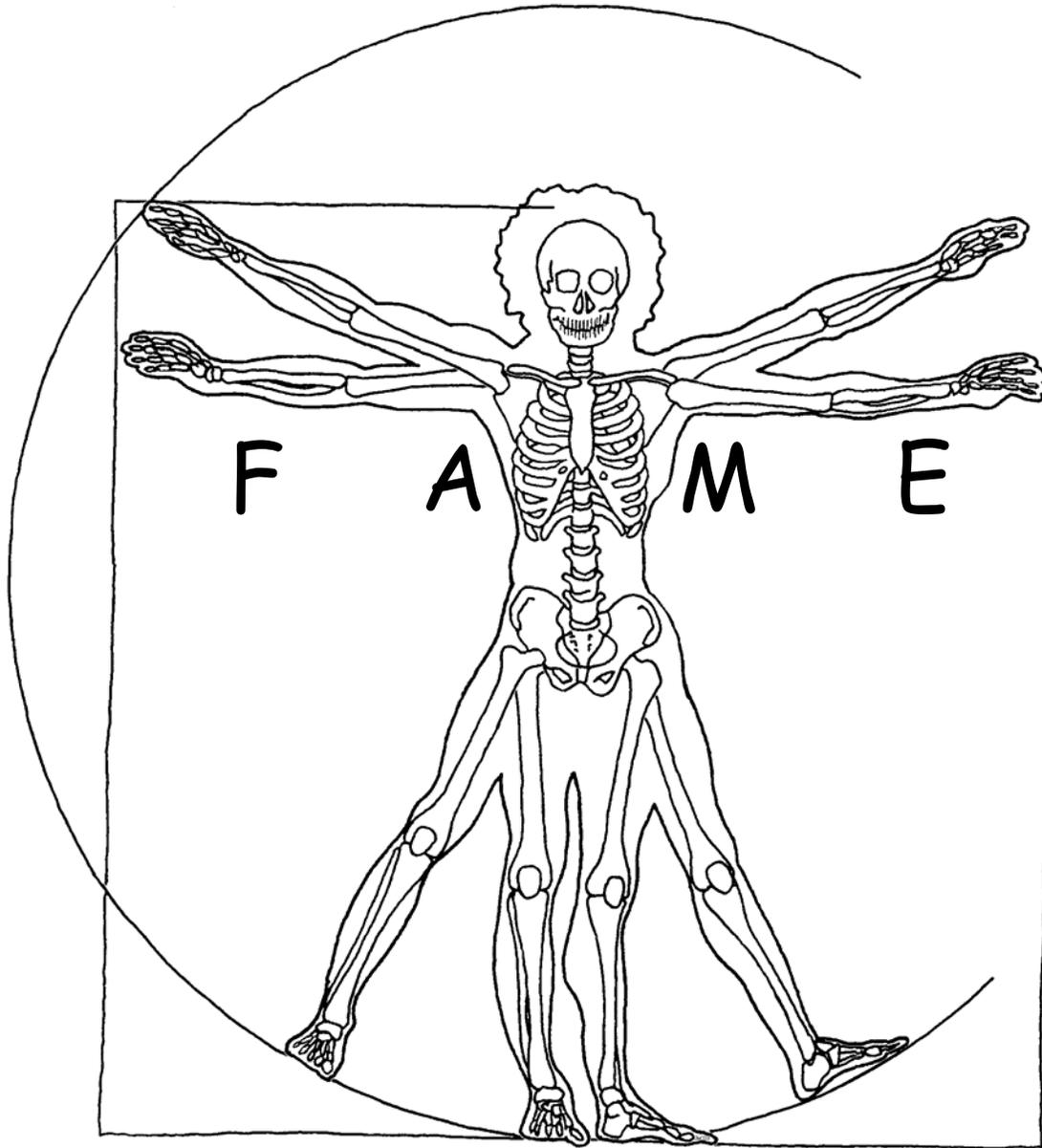


Fysisch-Anthropologische Mededelingen



Newsletter of the Dutch Association of Physical Anthropologists

No. 15, January 2007

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From the editors

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This new FAME begins with the publication of the abstracts of the interesting talks given by members of our association at the Autumn symposium held in November last year.

These are followed by the usual section of interesting abstracts, and two articles written by members.

We are still in the process of restyling the website but it is worth having a look now: [www.nvfa.nl](http://www.nvfa.nl).

If you have any suggestions for additions and/or corrections, we should be very grateful.

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Symposium abstracts

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**“Lucy’s daughter”.**

**The meaning of the child skeleton of *Australopithecus afarensis***

Paul Storm

Since the mid 1970s, the skeleton of Lucy, *Australopithecus afarensis*, plays an important role in our thinking about the evolution of man. Despite the fact that in subsequent years older hominin fossils have come to light, *Australopithecus afarensis* has continued to play a significant role, also thanks to Lucy. Not counting Neandertals and remains of *Homo sapiens*, the finding of many parts of an individual skeleton is a very rare occurrence in palaeoanthropology. After the Nature publication of 21st September 2006 by Zeresenay Alemseged and colleagues, we can now add the remains of a 3.3 million year old child skeleton.

After the introduction of *Australopithecus afarensis*, there were fierce discussions. Are we really dealing with a new species? Opinions widely diverged on the taxonomic status of *Australopithecus afarensis*: from “we are not dealing with a new species at all” to “we are dealing with several species”. Not everybody agreed that the large morphological variation in the fossil record could be crammed into one species. Sexual dimorphism was “shouted”. Small specimen were attributed to females, large fossils to much more robust males. But was the small Lucy actually a female?

According to researchers, the hyoid bone, the scapula and the phalanxes of the child skeleton with the nickname Selam, meaning peace, are ‘ape-like’, while the lower limbs give an indication of bipedalism. And here we enter another old discussion: how upright did *Australopithecus afarensis* walk? From top to toe quite a few features can be found pointing in the direction of ‘ape-like’. Since 2001, we know another candidate as possible ancestor of man: *Kenyanthropus platyops*, dated to 3.5 million years. In other words, can we really regard Lucy and ‘fellow species’ as an ancestral form?

The combination of antiquity and the fact that we are dealing with the remains of a child skeleton make this find very special indeed. The question is of course what the meaning is of Selam and what she will contribute. The most important potential significance for me is the insight that this skeleton can provide into the locomotive mechanism and the ontogenesis of a possible ancestral species.

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## **Every face its own skull**

Maja d'Hollosy

Facial reconstructions are mostly used in forensic research, and for archaeological and historical skulls.

The aim of a facial reconstruction in police investigations is clear, viz. recognition of an unknown victim, which recognition should lead to identification. The aim in archaeological reconstructions is different, as it is mainly for education and illustration, and to thus generate interest for the past. Because the aim is different, whoever makes this kind of reconstruction has the freedom to fill in the missing characteristics such as hair and eye colour. In forensic research this can be counterproductive.

How is it done? In the reconstruction of a face are used the average thicknesses of tissue which are appropriate for that person. There are differences in tissue thickness between men and women, ethnic groups, age groups and dietary conditions. In addition, the method uses rules for the positioning of the different facial features. The first facial reconstruction was made in 1895 using measured tissue thicknesses. The basic technique has remained the same since that time, but more research has been carried out on the thickness of soft tissues and the correlation between certain facial features and the skull.

Reliability can be examined in different ways. One can look at the percentage of identifications in police cases, worldwide this is 50-75%. This is of course not the same as a likeness in 50-75% of the cases; this percentage can be higher or lower, as whether somebody is recognised in a police case depends on quite a few factors.

A different way of testing the reliability is by means of blind trials and then to see to what extent the reconstructions resemble the original faces. The most recent investigations (the first one took place in 1913) have resulted in the possibility of achieving a very good likeness in the faces.

A third way is to carry out an investigation by means of a face-pool. This way resembles the forensic practice a little more. Without prior knowledge, a number of faces is reconstructed and volunteers have to choose from a series of photographs, among which is also the correct face, the person most resembling the facial reconstruction. The results are variable but most investigations show that it is possible to achieve a likeness in the facial reconstruction.

With archaeological or historical facial reconstructions it is more difficult to examine the reliability. As example we take the pharaoh Tutankhamen. Compared with his death

mask and statues, the reconstructed faces are much uglier. Who is right? As the skull is very peculiar and characteristic, I tend to regard the reconstructions as more truthful. But what Tutankhamen really looked like will always remain a mystery. Facial reconstructions can definitely not provide an accurate portrait; the best that can be achieved is an approximation, and at times this approximation is a good likeness, and at times it is not.



### **Separated during life and death: protestant and catholic skeletons from 's-Hertogenbosch**

Daphne Scoop

In 1993, the Bouwhistorische en Archeologische Dienst of 's-Hertogenbosch decided to excavate the remains of the old St Joseph Street graveyard, and to keep these remains for further analysis. It concerns a protestant graveyard that was used from 1833 until 1858.

An investigation of the population was carried out in 2005, in which a comparison was made with skeletons of catholics from the St Jans churchyard in 's-Hertogenbosch which were buried in the same period.

There appeared to be significant differences between the populations regarding stature, age at death, dental state, and pathology. On the basis of literature on the living conditions of the populations, an attempt was made to explain the differences found.



### **From carbon to sulphur; the reconstruction of diet and origin of two neolithic populations (Swifterbant and Schipluiden) by means of stable isotopes**

Liesbeth Smits

With new research techniques it is now possible to uncover more information on the way of life of former population groups. Hence, chemical research of skeletal material can give an insight into the dietary pattern and composition of populations.

Isotope research of skeletal material from two neolithic findspots, Swifterbant and Schipluiden, is presented here. Swifterbant is the well-known type-site in Noord Flevoland dating from c. 4200 BC and characterized by habitation on the banks of creeks, and where also some clusters of graves have been found. The dead were buried on their backs, following the mesolithic tradition, with few burial gifts. A total of c. 50 individuals are known from the graves and from isolated skeletal remains.

The findspot Schipluiden, dating from c. 3500 BC, is located on a low dune on an old beach plain. Here a.o. as small graveyard was found with six graves from which the skeletons of five men and two children were recovered. From the isolated skeletal remains in the spoil zone another eight individuals are known. The dead were buried with tightly flexed arms and legs, some with a burial gift.

### Questions

A question regarding diet concerns the distinction between a mesolithic and a neolithic way of life, viz. the transition from food gathering to food production. In mesolithic groups, the consumption of fish formed an important contribution to the food range; in neolithic groups we generally see a sharp decrease in the consumption of fish and the transition to other food sources such as grains and land animals. With carbon ( $^{13}\text{C}$ ) and nitrogen ( $^{15}\text{N}$ ) analysis it is possible to gain insights into the composition of the food package.

Another question concerns the origin of the people. With isotopes contained in the enamel of teeth it can be determined whether the person concerned grew up locally or came from elsewhere. Immigrants and a rough indication of the area of origin can thus be traced. For this analysis, the following chemical elements were used: oxygen (O), strontium (Sr), lead (Pb), and sulphur (S).

### Results

The  $^{13}\text{C}/^{15}\text{N}$  analysis points to a marine component in the food package of both populations. In Schipluiden this was prominently present as indicated by the high  $^{15}\text{N}$  values. Compared with other population groups and their way of life, the  $^{15}\text{N}$  values for Schipluiden correspond with those of the population of Lepenski Vir in the Iron Gate area. There these values are linked to the consumption of caviar. This could also be the cause for the distinction between Schipluiden and Swifterbant. Despite the neolithic way of life as indicated by the fixed habitation places, the use of pottery and the production of food, the natural resources in the immediate surroundings were also exploited.

From the origin analysis emerged that the population of Swifterbant was very homogeneous, more so than that of Schipluiden. For Schipluiden some immigrants are indicated on the basis of their isotope image. The analysis has shown that the persons known from the graves had a local origin, some isolated teeth elements on the other hand belong to immigrants from areas south and east of Schipluiden.



### **At home with the dead?**

Raphaël Panhuysen

Between 1996 and 2000 the human remains of over eighty individuals were excavated among traces of a large settlement. The settlement situated on the northeastern coast of the Caribbean island of Guadeloupe was occupied around 1200 AD. Most individuals were buried in shallow oval graves in a semi-sitting position. The distribution of the graves indicates that they were located inside or around houses. Who were these individuals and what do their bones tell us about life on a Caribbean island before contact with the inhabitants of the Old World? In order to answer these questions the human remains were examined by a variety of osteo-archaeological methods ranging from standard physical anthropological techniques to isotope analysis. The preliminary results indicate that the population living at Anse à la Gourde was of mixed composition; of the 50 individuals at least 14 had spent their youth in another area before they came to Anse à la Gourde. In the examined population, infants were clearly underrepresented, probably because of a different burial ritual for children. Among the adults both sexes were equally represented. Stable isotope analysis indicates that no corn was consumed and marine food resources were less dominant in the diet than might be expected given the location of the site. A high prevalence of infectious disease, most likely Yaws, will have had a negative effect on living conditions.



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Abstracts

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MANUAL FOR THE PREPARATION OF GROUND SECTIONS FOR THE  
MICROSCOPY OF BONE TISSUE

Maat, G.J.R., van den Bos, R.P.M. and M.J. Aarents

Barge's Anthropologica 7: 1-18, 2006. Third print. Leiden (ISBN 90-806456-6-4)

As early as 1958, Frost recommended an elegant procedure for the "preparation of thin undecalcified bone sections by rapid manual method" (Frost, 1958). The technique was developed for the processing of fresh bone tissue "to provide a means for the microscopic observation of bone that appears close to the ideal of observation *in vivo*". To our entire satisfaction we have also applied Frost's original technique for many years on regular dry bone tissue of moderate to good preservation. It has proven to be very cheap and reliable. With time we made and tested some modifications which further improved the technique and which also made it very suitable for less well-preserved inhumed and even cremated osteoarchaeological and forensic material. As in the original method the modifications need only a few extra but still very basic and cheap products.



IMPROVING THE VISIBILITY OF TOOTH CEMENTUM ANNULATIONS BY  
ADJUSTMENT OF THE CUTTING ANGLE OF MICROSCOPIC SECTIONS

Maat, G.J.R., Gerretsen, R.R.R and M.J. Aarents

Forensic Science International 159S: S95-S99 (2006)

Age at death assessments by counting Tooth Cementum Annulations (TCAs) in unstained undecalcified microscopic ground sections of (single rooted) teeth is, amongst others, problematic because of the unclear distinction between the bright and darker annulations. Counting is hampered by optical superimposition of the tangentially positioned layers of cementum in the section since 'regular transverse sections' run perpendicular to the axis of a cone-shaped root with its yearly deposited cone-shaped

layers of cementum. This study demonstrates that to improve the visibility of the annulations, the cutting angle should be perpendicular to the exterior of a root, not perpendicular to its axis. The site where the cut hits the root first should show the best possible distinction between the TCAs. Here, superimposition of the now vertical positioned layers within the section will result in increased contrast between bright and darker layers. A procedure for such preparation is given.

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#### HISTOLOGICAL AGE PREDICTION FROM THE FEMUR IN A CONTEMPORARY DUTCH SAMPLE. THE DECREASE OF NON-REMODELED BONE IN THE ANTERIOR CORTEX

Maat, G.J.R., Maes, A., Aarents, M.J. and N.J.D. Nagelkerke

Journal of Forensic Sciences 51: 230-237, 2006

This paper presents an uncomplicated and minimally invasive method for age at death determination in a contemporary Dutch (West European) population, by modifying the approach of assessment based on the age related remodeling of bone tissue. In contrast to the usual 'osteon count', a 'non-remodeled tissue count' is undertaken. To optimize the method, proper zeroing of the polarization filter set of the microscope is essential. Instructions for setting the filters are given. A sample of femoral shaft segments totaling 162 individuals with ages ranging from 15 to 96 years is analyzed. Subperiosteal quantitative assessments are recorded at the most anterior point of the femoral shaft and also at points 25° to the left and to the right of that point. Interobserver agreement in the assessments shows an acceptable degree of correlation. Bone remodeling with age does not progress in a linear but in a curvilinear manner. Dependence of predicted age on non-remodeled surface counts in the analyzed areas of the anterior cortex of the femur appears to be significant. A set of regression equations is given. Sex can be ignored in age prediction. The small but statistically significant dependence of predicted age on cadaver length corresponds with the present strong secular increase in stature in the Netherlands. A concise catalogue with micrograph examples for every 10-year period in life is available upon request.

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INTER- AND INTRA-INDIVIDUAL VARIATION IN APPLIED FORCE WHEN LISTENING AT A SURFACE, AND RESULTING VARIATION IN EARPRINTS

Meijerman, L., Nagelkerke, N.J.D., van Basten, R., van der Lugt, C., De Conti, F., Drusini, A., Giacon, M., Sholl, S., Vanezis, P. and G.J.R. Maat

Medicine, Science and the Law 46: 141-151, 2006.

No abstract available



EARPRINTS AS AN IDENTIFICATION TOOL

Meijerman, L., Thean, A., van der Lugt, C. and G.J.R. Maat

In: Forensic Human Identification. An Introduction. Thompson, T. and Black, S., eds. CRC Press, Taylor and Francis Group, Boca Raton, p. 73-84, 2006

No abstract available



GRAVES AND HUMAN REMAINS

Smits, E. and L.P.Louwe Kooimans, 2006:

In: Schipluiden, a Neolithic Settlement on the Dutch North Sea Coast c. 3500 cal BC. *Analecta Praehistoria Leidensia* 37/38, p. 91-112, 2006. Leiden.

No abstract available



LEVEN EN STERVEN LANGS DE LIMES. HET FYSISCH-ANTROPOLOGISCH ONDERZOEK VAN VIER GRAFVELDPOPULATIES UIT DE NOORDELIJKE GRENSZONE VAN GERMANIA INFERIOR IN DE VROEG- EN MIDDEN-ROMEINSE TIJD

Smits, E.

Enschede, 2006

Summary

The conquests of North-western Europe by the Romans lead at the beginning of our era to a confrontation between the native tribes and the Roman army and society. After the first period of warfare, with genocide and movements of native populations and tribes, a period of relative peace and integration followed.

The establishment of an infrastructure with a trade network and the consolidation of the northern frontier along the Lower Rhine resulted in a multicultural habitation of the border zone. Settlements were built in the vicinity of the fortresses as the founding of the *castellae* and the presence of the military troops led to an influx of populations, mostly from the hinterland of the Roman Empire.

This dissertation presents the investigation of the cremated remains of four cemetery populations from the northern frontier zone of *Germania Inferior*. It focuses on the demographic and cultural composition of these populations and the changes therein during the first two centuries AD.

The location of the cemeteries near the military fortresses and the associated civilian settlements lead to the expectation at the start of this study that in these cemeteries both military and civilians were buried. Especially in the 1<sup>st</sup> century, a period of frequent warfare, military graves are expected to be present in the cemeteries.

The composition of the cemetery populations should have been more balanced in the 2<sup>nd</sup> century, because this period was more peaceful and prosperous, known as the *Pax Romana*, comprising mainly the civil inhabitants of the settlements. The improvement in living conditions would have led to healthier populations than in the 1<sup>st</sup> century AD.

To test these assumptions the human skeletal remains, mostly cremations, from the cemeteries of Valkenburg- Marktveld, Nijmegen-Museum Kamstraat, Moers-Asberg and Krefeld-Gellep were studied. The cemetery of Valkenburg was in use during the first two centuries AD and comprised 520 cremation- and 134 inhumation-graves. It

was located in the vicinity of the *castellum* Praetorium Agrippinae and the *vicus* on the Woerd.

In Nijmegen many military and civilian sites were excavated. The cemetery of the Museum Kamstraat is one of the earliest cemeteries and dates from circa 30 till 70 AD. Studied were 131 graves with cremated remains that were part of a much larger complex, most of which hasn't been excavated due to modern building.

Moers-Asberg is the location of the *vicus*, which was situated near the *castellum* of *Asciburgium*. There were two cemeteries here, the northern and the southern one. From the northern cemetery 89 cremation graves were available for study dating from the first two centuries. From the southern cemetery the results of the investigation of 94 cremation graves were used to compare with the demographic structure of the northern cemetery.

The extended cemetery of Krefeld-Gellep is situated near the *castellum Gelduba*. There are 670 graves with cremated remains from the first three centuries AD which were studied.

The diversity in the cremation graves is shown by the grave typology. The main grave types are: Urn Graves (U), Urn Graves with pyre remains (Us), *Brandgruben*-graves (Bg), *Brandschüttungs*-graves (Bs), graves with 'clean' cremated bones (Cr) and *Bustum*-graves (Bu). The results of the physical-anthropological analysis were studied in relation with the information on the grave types and the dates of the graves.

Each cemetery is discussed in a separate chapter that is arranged in the same way. Firstly the quality of the cremated remains and the research possibilities are described. The results of the age- and sex-diagnoses are analysed by way of mortality curves followed by a description of the demographic composition of the cemetery populations, divided by the 1<sup>st</sup> and 2<sup>nd</sup> century when possible. The health of the populations is discussed according to the osteological pathological changes, the reconstructed stature and the mean age. After this the burial traditions are described in relation to the data on the sex, age and the grave types.

The description of the cremated remains according to the weight, the fragmentation and the presence of the several skeletal parts have shown that the quality is best when these were buried in an urn. The quality is a lot worse when the loose cremated remains were buried in a pit, resulting in less research possibilities. The variety of the *Bustum*-graves is responsible for differences in the quality of the remains. In Valkenburg these graves contained more cremated bones than those in Moers and

Krefeld. In Moers the cremations had sometimes been deposited in a small pile and in Krefeld in some of these graves an urn had been placed.

Age-diagnosis was possible in 50-70 % of the cases and concerning the adults a sex-diagnosis in 52-89% of the individuals. This is an important addition to the archaeological sex diagnosis, which is based on the so-called 'female' and 'male' grave goods. In those cases where both methods could be applied, the results are compatible with only a few exceptions. The sex-related grave goods from the graves of females are fibulae, toiletries, jewellery and specific implements. In the graves of males these items are specific types of fibulae, weapons and tools.

The demographic structure of the cemetery populations shows minor differences between both centuries. There was no surplus of young men in the 1<sup>st</sup> century. Child mortality was high and most of the adults died in the age of 20-40 years. The civil population treated their dead according to old, indigenous rules, but also followed the Roman rules on this subject. The dead were cremated except for newly born children who were buried. In case of warfare normal procedures were abandoned, the victims were buried apparently without any consideration, as is implied by the inhumation graves from Krefeld and possibly those of the adults and elderly children in Valkenburg.

It is not possible to draw conclusions on the health of the population and a change herein during the first two centuries because the fragmented and mostly incomplete nature of the cremated remains inhibits the detection of pathological features on the bones. Also the dates of most of the graves are not specific enough. An exception is the toxicological research into the lead content of the skeletons of the newborn children in Valkenburg, which has shown that the lead was transported via the mother during pregnancy. The lead content of food, like wine, probably had a negative influence on the pregnancy and the survival of these children.

The presence of certain grave types shows a chronological trend that can be related to the different population groups in this region. The urn graves, with and without pyre remains (U- and Us-graves) mostly date from the 1<sup>st</sup> century when military troops and possibly also civilians from the Gallic hinterland were settled in the fortresses and associated settlements. The *Bustum-graves* (Bu-graves) appeared when troops from the Balkan countries were moved to the Lower Rhine. These graves were also popular in the 2<sup>nd</sup> century. *Brandschüttungs-graves* (Bs-graves) and graves with 'clean'

cremated bones (Cr-graves) appeared at the end of the 2<sup>nd</sup> century. *Brandgruben*-graves (Bg-graves) are abundant in both centuries and form the largest group. The Bg-, Bs- and Cr-graves are probably of indigenous origin and are not related to military presence in the border zone.

The urn and *Bustum*-graves indicate an adoption of other rituals by the local population. The variation in the *Bustum*-graves, with special treatment of the cremated remains or the deposition of an urn, points to a blending of various burial traditions.

The study has shown that on a higher aggregation level, that of the cemeteries, based on the combined physical-anthropological and cultural archaeological data meaningful conclusions can be drawn on the demographical and cultural features of the populations under study. This has led to a model for the composition of the population in the border zone of *Germania inferior* in the Early- and Middle-Roman period. In this region the native population was settled alongside civilians and soldiers from Gaul and military troops from the Balkan area.

The research possibilities give cause to the construction of a research agenda for *Germania inferior*. Several regions can be defined with each a diversity of habitation forms like military fortresses, large-scale urban sites, small-scale civilian settlements and villas.

Physical-anthropological and cultural archaeological investigations can give insight in the demographic and cultural characteristics of these areas and thus contribute to a better understanding of society in this part of the Roman Empire as well as the restrictions and possibilities of this approach.



## DE "HOBBIT" VAN FLORES: EEN MENSACHTIGE EILANDVORM

Storm, P.

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Cranium 23/2; 3-14.

The news of the prehistoric "Hobbit" of Flores was a big surprise. With its small size and endocranial volume, reduced prognathism and relatively recent date, you cannot compare it with anything else in the human family tree. Again scientists tumbled over each other: a pathological freak or a new species? As far as I can assess the evidence at this moment, the hypothesis that we are dealing with a new species, *Homo floresiensis*, is the most likely one. However, this does not mean that we have to rewrite the evolutionary history of humans. Because, the small hominin of Flores fits in with the picture of island evolution.

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#### REDISCOVERY OF THE LATE PLEISTOCENE PUNUNG HOMININ SITES AND THE DISCOVERY OF A NEW SITE GUNUNG DAWUNG IN EAST JAVA

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Senckenbergiana lethaea 86 (2); 271-281.

In the 1930s Von Koenigswald collected a fauna from two Pleistocene deposits, close to the village of Punung, East Java, in which hominin remains were found in association with mammals which clearly indicate the presence of a tropical rainforest, like orang-utans (*Pongo*) and gibbons (*Hylobates*). Although the Punung fauna is of scientific importance for understanding the distribution and evolution of mammals – including hominins – in Australasia, the location of the deposits was unknown. In the late 1990s Bosscha Erdbrink, who was present during the excavations in the 1930s, released photographs made by him and he expressed his willingness to help in locating the original sites. In 2003 a joint Dutch-Indonesian team of Naturalis in Leiden and the Geological Museum in Bandung visited the region of Punung and rediscovered the two original Punung sites. In addition, we found and documented fossils *in situ* stemming from a tropical rainforest at a new site, Gunung Dawung.

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Articles

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PALAEOEPIDEMIOLOGY OF INFECTIOUS MIDDLE EAR DISEASE:  
THEORETICAL AND METHODOLOGICAL CONSIDERATIONS

Tj.D. Brintjes  
Barge's Anthropologica  
Leiden University Medical Center

Abstract

Little is known about the prevalence of infectious middle ear disease (IMED) in ancient populations. In order to assess the feasibility of starting a palaeoepidemiological investigation of IMED, the relevant palaeopathological and otorhinolaryngological literature has been surveyed. IMED in childhood leads to reduced pneumatization of the mastoid air cell system, which in turn can be visualized by X-ray photography of the temporal bone. Such an approach using standardized procedures may allow assessment and comparison of the prevalences of IMED.

Introduction

Infectious middle ear disease (IMED) is a common health problem today and the question arises whether this has always been the case. Several studies have shown unequivocally that IMED was present in ancient populations, but data allowing prediction of the actual extent of the disease in ancient times remain notably absent. This is unfortunate, because knowledge of geographical and temporal differences in prevalence may shed some light on the pathogenesis of the disease or at least may reveal which factors are involved. The relevance of palaeopathology with regard to the problem of otitis media has been discussed by Daniel et al. (1988). This paper addresses the theoretical and methodological aspects of such a palaeopathological study.

IMED: Classification and clinical picture

Three clinically different types of IMED can be distinguished: acute otitis media (AOM), chronic otitis media (COM) and otitis media with effusion (OME). In both AOM and COM there is an inflammation of the middle ear cavity produced by pus-forming organisms. AOM is of short duration and is characterized by otalgia, deafness

and aural discharge. In COM there is a chronic discharge from the middle ear with hearing loss. OME ('glue ear') denotes the presence of effusion (non-purulent fluid) in the middle ear cleft. The predominant symptom is hearing loss, which in children may result in delayed speech development. Although clinically different, the types of otitis media are dynamically interrelated. Indeed, the different types of infectious middle ear disease are probably not separate entities, but actually are a continuum in which each type may be clinically manifest at a particular time in the course of the disease (Giebink, 1992).

Researchers have identified several etiological factors for IMED, which can be divided into host-derived and environmental factors (Daniel et al., 1988). Age, for instance, appears to be important: IMED is much more common in childhood than in adulthood. There also seems to be a racial factor involved. In white children the prevalence of otitis media is higher than in black children, whereas Greenlandic Inuit and North-American Indians show a particularly high prevalence. With respect to the environmental factors, data correlating IMED with socio-economic status are not consistent. Some studies report a higher incidence of IMED in the lower socio-economic group, while others do not show any correlation at all.

#### Dry bone changes

All three types of IMED leave detectable traces in dry bone. There are two kinds of osseous scarring. In chronic and recurrent AOM, erosive bone changes may affect the auditory ossicles in the middle ear cavity as well as all bony structures surrounding the middle ear cavity, depending on the severity and duration of the condition. In OME, erosive bone changes are not common, although some ossicular erosion may occur. Apart from erosive changes, recurrent AOM and COM as well as OME are commonly thought to be responsible for disturbed pneumatization of the mastoid air cell system which takes place in childhood (Tos et al., 1984; Tos & Stangerup, 1985). This view reflects the so-called "environmental" theory of pneumatization, which states that hypocellularity of the mastoid is the result of previous inflammatory middle ear disease. Especially asymmetry in the mastoid air cell system is thought to be indicative of previous IMED (Tos & Stangerup, 1985). According to the less popular "genetic" or "normal-variant" theory reduced pneumatization of the mastoid is genetically determined and an aetiological factor in chronic otitis (Diamant, 1940; Schuller-Ellis, 1979). At present it is generally assumed that, although the degree of initial mastoid aeration may be a predisposition to otitis media, the cell system will most certainly decrease in volume, once inflammation has developed.

### Methods of investigation

Inspection of the dry bone specimen may reveal erosive changes indicative of infectious middle ear disease. However, these cases represent the more severe, chronic suppurative infections and not the mild cases or those with OME. Furthermore, discrimination between inflammatory and post-mortem changes can be extremely difficult, as indicated by McKenzie and Brothwell (1967) and Loveland et al. (1990). For this reason, visual inspection cannot be used for accurate assessment of the presence of IMED, although attempts in this respect have been made by using ossicular erosion as a parameter for the presence of chronic suppurative otitis (Brintjes, 1990; Qvist and Grøntved, 2001).

Radiological techniques demonstrating the state of pneumatization of the mastoid bone are more suitable for this purpose. For plain X-ray investigation of the temporal bone there are a number of standard views, each of which have their advantages and disadvantages. The best depiction of the mastoid air cells is provided by the lateral view. To prevent superimposition of the two temporal bones in an intact skull the incident X-ray and/or the skull is angled. This is the case in Law's lateral view and the lateral projection of Runström II. Other views provide a less clear picture of the mastoid (Stenvers' view and submento-vertical view).

Radiographically, the degree of pneumatization is usually classified according to the criteria of Tremble (1934): pneumatic, diploic, mixed, and sclerotic. Any type other than a pneumatic mastoid is considered to be a consequence of IMED in childhood. Apart from unarmed visual examination of the pneumatized area, the projected surface can also be measured planimetrically by computer (Homøe and Lynnerup, 1991). Based on planimetric measurement of mastoid cellularity in living Greenlandic Inuit, Homøe et al. (1994) developed a useful, though rather complicated, statistical method to estimate the occurrence of IMED in ancient populations.

CT-scanning of the temporal bone allows detailed assessment of both erosive changes and the degree of cellularity of the mastoid (Homøe et al., 1992). However, this is a rather expensive method of examination which is generally not available to the osteoarchaeologist.

### Palaeoepidemiology of IMED

Table 1 lists the palaeoepidemiological studies on IMED that have been performed thus far. Gregg et al. (1965) were the first ones to use altered mastoid pneumatization as a tool for detecting IMED in childhood. In a heterogeneous group of Pre- and Post-Columbian Indian skeletons from the Upper Missouri River Basin in South Dakota they found altered mastoid air cell development in 44-52% of the mastoids. In a later

study they evaluated X-rays of mastoids from other ancient Indian populations from the same area and compared the findings with those in living Indian children and hospital patients (Gregg and Steele, 1982). IMED was found to be more common in the Post-Columbian Indian skeletons and the (predominantly white) hospital population than in the Pre-Columbian skeletons and modern Indian children. They concluded that the increase in IMED prevalence after 1492 was probably due to contact with virulent infectious agents brought to the Americas by immigrants, whereas the decrease in IMED prevalence in the modern population was thought to be the result of socio-economic improvements and the availability of antibacterial drugs. Another temporal bone study was performed by Titche et al. (1981) in Pre-Columbian Indians from Arizona. Interestingly, they found a significant lower percentage of decreased mastoid pneumatization than in the Pre-Columbian Indian population studied by Gregg et al. They could not explain the difference, but suggested climate, living conditions and diet as factors of influence.

In the studies by Rathbun and Mallin (1977) and by Schultz (1979) the samples are heterogeneous and the sample sizes are small, which makes it impossible to draw conclusions on a palaeoepidemiological level.

Homøe et al. (1996) investigated the presence of IMED in Greenlandic Inuit from different time periods (before colonization, 18th-19th century, modern). They found a decrease of mastoid cellularity from past to present indicating an increasing secular frequency of IMED. They attributed this change to the colonization of Greenland and the following social decline of Inuit societies.

In conclusion, up to now only a few palaeoepidemiological studies regarding IMED have been performed. In these studies the degree of pneumatization of the mastoid was rightly used as indicator of IMED in childhood. Further investigations of ancient populations are useful for making comparisons of IMED occurrence. These studies should use standardized methods for the examination and interpretation of mastoid cellularity.

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Table 1. Studies on altered mastoid pneumatization in various populations.

<b>Study</b>	<b>Material</b>	<b>X-ray projection</b>	<b>Interpretative criteria</b>
Gregg et al. (1965)	Pre- and Post Columbian Indian	Law's lateral view Stenvers view	visual assessment
Rathbun & Mallin (1977)	Iranian (1300-300 BC)	Law's lateral view Stenvers view	visual assessment
Schultz (1979)	Frankish-Alemanic (500-725 AD)	lateral view	visual assessment
Titche et al. (1981)	Pre-Columbian Indian (Arizona, 950-1450 AD)	Law's lateral view Stenvers view submento-vertical view	visual assessment (Tremble)
Gregg & Steele (1982)	Pre- and Post Columbian Indian Contemporary population	Law's lateral view Stenvers view	visual assessment (Tremble)
Homøe & Lynnerup (1991) Homøe et al. (1996)	Greenlandic Inuit (ancient - before colonization - and recent -100-200 y old) Contemporary population	Runström II lateral view	planimetric analysis

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## CANCER? TIME FOR A PARADIGM SHIFT?

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Commentary to the Vitamin D-cancer hypothesis.  
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In your section ‘Reprints and Reflections’ of the Journal you present the original paper by C.F. Garland and F.C. Garland on the so-called ‘vitamin D-colon cancer’ hypothesis<sup>1</sup>, published in 1980, followed by a series of six commentaries resuming the state of affairs 25 years later. Correlation studies between higher colon cancer rates and higher geographic latitude and, thus less vitamin D have been extended to other cancer sites, including breast, bladder, corpus uteri, oesophageal, kidney, lung, ovary, pancreas, prostate, rectum, stomach, multiple myeloma and non-Hodgkin lymphoma. And, if not enough, also to other diseases – including hypertension, type 1 diabetes mellitus, multiple sclerosis and osteoporosis – that are linked to vitamin D insufficiency.<sup>2</sup> This hypothesis, therefore, has found adherence and been tested in different ways.<sup>3</sup> The great importance related to the burden of colon and other cancers and the compelling possibilities of preventive measures are at issue. However, confirmation that vitamin D indeed would account for these observations is critical, because it is broadly accepted that there was no vitamin D deficiency in the US. The more, the minimal dose required (and upper threshold) for colon cancer prevention is by no means established. The current health recommendations typically discourage high intakes of vitamin D as well as sun exposure, at least without use of sunscreen, which effectively blocks vitamin D production.<sup>2</sup>

The most impressive argument in the original report was the indication of a strong inverse association between colon cancer mortality rates and the annual mean daily solar radiation compiled in both the Metropolitan (80% of the population residing in a metropolitan area) and non-metropolitan states in the US. The authors considered the possibility of an indirect association with vitamin D, i.e., an ecological fallacy or confounding at the group level. They, assessed two potential covariates, namely regional differences in the consumption of red meat, which was assumed to increase

the rates of colon cancer, and also fruit and vegetables (as source of fibre) assumed to reduce them. Examination per capita consumption of these foods in several regions of the US, however, did not track in expected ways assuming confounding by these factors. They admit: "If living in higher latitudes were associated with aetiologically important differences in behaviour, dietary constituents, or genetic characteristics, an indirect association might exist that was not directly attributable to differences in exposure to sunlight". Such differences in behaviour have not been mentioned.

It is our purpose to question the causal relation to vitamin D in the current discussion and to infer an up till yet neglected biological factor which is present in animals and humans namely the South-to-North gradient of the seasonally-bound conception and birth rates.<sup>4,5</sup> This gradient in seasonality goes parallel with geographic latitude and solar radiation, apparent on both hemispheres. That is, the further discarded from the equator, the stronger this birth seasonality. The preovulatory overripeness ovopathy concept is based on this biological phenomenon and predicts that individuals conceived during the breakthrough and breakdown of the seasonally-bound ovulatory seasons are at higher-risk for being prone to developmental anomalies and deficiencies in different organs and organ systems, for example, in the immune system.<sup>6,7</sup> This ovopathy concept is backed by animal experiments on pre- and postovulatory overripeness ovopathy and in line with the disproportional excess rates of fatal neural tube defects<sup>8</sup> and type 1 diabetes mellitus<sup>9</sup> diverging on both hemispheres.

This assumed causal relation of seasonally-bound non-optimally matured oocytes to cancer, therefore, not only agrees with the geographical latitude effect under discussion, but also with the disproportional month-of-birth deviations apparent in childhood leukaemia,<sup>10-12</sup> premenopausal breast cancer,<sup>13-15</sup> lung cancer,<sup>16</sup> brain tumors in children,<sup>17,18</sup> and adults,<sup>19</sup> in general corresponding with the major total birth peak or major ovulatory season [often as a double hump surge corresponding with the transitional breakthrough and breakdown stages of it].<sup>6,7</sup> Further, it disentangles the enigmatic phenomenon of shorter life expectancy of people born in the first half of the year when compared with the second half, at least in Europe and upside down in Australia.<sup>20</sup> Finally, this ovopathy concept clarifies the male bias in about all (non-gender specific) cancers<sup>7</sup> and is in accord with many prenatal determinants, such as specific maternal and intrauterine factors in childhood leukaemia,<sup>21-23</sup> breast cancer,<sup>24,25</sup> and oesophageal cancers.<sup>26</sup>

An analogous persistent paradigm regards the so-called Mediterranean diet allegedly

protective for cardiovascular diseases<sup>27</sup>. Olive oil in the diet has been argued to be a similarly confounding or indirect factor, which is associated with geographical latitude. Seasonally-bound ovopathy and its pathophysiological consequences related to geographical latitude again explains the presumed association and needs a paradigm shift. ‘Not the olive is important, but where the olive grows’.<sup>28</sup>

A similar paradigm shift related to vitamin D might be necessary in order to discard some inconsistencies encountered. Fortification or addition of vitamin D in the nutrition is still under debate and the epidemiological findings do not prove that higher levels of vitamin D would lower risk of colorectal cancer, while overexposure to UVA is harmful.<sup>2</sup>

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Forthcoming events

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March 5-9, 2007  
ANTHROPOS  
Havana, Cuba

March 30, 2007  
Kroon lezing  
Amsterdam  
Peter de Knijff on ancient DNA

July, 2-6, 2007  
Summer course Physical Anthropology  
LUMC, Leiden

July 7, 2007  
Barge Forum  
Leiden  
Speaker and title to be announced

November 4, 2007  
Autumn Symposium NVFA  
Leiden  
Theme and venue to be announced

August 21-24, 2008  
17<sup>th</sup> European Meeting of the Paleopathology Association  
Copenhagen, Denmark