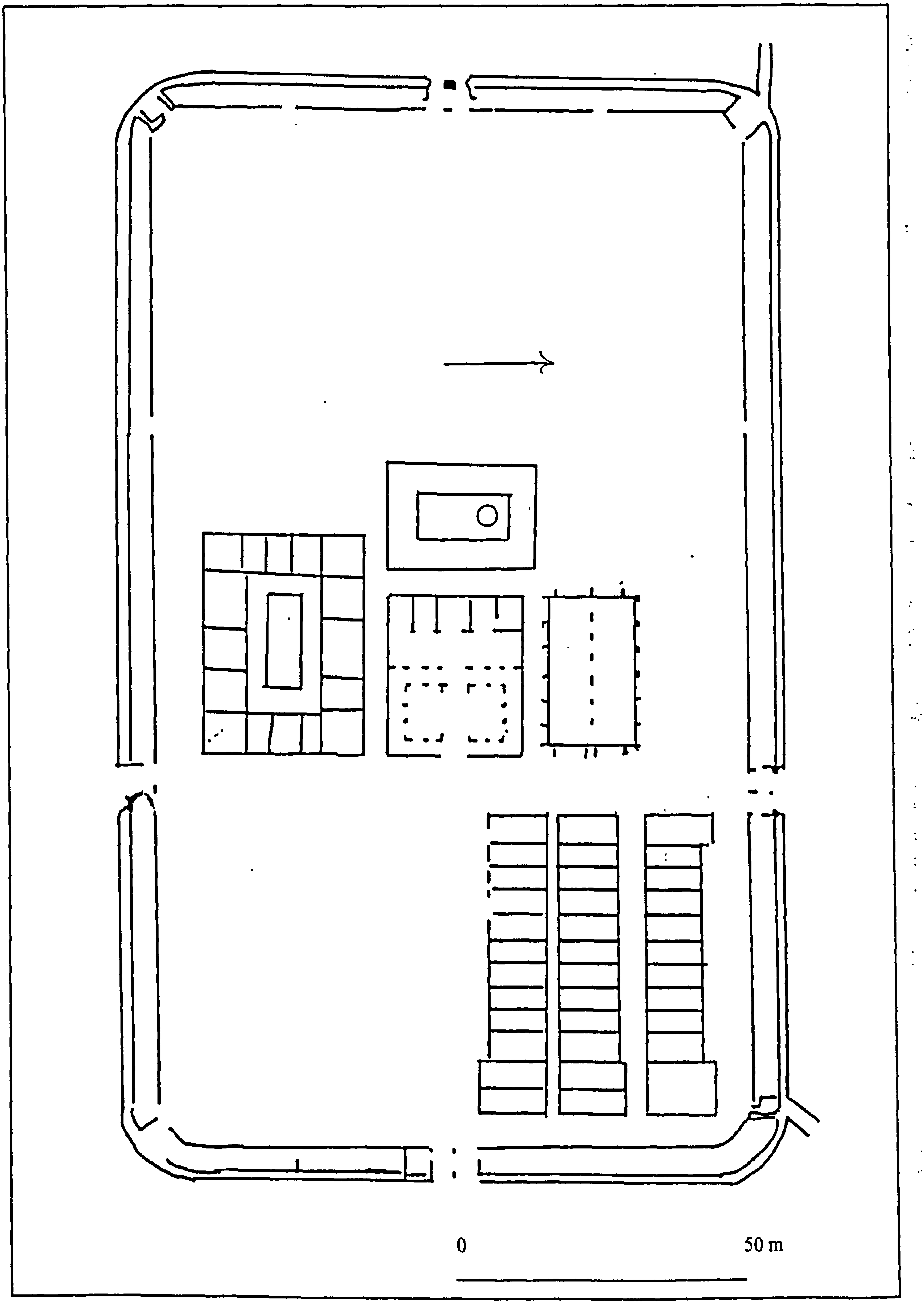


Fig. 115. Plan of Housesteads marking the 'hospital'. After Johnson 1983: 271, Fig. 190.

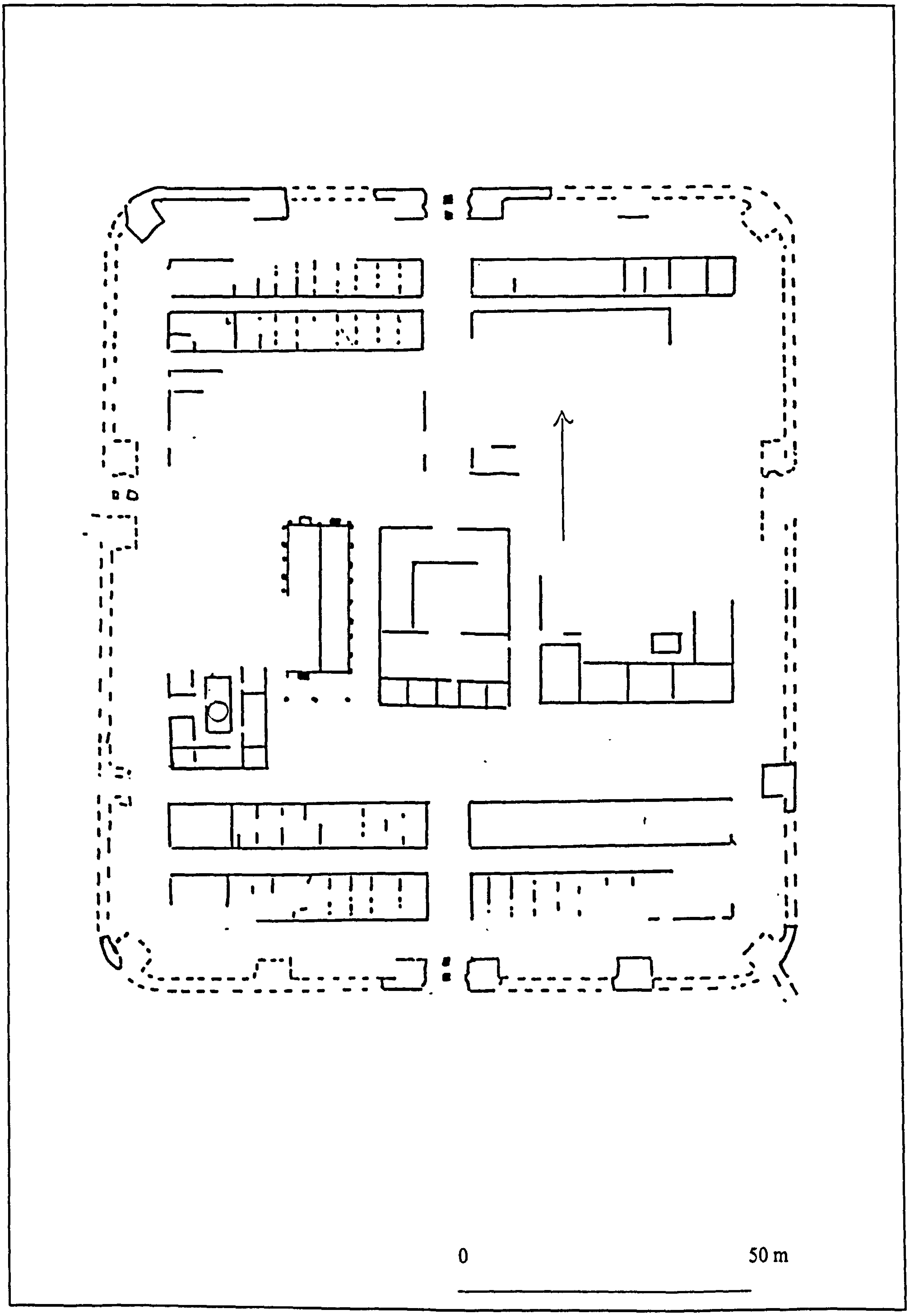


Fig. 116. Plan of Wallsend marking the 'hospital'. After Johnson 1983: 272, Fig. 201.

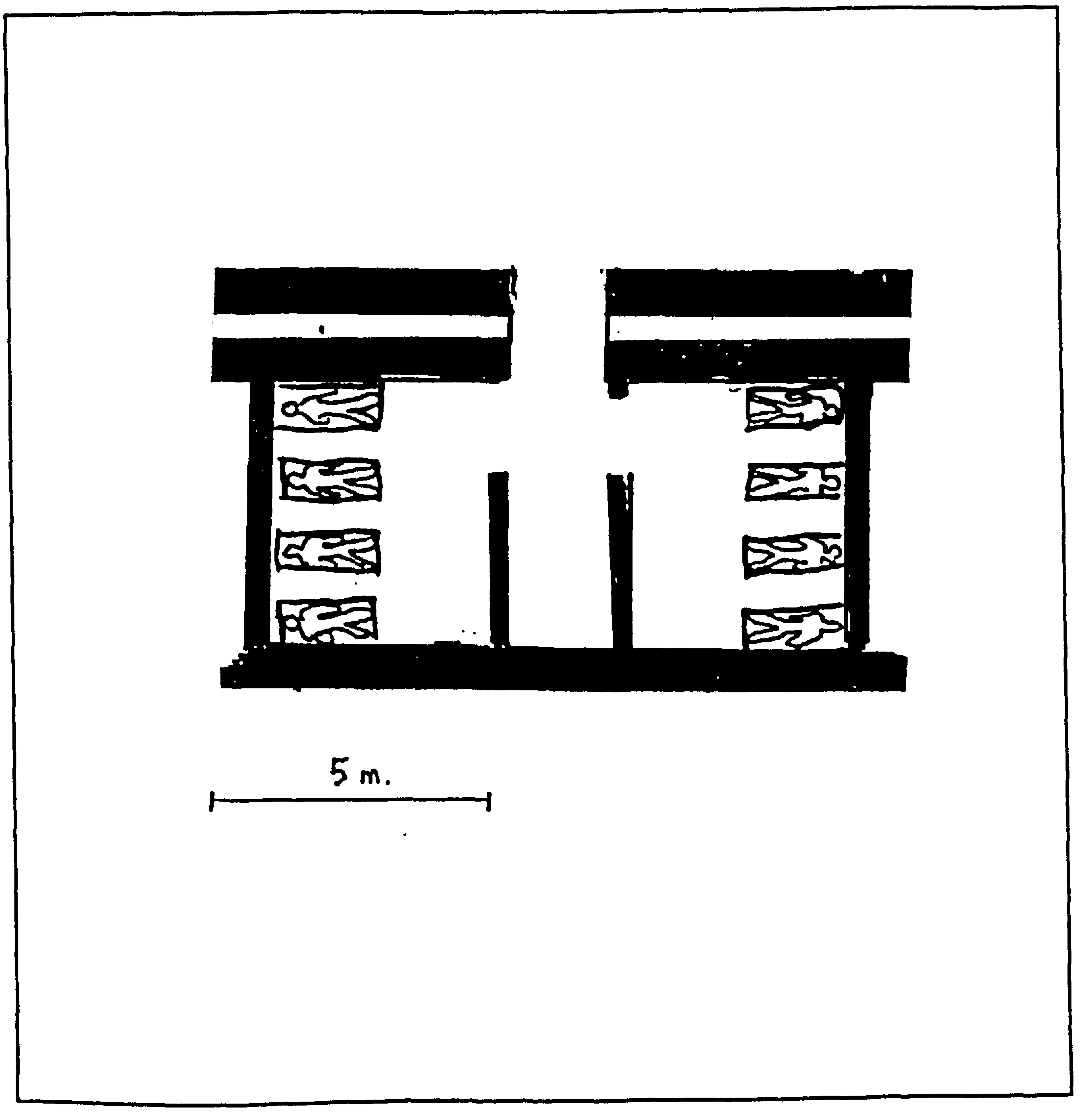
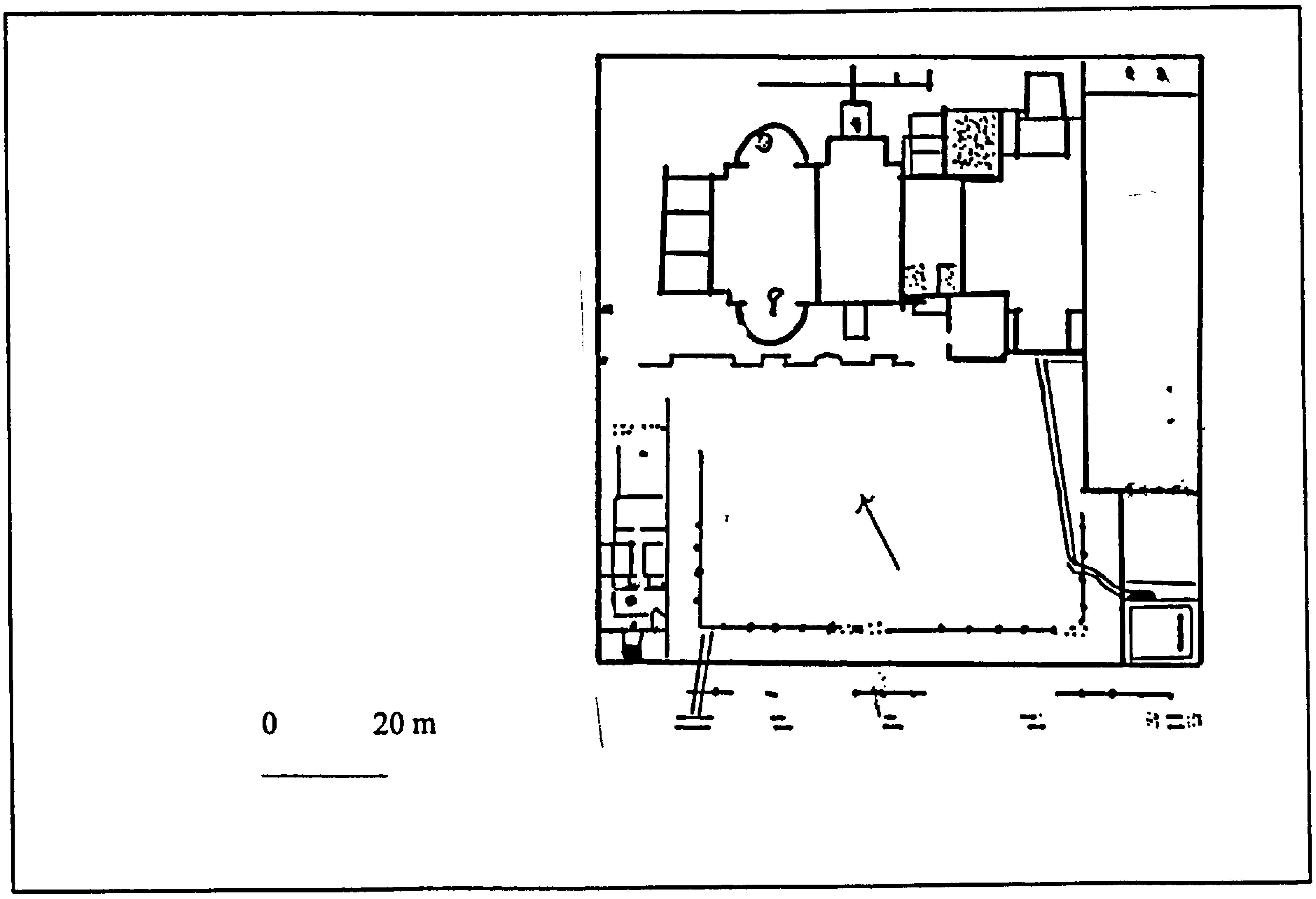
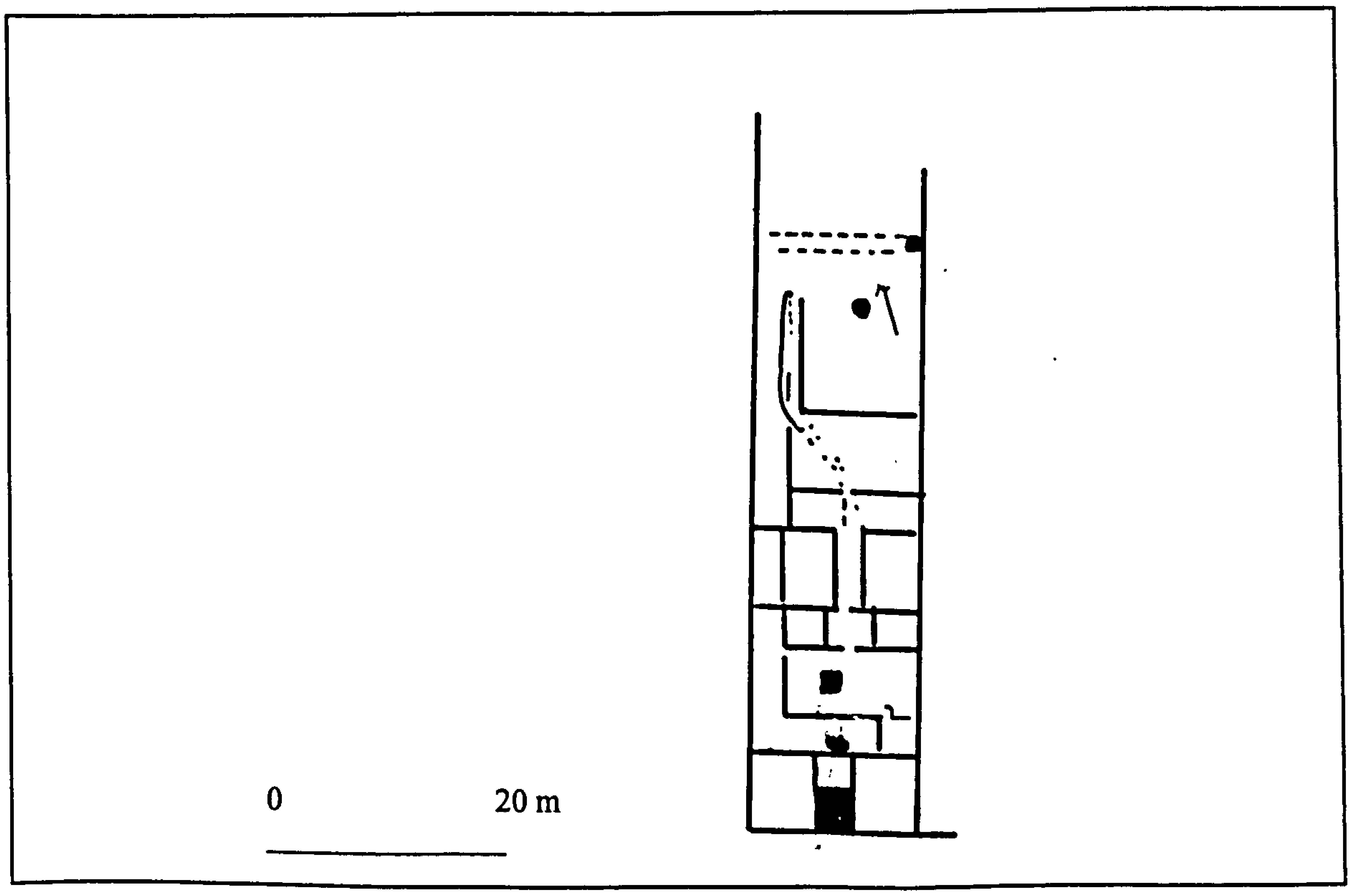


Fig. 117. Plan of conjectured sleeping arrangements in 'hospitals'. After Majno 1975: 387, Fig. 9.39.

Fig. 118 a. Plan of bath at Xanten. After Künzl 1996 1989/90.





Fig, 118 b. Close-up of the 'doctor's rooms' in the bath at Xanten. After Künzl 1989/90