

News, Notes and Queries

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OSTEO-ARCHAEOLOGY AS A MEDICO-HISTORICAL AUXILIARY SCIENCE*

INTRODUCTION

PALAEOPATHOLOGY HAS for many years been one of the fundamental disciplines of the history of medicine. The word 'palaeopathology' means literally: the science of very ancient diseases. Due to the fact that we have no contemporary literary reports about diseases in prehistoric men and animals, we only can find information about this important subject by studying skeletons. Prehistoric skeletons can be difficult to date, and often their state of preservation is so bad that the diagnoses of the diseases are dubious, and sometimes it is pure guesswork. This is—in short—the contents of the research with the limited possibilities and uncertain scientific results which are characterized as palaeopathology.

In 1930 the French army-surgeon, Dr. Léon Pales issued in Paris his big composite work: *Paléopathologie et Pathologie comparative*, the subject of which is fossil skeletons of men and animals.

In 1966 the medico-historian and pathologist Dr. Saul Jarcho published the book: *Human Palaeopathology*.² Dr. Jarcho states in the introduction the importance of the word palaeopathology, and he points out that, unlike the earlier definition of the conception 'human palaeopathology' as a 'science of diseases of pre-historic mankind', American scientists now by this name mainly refer to diseases of American Pre-columbian men, i.e. men on the American Continent living before 1492.

In this way the upper limit for palaeopathological subjects for research has been moved various thousand years further in time, to the year about A.D. 1500.

Many research workers of today use—without knowing the etymology of the word—the expression 'palaeopathologic examinations' for nearly everything concerning the study of bones found in earth, no matter whether they originate from the stone age or from a more recent period.

During the last few years a new word, osteo-archaeology, has become familiar in the history of medicine. Still, the word is often used in conjunction with the word palaeopathology. Since it was I who formed the new word, and as I feel a certain responsibility that it may be understood and used in the right way, I should like to give a short account of the problems involved.

Archaeology is one of the most fascinating sciences of our time, which, generally speaking, covers all that is connected with the excavation of historic finds. As a university subject it exists as prehistoric (Northern and European) archaeology, Egyptian, Oriental, as the subject of primitive Christianity, and as medieval archaeology. We

*This paper was read to the XXIII International Congress of the History of Medicine, London, 2-9 September 1972.

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use terms such as archaeology of buildings and 'archaeology of the Bible'. The framework of time for the archaeological field, originally merely covering 'Antiquity', includes now also the middle ages, and at the same time the geographical field, for the subject is now extended over the whole globe, and has been classified into chronologically limited sub-groups.

The most important task of archaeology is to spread knowledge about man, the person behind the remains, i.e. the buildings, the tools, the provisions, the jewels, the tombs, etc. This task has been worked out admirably by the archaeologists. Still, until now they seem to have almost overlooked the fact that the most important personal evidence is the skeleton, and that scientific study of the skeleton demands the presence of a *whole* skeleton, and exact information regarding the conditions of its discovery. Only by studying a perfectly excavated skeleton can the scientist obtain real knowledge about the individual in his diseases, death, and disasters, and about the whole group of people in their common endeavours for survival.

With reference to the apparently failing interest of the archaeologists in the excavation of skeletons, one man—with a certain right—asks if it is relevant that archaeologists take endless pains during the excavation of our ancestors' material produce and remains, whereas they simultaneously treat the skeletons of these ancestors as rather 'irrelevant' foreign bodies? During nearly a generation I had ample opportunity of seeing the results of the archaeologists' failing competence with regard to the excavation of skeletons, when, during my study of the history of bone diseases, I visited the big anthropological collections in Europe and the United States. I shall name a few examples. During my study of diseases of the teeth I was often shown an enormous number of skulls in which more than fifty per cent of teeth and bits of teeth were lost due to the failing effectiveness of the archaeologists when leading the excavation work. This was particularly evident as the respective 'grave-goods' such as jewels, weapons, coins, ceramics etc., were taken up according to a perfect excavation technique.

Since no one knows with certainty, whether a tooth which was lost during the excavation work was defective or not, it is impossible to utilize a skull with post-mortem loss of teeth for caries research. Nevertheless, one finds that caries research workers in their statistics have indifferently considered teeth lost post-mortem as being free from caries, since they have made no allowance for teeth lost post-mortem, and only considered the existing teeth affected by caries. Thus the statistics are loaded with an important degree of uncertainty.

By the excavation of thousands of skulls I have often seen that just the defective teeth are loose, and they have fallen out into the grave, where they can usually be found on the cervical column. In order to correct this and procure skeletons for scientific use, I have for a number of years developed a special excavation technique, which safeguards the find and ensures the taking up not only of all the existing teeth and bits of teeth in untouched tombs, but also each of the approximately 222 single bones, and particularly the very fragile, pathologically changed small bones, which can easily crumble at a rough touch. This method of excavating, the main idea of which is to treat any part of a tiny and fragile bone just as carefully as the archaeologists treat jewels, gold and pearls, I have called osteo-archaeology.

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Osteo-archaeologic material is therefore the skeletal material which is excavated according to the osteo-archaeologic method. An osteo-archaeologic examination of a burial place is therefore something quite different from the taking-up of skeletons by archaeologists.

In conclusion I shall name some results showing that the method of osteo-archaeology made it possible to produce quite unique finds of medico-historical importance.

In 1949 I published in collaboration with Dr. Ove Brinch, a dentist, a work: 'On comparative investigations into the occurrence of dental caries in archaeological skulls with a preliminary report on investigations of caries frequency in medieval times in Denmark (Aebelholt Abbey)'.¹ In that publication we discussed among other topics the various results concerning frequency of caries per individual and tooth, which one attains by means of perfect skull material, in other words skulls which are excavated according to the osteo-archaeological principles, thus neither teeth nor fragments of teeth are lost during the excavation—and for a comparison, in the case of skulls which are found detached and lacking a big number of teeth lost post-mortem. The two groups were suitable for comparison, as the skulls came from the same churchyard. The results were as follows:

197 perfect skulls. Caries per cent per individ: 54.8, per tooth: 5.9.
373 defective skulls. Caries per cent per individ: 42.5, per tooth: 5.4.

THE OSTEO-ARCHAEOLOGICAL METHOD

Figure 1 shows an excavated area of the leprosy churchyard in Aaderup near Naestved (Denmark) (about A.D. 1250–1550). The area is excavated according to osteo-archaeological technique.

Figure 2 (A, B, C, D, E, F, G & H) shows the theoretical basis for the osteo-archaeological method of excavating.

A 60 cm. broad search trench—in the direction north—south, i.e. perpendicularly to the normal Christian longitudinal placing of the deaths: in supine position with the head towards west, and the feet towards east—is dug through the field which has to be examined for old graves and skeletons (fig. 2A). The osteo-archaeologists have to continue at that depth until the first untouched skeletal parts are seen. Then—by horizontal slice digging—the earth has to be removed very carefully from the area, where undisturbed graves may lie. The sepulchral mound, which usually contains bits of bones, and funerary remains, contrasts to the surrounding intact soil. Very soon the osteo-archaeologist is able to localize the outlines of the undisturbed graves and remains of old foundations, e.g. of old wooden houses (fig. 2B).

The extreme points of the skeleton: the top of the head, the shoulders, the elbows, the iliac crests, the trochanters (femurs), the knees and the feet, are now localized and marked by metallic pegs. Thereafter the osteo-archaeologist has to dig a suitably deep trench around the hummock with the undisturbed skeleton (fig. 2C).

The purpose of that procedure is to get the skeleton to lay on a kind of autopsy table, thus every excavation detail can be studied and photographed simultaneously. In that trench the osteo-archaeologist can sit comfortably and carry out his difficult and important uncovering work and take up the skeleton. At the same time the

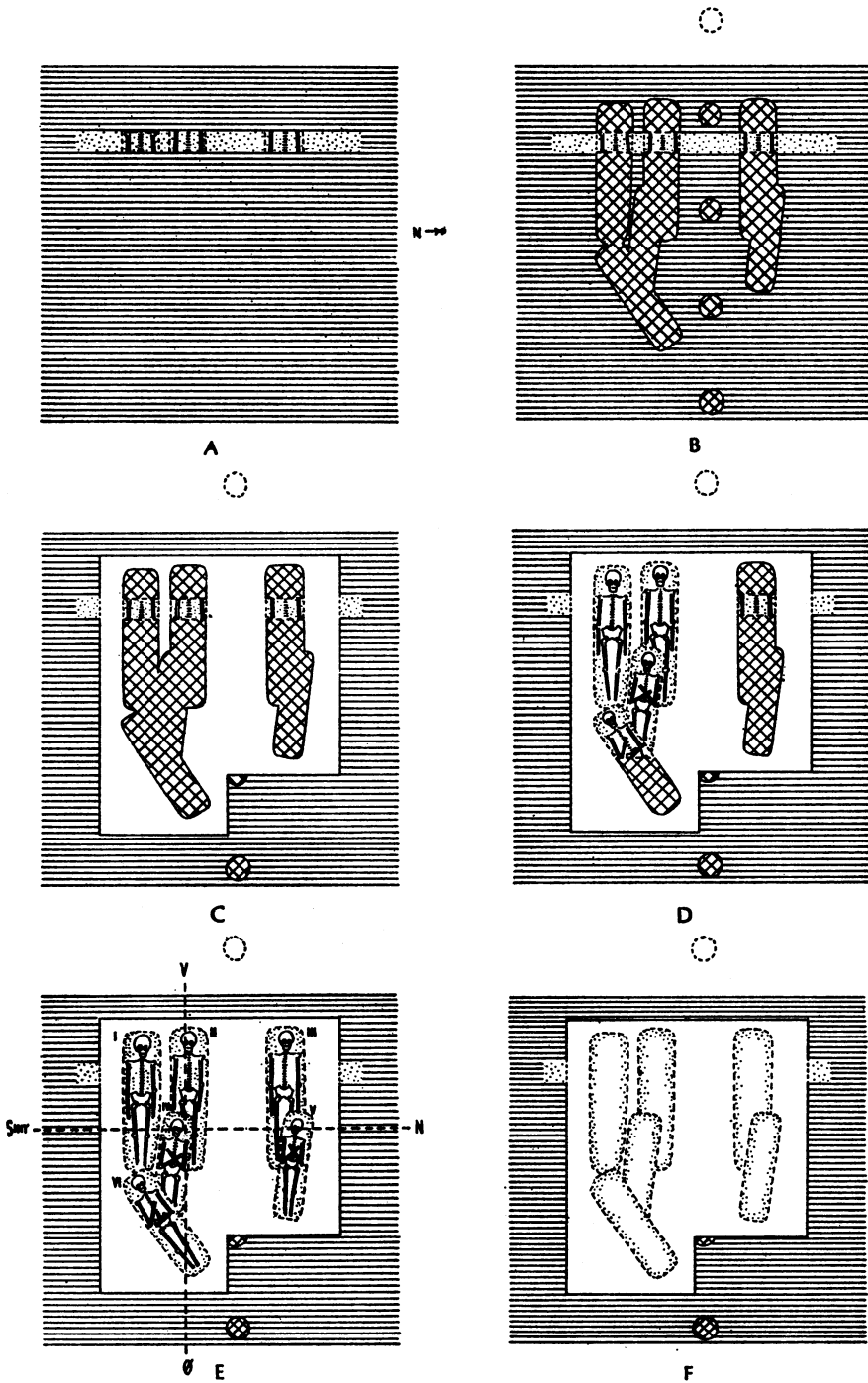


Figure 2 (A-F)

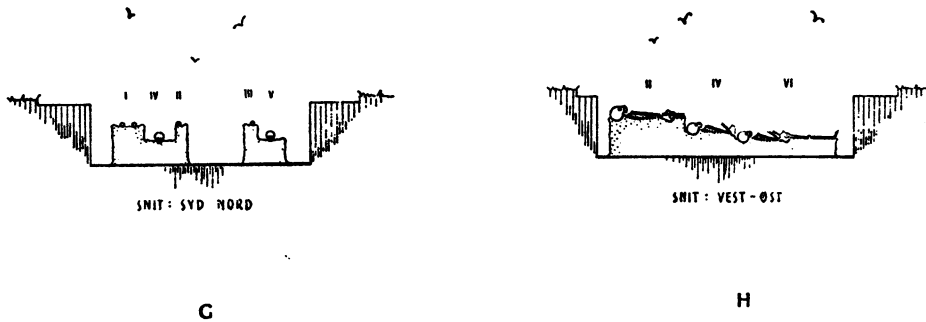


Figure 2
(A, B, C, D, E, F, G, H): The theoretical basis for the osteo-archaeological method of excavating human skeletons.

trench can be used to place the excavated earth—which is to be screened—but the trench has also to serve as a draining trench.

Small things which the osteo-archaeologist might possibly have failed to see—if they are of metal or bone—can be found by screening the excavated earth (figs. 2D and E).

Figures 2G and H shows the skeletons lying on the 'autopsy tables' with the surrounding trenches.

Figure 2F shows the field after the finished excavation with the remains of all six graves. It is not difficult to find out that graves nos. I, II and III are the oldest, nos. IV and V the second ones and no. VI the youngest. From the dateable gravefinds it should be possible to determine the actual ages of the graves.

For the trained osteo-archaeologist the duration of uncovering, registration and taking up one skeleton is about two or three hours, all depending on the season of the year, the weather and the soil, whereas the subsequent laboratory work takes months, even years.

Figure 3 (A, B, C, D, E and F) shows the usual theoretical unearthing procedure used by the archaeologists. According to the main principles of that method the untouched earth must not be damaged, i.e. the side walls of the tomb must not be demolished. That means in practice that the excavator has to carry out the unearthing, photographing and taking up the skeleton while lying on his stomach and digging in about one metre's depth. Needless to say, this method of unearthing cannot be applied when the purpose is to unearth skeletons with pathological changes.

Figure 3C, E and F shows the skeletons lying at the bottom of the untouched tombs which are now emptied of earth. During rainy weather the tombs will quickly be filled with water which has no drainage outlet, and this is very bad for bones with pathological changes.

Figure 3D shows the field after the finished excavation with six graves emptied and four hollows in the ground, which indicates an old timber construction. It is now easy to state the mutual relations between the six tombs; but the removal of the skeletal parts has been unsatisfactory from a pathological point of view.

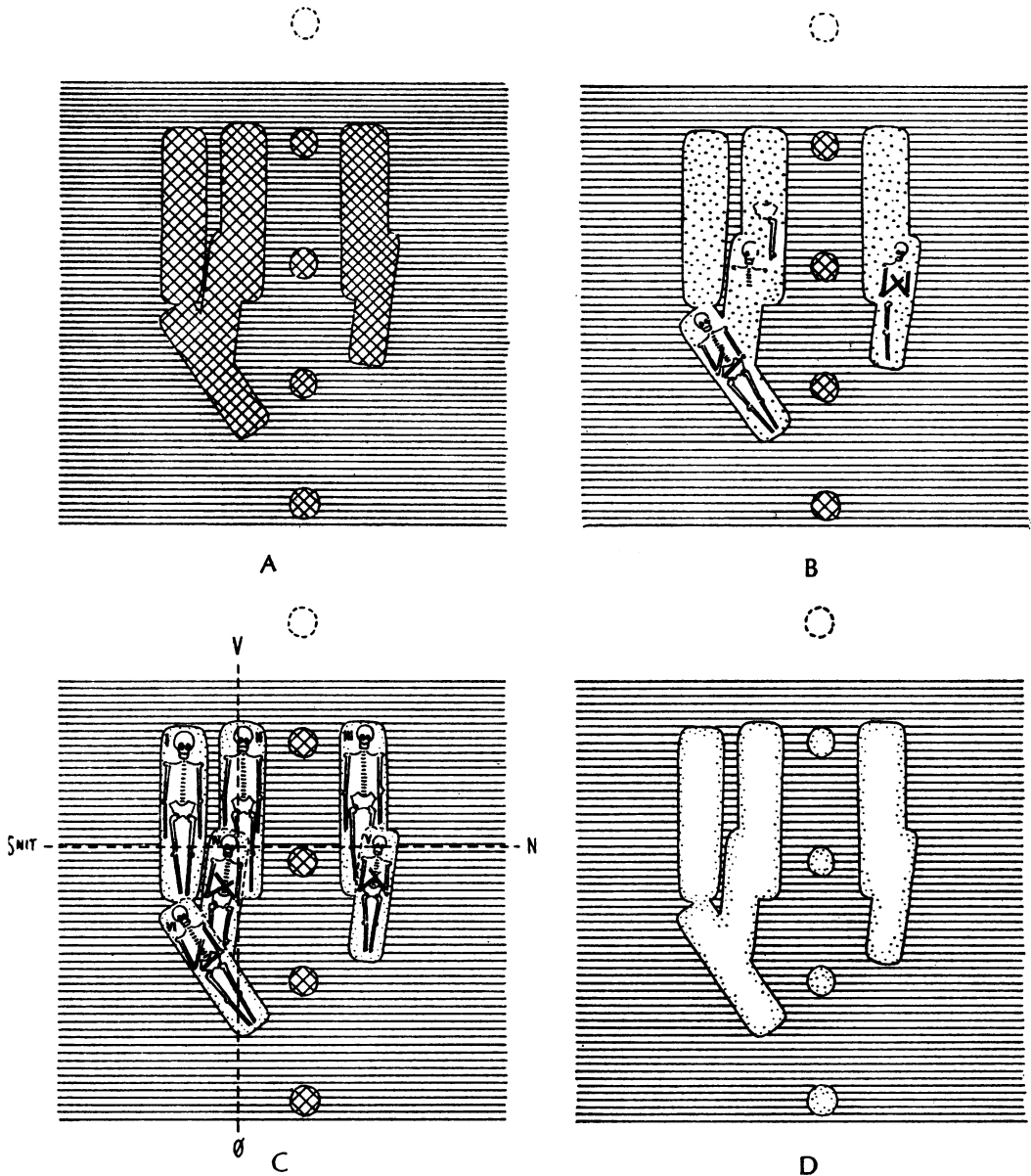


Figure 3 (A-D)

The duration of uncovering, registration and taking up of the skeleton is—in my opinion—about two or three days, and therefore very expensive. The most horrifying thing is that the whole procedure has been managed by an archaeologist without exact knowledge of anatomy and pathology and assisted by equally untutored collaborators.



Figure 4



Figure 1
The leprosy churchyard in Aaderup near Naestved (Denmark),
excavated according to osteo-archaeological technique
(V.M.-C. 1956).



Figure 5

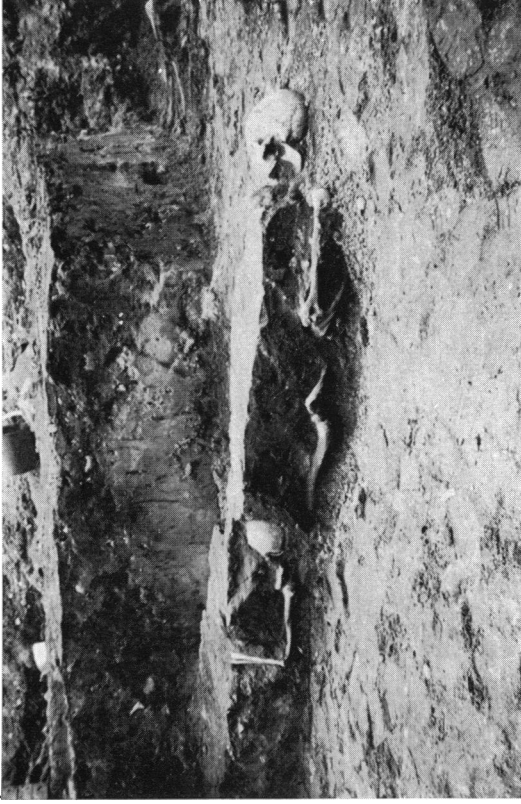


Figure 6

Figures 4, 5 and 6
Details in using the osteo-archaeological method. Aaderup leprosy churchyard, Naestved,
(V. M.-C. 1966).



Figure 7

Skull excavated at Aaderup according to osteo-archaeological method. Post-mortem lost frontal incisors are found in the earth in front of the cervical spine (V. M.-C. 1966).

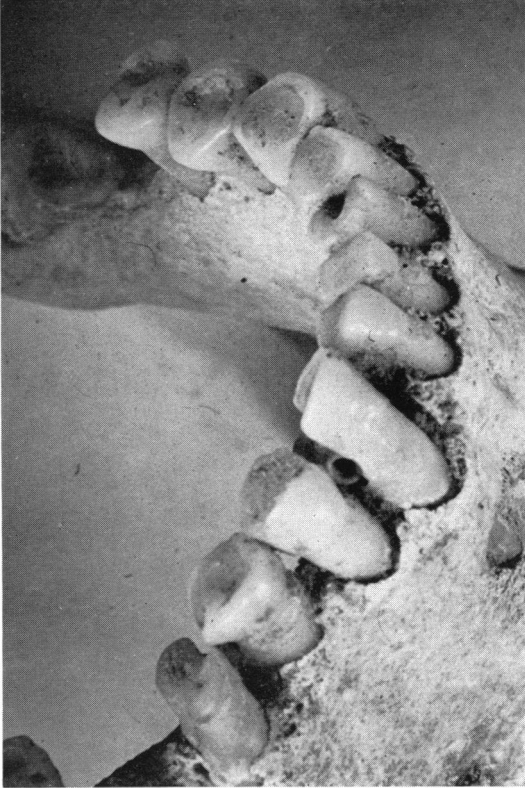


Figure 8

Figures 8 and 9
A rosary bead used as a tooth filling material. Aebelholt Abbey (V. M.-C. 1965).

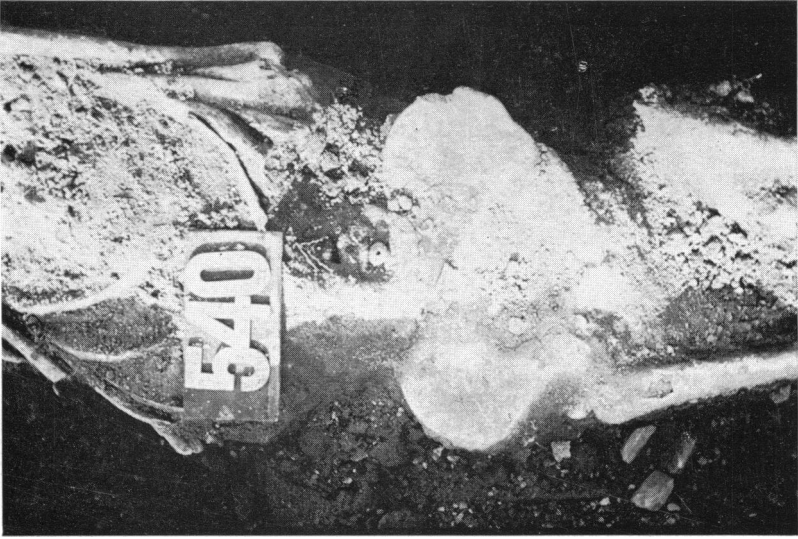


Figure 10



Figure 9

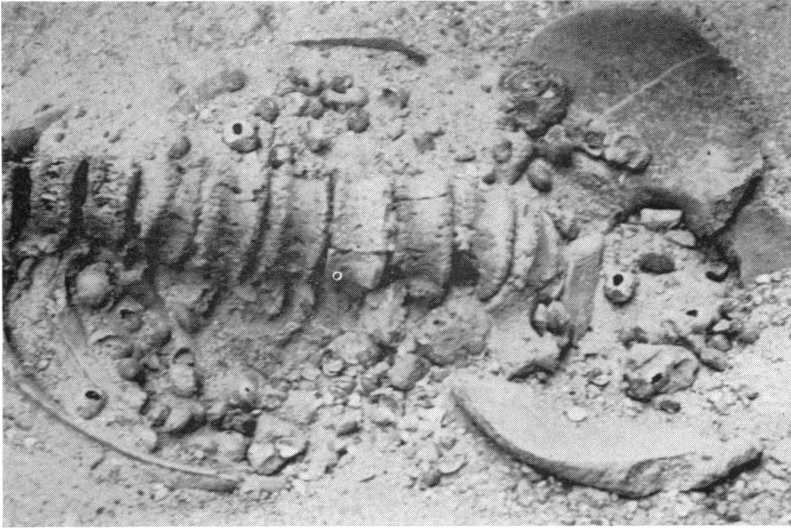


Figure 11



Figure 12

Figures 10, 11 and 12
A sixteen-year-old female leprosy patient (Aaderup, c. A.D. 1450) with echinococcosis and amulets.
(V. M.-C. 1967).

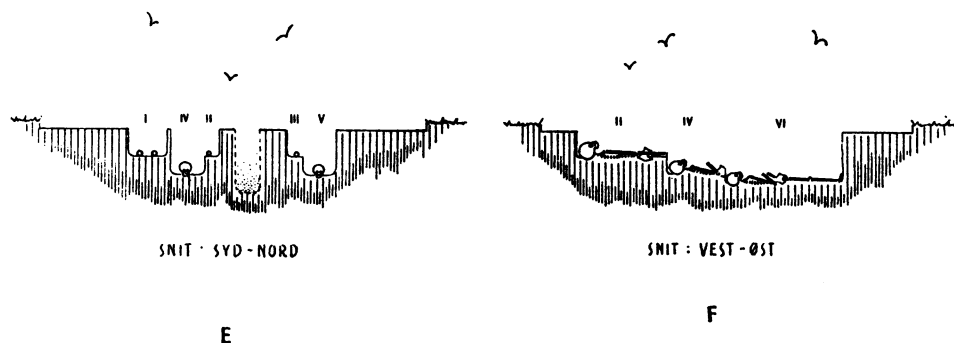


Figure 3
(A, B, C, D, E & F): The usual theoretical unearthing procedure used by archaeologists when excavating human skeletons.

SOME RESULTS OBTAINED BY USING THE OSTEO-ARCHAEOLOGICAL METHOD

Figures 4, 5 and 6 show some details using the osteo-archaeological technique.

Figure 7 shows a skull excavated according to osteo-archaeological principles, where the post-mortem lost frontal incisors are found in the earth in front of the cervical spine (atlas).

By this osteo-archaeological technique it is possible to make unique findings. Here are a few examples:

Figures 8 and 9 show a rosary bead used as a tooth filling material (from Danish middle ages, Æbelholt abbey, Seeland) in a mandibular canine tooth (3-), complicated with a big caries cavity and an apical abscess.³

Figures 10, 11 and 12 show the skeleton of a sixteen-year-old female leprosy patient, buried about 500 years ago. In the abdominal cavity I found about 100 calcified cystic structures and fragments and in addition 37 tiny sesamoid, pisiform, carpal and phalangeal bones, which are not parts of the skeleton but belonged to a small sheep and a small pig.

The fairly large size and uniform ovoid shape of the cysts (fig. 12), trabeculated internal structure and general calcification, suggested they were cysts of a parasite which had calcified during lifetime—presumably *Echinococcus granulosus*.

The 37 tiny bones of sheep and pig could be magical amulets.

This young girl who lived about A.D. 1450 is the first patient with diagnosed leprosy, echinococcosis and amulets who has been found and excavated by using the osteo-archaeological technique.⁴

My hope is that archaeologists will read my papers about the osteo-archaeological technique and results and in the future pay more attention to the excavation of human skeletons.

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V. MØLLER-CHRISTENSEN

THE MUNICIPALITY OF PARIS CONFRONTS THE PLAGUE OF 1668

In the 1660s the bubonic plague, quiescent for a decade, once more returned in force to western Europe. Along with the great epidemic of 1665 in London, there was pestilence in the United Provinces and in Normandy and Picardy. In 1668 Paris heard reports of plague at Soissons and Amiens; by July the port of Rouen, downstream from the capital along the Seine, was stricken. As the epidemic threatened commercial routes to Paris, the authorities there put into motion traditional measures designed to restrict communication with afflicted communities. The safety of Paris—a capital numbering nearly one-half million and potentially a point of convergence for persons or merchandise carrying plague—was at stake.¹

A variety of officials enforced regulations against pestilence, among them the minister Jean-Baptiste Colbert, the Parlement of Paris, and the municipality. The outbreak of an epidemic in the spring of 1668 prompted the Parlement (fundamentally a high court of law that occasionally legislated) to restrict commerce entering or leaving Soissons and Amiens. Guided by Colbert and the Six Merchant Guilds² of Paris, the Parlement agreed to restrict trade between Paris and Rouen, too. Its decree of 27 August forbade transport of goods by land between the two cities. As for river traffic, all boats were to sail upstream to Mantes to be unloaded so that goods 'susceptible to bad air' be ventilated and remain in quarantine at least forty days.³ Merchandise considered safe was to proceed, apparently with less delay, to Paris in other boats manned by persons other than those that had set out from Rouen. Soon the Parlement defined relatively harmless products to include cattle, tin, lead, and cheese.⁴

The 27 August decree forbade passengers en route to Paris to proceed to the city till after quarantine in places chosen by *conseils de santé*, health councils, along the Rouen-Paris route. To supervise enforcement of its order and choose a spot for airing merchandise bound for Paris, the Parlement relied on the municipality of Paris. The court sent as its delegate to Mantes, roughly fifty miles downstream, the Parisian *échevin* Jacques Belin and entrusted to the magistrate substantial powers.

The municipality—lodged at the Hôtel de Ville and led by a *prévôt* of merchants and four *échevins*, or aldermen—did not lack qualifications for this mission. It was familiar with sanitary conditions within the city and knew the river system leading to Paris. In fact, the municipality exercised authority over navigation on the Seine and several tributaries, as well as jurisdiction over river commerce bound for Paris.

In the meantime, the municipality had already become deeply concerned with what seemed to be a local crisis. A visitor from Amiens, a stricken town, had become fatally ill in Paris. Fearing an outbreak of plague, the *prévôt* of merchants located a residence