



**Master Erasmus Mundus in
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ERASMUS MUNDUS MASTER « QUATERNARY AND PREHISTORY »
ASIA LINK PROJECT « HUMAN ORIGINS PATRIMONY IN SOUTHEAST ASIA »**

MASTER MODULE « PREHISTORY OF SOUTHEAST ASIA »

PhD and PhD TOPICS

MASTER STUDENTS' SEMINAR TOPICS

ABSTRACTS

Dating of the Kabuh formation at Sangiran Dome, Java, Indonesia

Caroline Bachelet and Patrick Schmidt

The aim of our presentation is the exposure of the recent discussion about the dating of the Kabuh formation at Sangiran locality in Central Java, Indonesia.

We will begin our presentation with a brief introduction to Sangiran's geographical and geological context. More specifically we will expose the stratigraphy of the dome in order to situate the Kabuh formation in its context. Further, we shall talk about the research history with respect to dating of the formation. Finally, we will expose the problematic of the dating today and its repercussions on the significance of Sangiran site.

The Archaeological excavation at Khai Pratupha Site, Mae Moe district, Lampang province: Northern Thailand

Worrawit Boonthai

The discovery of the archaeological site at Khai Pratupha led to a survey and excavation by Chiang Mai National Museum in 1998. Khai Pratupha is one of the biggest archaeological sites in Thailand . It is in Lampang province, northern Thailand .

Archaeological research revealed that finding at the site present valuable evidence for a study of the social structure, technological progress and interrelation between human and the ecology. Findings have also shown evidence of evolution of human's thinking and belief during the transition period from prehistory to history which make this archaeological site even more important and interesting.

Important fact of the relationship between nature and ancient man are given through human wisdom. Many natural resources were used and living elements that led to the evolution of prehistoric culture. All these archeological evidences will be the huge sources of knowledge for study in the prehistoric period.

This paper aims at the archaeological study of the Khai Pratupha site which perform the activities of the people in the past from the archaeological evidences such as rock paintings and other archaeological specimens found in this site.

The archaeological remains found in this site displays the ritual performances and narates the subsistence activities of the people at that time. The archaeological specimens were unearthed from 3 excavated units which conducted under the area of first rock painting group.

It is interesting to know that there was the distinctive mortuary rite at that time, i.e. the skeletons were covered by bamboo mats, and red ore as well as pieces of bamboo laid on top of bodies. All these skeletons were smoked, it might be on the funeral process and this rite was regularly used as a ritual site by prehistoric populace. Hence, this site is approximately dated between 3,200 and 2,900 BP.

Though, the paintings and activity evidences found in this area such as the use of red ore to decorate the utensils, to paint the dead body etc. suggested us some information.

However, further archaeological investigation are needed for this site to get more useful information in order to help the future study.

Microscopic characterization of sedimentary layers and occupation floors in Sangiran (Central Java, Indonesia)

Boris Brasseur

During beginning of the 1990's a French/Indonesian team managed by Prehistory department of the "Muséum National d'Histoire Naturelle de Paris" organised archaeological excavation at Ngebung 2 site (North West part of Sangiran). This mission allowed the discovery of human remain, artefacts and vertebrate fossils in association on an occupation floor. Very few occupations floors of 800.000 yrs BP are known and this was the first ever discovered in Sangiran. It offers the unique opportunity to relate human fossils with their lithic tools and thus technical behaviour.

New researches on sedimentary and palaeoenvironmental context of this site have been conducted they will play a central role in this PhD research.

During summer 2006 archaeological excavations have been performed close to the ancient area of excavation. Preliminary results will be presented during this communication.

One PhD year of field and laboratory research has lead to the evidence of direct relationship between the environmental crisis and the exceptional preservation of the occupation floor. Flood deposits composed of volcanic breccias and mud gravels from locally destructed paleosoils are the sedimentary context of most archaeological material. The occupation floor is highlighted by a thin layer of Mn/Fe oxyde crust (underlying flood deposits), wich is also found in a similar context in several others places in Sangiran dome.

Thanks to micromorphological characterization study of this layer and sequences of sedimentary facies we will give some preliminary explanations of the palaeoenvironmental meaning of those sediments.

A revision of the mandibles of the *Meganthropus* and the *Pithecanthropus dubius*

Virginie Caup

I will present for this work, subject of my thesis which deal of a revision of the mandibles of Java by two complementary methods. This choice results from a review of the *Meganthropus* and the *Pithecanthropus dubius*, which have been defined on mandibles, thanks to traditional method of morphometry and recent methods of geometric morphometrics. The material includes mandible remains from Java, principally concentrated in the Sangiran dome, and is twelve in number.

The first part of the presentation of this study will present the theme of research with some generalities upon Sangiran dome and the stratigraphy. Then I will present the material and his stratigraphy position which reveals a homogeneous set.

On a second time, I will talk about the methods applies for the analysis of the morphologic and metric variation. At first a morphological description introduces different features for each fossil. Secondly morphometrics account will measure those differences. Finally, application of geometry morphometrics with procrusts method could deepen morphometrics results and bring us new information on variability of those mandibles. For ending I will give bibliography that I actually study concerning the geometric morphometric method, and present some example if time goes on.

Juvenile *Homo erectus* development particularities

Julien Corny and Boris Villier

In this study, we tried to definite juveniles features in *Homo erectus* and consequences of cranial development rate for cognitives abilities and social behaviours. The only juveniles *Homo erectus* remains are constituted of Mojokerto child. So, we are going to talk about different individual age estimations. These estimations are established by comparison of cranial and endocast morphology between modern human, *Homo sapiens* fossils, *Homo neandertalensis* and apes. Indeed, this comparison is essential to approach better particularities of juvenile *Homo erectus* development particularities. However, this study presents some limits. Fossils records on *Homo erectus* child development are limited to Mojokerto remains. Moreover, correlation between different taxa is not demonstrated and remains uncertain.

Body mass reconstruction of Pleistocene cervids in Java

Susanne Denzau

Reconstructing body mass of Pleistocene cervids takes center stage of this diploma thesis.

Therefore length and width of teeth of recent species are measured and correlated to their body mass.

With the help of regression equations it is possible to reconstruct body masses of extinct Pleistocene cervid species by only measuring teeth.

Functional reconstructions of skull and dentition of Southeast Asian Ursidae

Sandra Engels

Different dietary preferences can be demonstrated by morphological varieties of skull and dentition. The Ursidae belong systematically to the carnivores, but in fact members of this family possess quite different dietary regimes. Specialized herbivores, insectivores, carnivores and omnivores are found. Parameters of distinction on skull and dentition of recent animals have to be defined and then can be transferred to fossil material.

Subsistence Strategies in Dewil Valley, Central Philippines: A study of shell remains from Ille Cave

Pamela G. Faylona

The archaeological studies of Ille Cave in the Palawan Island have gone a long way since it was studied in 1998. At present, 11,500 BP is the oldest published laboratory date. This dated from charcoal from a culturally secure area within the excavation. Also, from excavations at the cave, a human cremation, a dog burial, shell middens, human burials, interesting ceramics and others have been exposed. These all indicate short and long-term human occupation of the cave.

Ille Cave is part of a vast karst formation. It has two major mouth openings, the east and the west mouth. Excavated shells from Ille's excavation is the focus of this paper. Shells in Ille have not been thoroughly studied despite the countless species accumulated that were either used as food, ornaments or tools. The only studies on Ille shells have been conducted by Szabo for her Ph.D. dissertation (Szabo 2002) and by Faylona (2003). Basilia and Vitales have conducted preliminary studies in connection with the work of Szabo. Szabo (2004) focused on the techniques of how particular species of shells were being formed as artifacts. Faylona concentrated on the foraging pattern of the past people from Ille through shells (2003). While Basilia (2006) studied standardization of shell beads production, and Vitales (2006) studied the *Melo* artifacts as ritual indicators.

The shells excavated are from 1998-2005. There are two types of shells found at the Ille Cave. More than 50 shell species found in the site. These are the gastropods and the bivalves shells from freshwater, estuarine and marine environment. There are also shells from the Class Crustacea and other species from the Class Gastropoda.

The objective of this paper is to analyse the subsistence strategies of Ille's past inhabitants through shell remains. It would also answer the following: to identify the different shell species present in the cave; to determine the total frequencies of each species per layer of each square; and to relate the shells found in each stratigraphic sequence.

The shells excavated were identified using Springsteen and Leobrera (1986), Wye (1991), Abbott and Dance (2000) and de Bryne (2003) and were sorted according to their class and environment. Terrestrial gastropods are excluded in this study. The rest of the species from freshwater, estuarine and marine are not integrated in this report because some species are not foraging (i.e. *Melo amphora* was studied by Vitales and suggested as a grave good indicative of ritual rather than subsistence) and others are not from the Phylum Molluska.

Minimum Number of Individuals (MNI), a quantitative method of analysis, was employed in acquiring the frequencies of the shell sample of gastropods and bivalves from Ille Cave. After getting the frequencies of each shell species and classifying them according to their respective environments, a behavioral ecology paradigm was used called diet breadth model (diet diversity) (Kelly 2000). This is done by ranking the shell species (number of taxon present in an assemblage) and evenness (relative proportion of taxa represented).

Ranking the freshwater and marine/estuarine shell species were qualified through the following criteria: number of shells accumulated and its presence in each given layer as well as the time given in meat processing. In freshwater shell species, *Batissa* was ranked first, followed by Neritidae and *Melanooides torrulosa* as last. In marine/estuarine shell species. There were eight species found: Neritidae (1), *Cerithidea* (2) *Chicoreus capucinus* (3), *Anadara granosa* (4), *Gafrarium tumidum* (5), *Saccostrea culcullata* (6), *Terebralia sulcata* (7) and *Telescopium telescopium* (8). With regard to the evenness of the shell resources, the distribution of shell species in freshwater is more even than in the marine/estuarine shells.

These findings may be attributed to the following factors, namely: the existing environment during that time and processing and meat extraction patterns. In summary, *Batissa* and Neritidae are the best choices for its quality based on the diet ranking of shells among ancient Ille inhabitants.

Crushing and squeezing structures on the occlusal surface of postcanine teeth of viverrids

Julia Hansen

The diet of viverrids is omnivorous, and most of them will feed on a variety of plant and animal matter. However, many viverrid species are showing a varying degree of specialization toward a

specific diet. Otter civets e.g. hunt fish and fossas prey successfully on lemurs. The least omnivorous viverrids are the palm civets, which feed almost exclusively on fruit.

An earlier study (Anders 2005) revealed considerable variation in the orientation and alignment of tooth rows. However, number, distribution and specific shape of basins and cusps in the postcanine tooth row were neglected. However, if crushing or squeezing represents a major portion of the masticatory process, this will be reflected particularly in cusp shape. A method to address this problem will be introduced.

The evolution of the vegetation in Southeast Asia

Marie Kalaghabian and Elif Tetik

Under the influence of glacial/interglacial cycles, climate changes and volcanism, the vegetation in South East Asia has periodically changed in physiognomy.

At the beginning of lower Pleistocene, the environment is composed of mangroves near the coasts and of rain forests on the further hills. At 2.5 My, a glaciation reduces the sea level and allows the appearance of land bridges between the continent and the islands. These are crossing points for animals and Men. Then, because of the climate oscillations, there is an alternation between rain forests and open forests. These are probably the environments in which the first Homo erectus of Java, dated between 1.8 and 1.2 My, have lived.

After, the landscape becomes, in majority, more open, with a lot of Herbaceous species, due to the moisture decreasing or volcanism. And when the temperatures decrease, the mountain taxa forests develop. The "classical" Homo erectus and the "evolved" Homo erectus are associated with an open environment.

Consequently, the development of this hominids has been possible and favorable in this latter kind of landscape, less hostile, and their evolution is, undoubtedly, linked to the environment evolution.

During Holocene, around Homo sapiens, the environment becomes comparable to the current one. And from 5000 years BP, the vegetation changes (regression) are due to human agent.

Geological observations and acheulian assemblages in the central Narmada Valley (India)

Satyadev Kaushik

The present paper describes the archaeological and geological observations in the districts of Hoshangabad and Sheore, with special reference to Hathnora and nearby regions, in the central Narmada valley, Peninsular India. It is in this context that the present research was initiated as an attempt in understanding past human behaviour, the signatures of which are preserved in the Pleistocene alluvial deposits of the Narmada valley.

The alluvial deposits, spanning from the Lower Pleistocene (provisionally) to the Holocene, have yielded evidence of vertebrate fossils, lithic industries and associated palaeoenvironmental data. The stratigraphical sequence reveals distinct litho units such as the Dhansi Formation (possibly Lower Pleistocene), Surajkund Formation and Baneta Formation.

The typo-morphological analysis of the stone tools, coupled with the metrical study, revealed a general continuation of the Acheulian techno-complex in the central Narmada basin. Due to the

lack of absolute dates, it is not clear if some of the bifaces belong to the Early Acheulian. The occurrence of several flakes in the Dhansi Formation (which is overlain by the Surajkund Formation at Bikhori-Budhni) if confirmed, may extend the antiquity of human occupation to slightly earlier than the Brunhes-Matuyama boundary.

A systematic study of post-depositional processes or site formation in several geomorphic settings is indeed needed at most of these lithic occurrences to understand their response to variations in fluvial regimes, following their discard by Pleistocene hominids.

Dental microwear study on Hominid fossils of south-eastern Asia: implications in terms of environment and subsistence

Alex Lee

Dental microwear study has been applied in palaeoanthropology, archaeozoology, primatology etc. for the reconstruction of ancient diet and environmental adaptation for more about 30 years. The classical method uses the SEM to record the teeth surfaces' images and analyze them in different ways. New 3D technology has been adopted recently to record

teeth surface in microroughness parameters. The buccal surfaces of 69 molars of southeastern Asian hominids have been analyzed in this study. Only a few of them conserved the occlusal surface. Our objectives include: (1) to observe the inter-group variations of the samples; (2) to infer the relation of the dental microwear and the type of subsistence; (3) to standardize the research protocol of the application of 3D microroughness technology. We have applied the classical method and the 3D technology. A new protocol and the S series amplitude parameters of microroughness analysis adopted in current study are firstly applied in dental microwear study. The results show a high accordance between two methods. The grouping according to the environmental difference but not taxonomic difference is significant in the Javanese *Homo erectus* and *Homo sapiens* samples. The abrasiveness of the diet between groups is also distinct.

Tektites Age Paradox

Tatiana Piron and Adrien Jurvilliers

At a collision between the Earth and a meteorite, terrestrial and meteoritic materials melt together to form small droplets of glass. These droplets are called "tektites" and are usually black or blackish brown, from opaque to translucent.

At the impact they are thrown out into the air and sometimes scattered over thousands of kilometres. We talk about *microtektites* when they are formed into the high atmosphere and measure less than 1cm and about *macrotektites* when they are greater than 1cm.

Four tektite strewn fields were so far discovered around the world and are linked to supposed meteoritic impacts. One of them is considered to have occurred somewhere in South Asia (in between with Mongolia and Indochina) and to have formed the so called *Australasian* strewn field.

Studies run in North Thailand suggest a correlation between the first tektite deposits and very high scaled local events, such as major floods.

These Australasian tektites had been dated by laboratory studies (Ar/Ar datations) and by relation between their stratigraphic position and a known event (Bruhnes/Matuyama palaeomagnetic boundary, established at 0.78My).

The tektites, and thus the impact event, are so estimated to be a few thousands years older than the B/M boundary, this is about 0.8My.

This very high chronological definition allows researchers to attribute an impact-similar or smaller age to the tektites bearing archaeological deposits.

The possible presence of tektites *in situ* should lead them to an exact situation of the bearing layer in the surroundings of 0.8My.

Very important are thus the implications of tektites in archaeology, as they contribute to define a maximum age for their bearing layers and to establish precisions, corrections and controversies about their dates.

However tektites are very small, and are thus very easily transported and reworked over the post deposit times. Moreover they are always very few to be discovered in the layers, such a fact forbidding solid conclusions.

So the greater part of the found tektites only date sediments that are much recent than the tektites themselves (this is the "*Tektites Age Paradox*") and numerous are the sites that just bear a few of them.

Difficulties to date archaeological sites (methods are limited and sediment records are sometimes very hard to read) don't always lead to efficient chronological correlations with tektites and can generate other imprecision.

The study of tektites seems thus very promising and even decisive, but the difficulties of the method can conduct to wrong estimations.

An Overview of Pacitanian Collection in Indonesia: Preliminary Result

Martha Rosintauli Bakara

Pacitan is one region in Java-Indonesia which is famous by a number of Palaeolithic sites distributed along the Baksoka River and some other places in adjacent areas. Following the discoverer of this Palaeolithic assemblage, G.H.R. von Koenigswald and also H. L. Movius, this assemblage was characterized by the type of Chopper-Chopping Tool, Hand adze, Proto Hand Axe, and Hand Axe. The majority of raw material is silicified limestone, silicified tuff, and fossil wood. They stated that the typology of this lithic assemblage can be defined as chopper Chopping tool complex that developed in East and South East Asia, and further more this is the main characteristic of typology in Pacitan. So they proposed to mention this culture as Pacitanian.

As long as they were mainly discovered as a surface finds, generally found on the river beds and river banks, their origin cultural layer is still unknown, so their dating can not be defined. These two cases are the main problems which occur within the assemblage of the Pacitanian. Based on these problems, Pacitanian is needed to be studied further.

The aim of this study is to determine whether, technologically and typologically, they are specific to this region or comparable to other Palaeolithic assemblages in the world. The study will include some collections from Indonesia and other institutions in Europe, and in this section, it will be presented the preliminary work focussing on the Pacitanian lithic industries from Indonesian collections.

Bone industry from Javanese Holocene sites (Indonesia): an identity cultural of the human

Kasman Setiagama

Bone, antler and tooth artifacts are quite common in both continental and insular Southeast Asian prehistoric sites (Bellwood, 2004). "*Bone and Antler Artifacts*" is a classical matter in Indonesian prehistoric studies, as such artifacts are commonly found in archaeological sites and frequently mentioned in publications: the term "*Ngandong Industry*" (Stein Callenfels, 1938) was used to address "Solo Man" 's culture and van Heekeren (1972) used "*Sampungian Bone Industry*" about the flake and blade complex of the "Mesolithic" period in Indonesia. More recent Indonesian prehistoric research standardized the typology mainly using the morphology of the artifacts: antler instrument, spatula, point, awl, double point, worked bone, etc. (Bagyo Prasetyo, 1999 & 2002).

The detailed study undertaken on the Song Terus collection will enlighten important aspects of human behavior and migrations during the Holocene in the rich area of the Gunung Sewu, especially by means of a comparative approach with the collection from the Braholo cave, Song Keplek, Song Tritis, Song Gupuh, etc. From Upper Pleistocene to early Holocene; bone modification by human was clearly observed. The bone technology; it was indicating by several specimens as "bone utilization" in Tabuhan level (80 – 40 000 y. BP), was clearly occurred in Keplek level (10 – 5 000 y. BP) as a really "bone industry" with a various kind of tools and decorated objects: adze, auger, digger, knife, necklace, point, pivot, pendulum, etc. These technical terms we refer as a synthetic name after observation from morphology aspect, raw material, bone technology, and use-wear characteristics.

The abundance of such artifacts in the Gunung Sewu Holocene archaeological horizons led us to undertake their study from different points of view, including: morphology and typology, but also archaeozoology, as well as microscopic –including MEB- description of modification and use wear. These approaches are considered within the global frame of the archaeological record: stratigraphy, taphonomy, and other contextual aspects (such as the particular excavation near a 9300 y.o. burial).

Chronology of Zhoukoudian Locality 1

Qingfeng Shao

Zhoukoudian hominid specimens, commonly known as "Peking Man" first discovered in 1929, have been widely recognized as representative of *H. erectus*.

The cave sediments at Locality 1, which are more than 40 m thick, have been divided into 17 layers, numbered from top to bottom. Human remains were found in almost all the Layers (1-10), and additional animal bones were uncovered also in the deeper deposits.

Since the first attempt to date the Zhoukoudian site with $^{230}\text{Th}/^{234}\text{U}$ by Cherdyntsev in 1971, many dates have been published for the layers of Locality 1. It has been widely accepted that the hominid remains were in the range of about 230-500 ka. However most of these dates are based on electron spin resonance (ESR) and U-series dating of bone and tooth that are not closed-system for uranium and its daughter nuclides.

As the advancing of dating technique the earlier established chronological framework of Zhoukoudian Location 1 has been challenged by thermal ionization mass spectrometric (TIMS) $^{230}\text{Th}/^{234}\text{Th}$ dating with speleothem samples collected from Layer 3 and Layer 5. The new results

show that the age of the No. 5 Skull from Lay 3 is >400 ka, possibly in the range of about 400-500 ka, and that the hominid fossils from the lower strata (8-9, 10, 11) are at least 600 ka and possibly >800 ka (Shen, 2001).

The lower strata of Zhoukoudian don't have reliable absolute dates until now. The B/M boundary was correlated with Layer 14 by Qian (1985), which indicates the maximum chronology, 0.78 Ma, for the overlying deposits. However the paleomagnetic study may also be suspect, because only 27 samples were measured out of a 48 m thick sequence.

To decipher the chronology of lower strata of Zhoukoudian Locality 1, we have been trying to use the recently developed cosmogenic radionuclides $^{26}\text{Al}/^{10}\text{Be}$ dating method (with upper limit of 5 Ma) with quartz samples collected from Layer 8-9 and Layer 10. With two years effort, our primary result indicates that the deposits below Layer 8-9 possibly were buried at ca. 1 Ma ago. If our estimation is confirmed, it will have important implication for understanding hominid evolution.

Analysis of Ceramics from the Phum Snay Archaeological Site; a Prehistoric Cambodian Burial Site and Settlement

Sophy Song

In 2001, an important archaeological site was found accidentally when people from a small community in Phum Snay (northwest Cambodia) built a road. Many artifacts and faunal remains were discovered, including human bones; animal bones; metal (bronze and iron artifacts, including complete swords, spears and daggers), numerous foreign and local beads made of glass, metal, ceramics and precious stones; and an incredibly diverse collection of ceramics. Most of the ceramics were decorated with variety of designs. The designs and ceramic technology sparked my interest in pursuing detailed research.

The resources and processes of my research include the following:

- ◆ Field survey in 2003
- ◆ Analyzing data from collections obtained from the 2001 excavation, stored in Laboratory in the Faculty of Archaeology, Royal University of Fine Arts, Phnom Penh. This included multiple site comparisons from other site collections.
- ◆ Classification of ceramics; particularly by identifying elements of the outer portions of potsherds.
- ◆ Photography (including digital imaging) and drawings.
- ◆ Analyzing potsherds in Singapore, with the help of Dr. David Kyle Latinis. This included Compositional Analyses (Material Characterization Research) conducted at National University of Singapore laboratories in order to understand ceramic production, exchange and source locations. 30 potsherds from three different sites were included in EDXRF and thin section analysis (10 potsherds each from PHUM SNAY, KROSANG THMEY and KOH CHHNANG Sites).

As a result, the PHUM SNAY ceramic study, comparative classes were divided as:

- ◆ Earthenware, Stoneware, Phimai Black (possibly related to the Phimai site in Thailand, research by Dr. David Welch and others).
- ◆ Decorations included slips similar to the circular earthwork site in Krek 62/52, glaze (similar to pre- to post-Angkor sites), painting (similar to the Funan and pre-Funan ceramics at Angkor Borie and Oc Eo), and many other embellishments reminiscent of Pre-Angkor sites such Sambor Prei Kuk, Angkor period sites and Iron Age sites throughout the region. In fact, a long temporal sequence is stylistically represented in the area.

- ◆ Other design differences include incised waves, lines, chevrons, and arrow heads (as well as other design patterns) that show similarities and differences with other site assemblages in the region.

Local people were using ceramics since prehistoric periods and continued throughout the Angkor period. Decorations on ceramics have occurred in every period and at numerous sites. Some have different degrees of similarity and difference. Decorations demonstrate a sophisticated level of effort and aesthetics. They were obviously meant to make the pottery more beautiful in addition to functional purposes.

Because there are Phimai Black potsherds in Phum Snay and an ancient road linking the Angkor Area to Phimai through the region, it is hypothesized that Phum Snay may have had a significant linkage with sites in Thailand and also with the surrounding sites as Krosang Thmey and Koh Chhnang. Future research and study will provide us more understanding of the Phum Snay site, its duration, demographics, history and connection with other settlements in ancient history.

The proposed project will fill gaps in prehistoric and early proto-historic understandings of ancient Cambodia. Thus far, few studies have been conducted. Studies such as this will provide vital information for understanding the development of ancient mainland Southeast Asian societies and exchange networks which eventually evolved into powerful polities such as the Pyu, Pagan, Dvaravati, Cham, and Angkor.

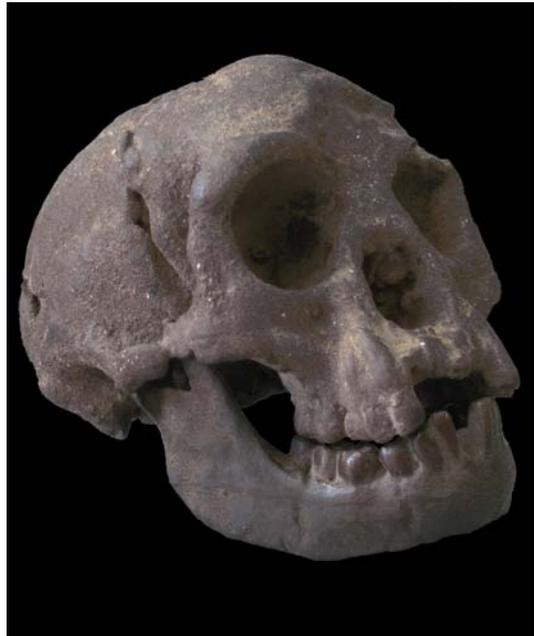
Halfling or Halfretarded?

Anneke H. van Heteren

Homo floresiensis is a small bodied hominin from the Indonesian island Flores. The type specimen, LB1, is believed to be a female of approximately 1 m or a bit more than 3 feet in length with a cranial capacity of around 400 cc. There is still no agreement on the cause of the small stature and small cranial capacity of LB1 and the associated individuals.

The most likely explanation is that *Homo floresiensis* is a typical hominin island form, which can be expected on an island such as Flores, because there are also other endemic island faunas present. *Homo floresiensis* displays several island adaptations, which also have been observed among the members of other typical island faunas, indicating that *Homo floresiensis* might very well have been an endemic island form.

Homo floresiensis has little prognathism, shortened lower limbs. And *Homo floresiensis* has the morphology of a *Homo erectus* juvenile, since it has a high orbital, dental and brachial index, low humeral torsion, low tibial torsion and a high gonial angle.



The features displayed by *Homo floresiensis* give an indication of the manner of dwarfing, which was by truncating growth through increase in the rate of skeletal ossification, possibly caused by hormonal changes.

Predator Prey Relations in Pleistocene Faunas in different Pleistocene faunal levels in Java

Rebekka Volmer

The composition of mammalian faunas in Java during the Pleistocene changed through time. Several predator species appeared and disappeared from one faunal level to another. Moreover, potential prey groups are changing as well. An ecosystem is characterised by interspecific relations like predator-prey-relations. By alterations in the composition of faunas it is expected that the predator-prey-relations are changing as well.

The aim of the present study is to reconstruct predator prey relations for different faunal levels of the Pleistocene in Java and to show how these interspecific relations have changed by time.

The body masses of felids scale with their prey focus mass. Thus, if the body mass of a fossil felid is known, its prey focus mass may be calculated by a regression term.

If the body masses of the potential prey are also known, it is possible to reconstruct the predator prey relations for each faunal level. Hence, body masses of carnivores, i.e. regressions to reconstruct the prey focus mass of felids, canids and hyaenids, and body masses of potential prey groups are required for reconstruction of predator prey relations for each faunal level.

The body masses of fossil ungulates may be reconstructed. The method is based on different dental, cranial and postcranial parameters. This is also possible for fossil carnivores, but the methods include fewer parameters than those for fossil ungulates. The resulting problem is that fewer fossils can be used for the reconstruction of body mass. The prey focus masses of felids can be reconstructed by an existing regression. This regression cannot be immediately transferred to hyaenids and canids, but scaling of body mass and preferred prey mass may reasonably be expected in these families as well.

Thus, two methods will be developed in the present study. Firstly, new regressions for reconstructing body masses of fossil carnivores based on a larger number of dental and cranial parameters. Secondly, a method to reconstruct prey mass spectra of fossil canids and hyaenids will be established. These new methods will be used to reconstruct the body mass of the fossil carnivores in the single faunal level of the Pleistocene in Java. The prey mass spectra will be reconstructed in the next step. In combination with results of about body masses of Pleistocene ungulates the predator prey relations will be reconstructed.

Reconstruction of body-masses of Plio-Pleistocene rhinoceroses in Java and continental Southeast Asia on the basis of the von Koenigswald collection

Andreas Wagner

Dependencies arise between numerous parameters of body size, which evolve uniformly. In this context it is possible to gather information about fossil teeth from comparison with recent teeth by developing regressions. These regressions are generated from all extant rhinoceros species and fossil teeth from the von Koenigswald collection. Body size allows drawing conclusions about preferences in habitat and food. It is also important in ecological reconstructions. This diploma thesis in its early stage bases mainly on the work of Christine M. Janis, who calculated regressions for all ungulates, kangaroos and various subspecies within the ungulates to differentiate feeding types.

Paleoenvironment in Sangiran during Pleistocene time based on fossils reptiles records

Donan Satria Yudha

Fossils of Reptilian Class member in Sangiran mostly found in Pleistocene deposit. The site of the Reptilian Fossil took place in some islands in Indonesia, which are: Java Island; West Java (Bandung), Central Java (Sangiran and Bumiayu), East Java (Ngawi, Trinil and Bojonegoro), Sulawesi Island; South Sulawesi (Sompoh, Tjabenge and Tjeleko), Timor Island; (Atambua and Raebia). Sangiran which is located in the Central Depression or Solo Physiographic zone, is one of the most important places in Java where Late Tertiary and Quaternary rock formations are exposed and yield abundant fossils. The aim of this research is to reconstruct the paleoenvironment in Pleistocene time correlated with these fossils Reptiles record found in Sangiran, and compare it with the valid stratigraphical data of Sangiran area. Based on my previous research, there are six family in the Reptilian Class member found in Indonesia generally and Sangiran specially, which are; Crocodylidae, Gavialidae, Testudinidae, Trionychidae, Cheloniidae, Varanidae and Pythonidae. According to fossils Reptiles records it can divide paleoenvironment in Sangiran into several different environment, and after arrange it in order, based on stratigraphical data, from the oldest sediment to youngest sediment (environment). Kalibeng formation (Upper Pliocene) : consist of dark grey to bluish-grey marls, clays and calcareous sandstones with many sea turtles and crocodiles fossils remains it shows shallow marine deposition. Pucangan formation (Lower Pleistocene) : the lower part of black clay there are blue- grey clay with many sea turtles fossils remains it is indicating a marine-freshwater transitional environment, such as an estuary or a bay, the upper part of black clay member consists mainly of freshwater black clay, and with evidence of some fossils crocodiles and turtles remains probably of lacustrine. Kabuh formation (Middle Pleistocene) : The basal part of this formation consists of lenticillar calcareous conglomeric sandstone layers of less than 2 meters thick, called the "Grenzbank" or boundary layers. The environment changed from marine into continental environment because some evidence from Varanidae and land turtle (*Geochelone*) for land habitat, and present of Crocodiles and Gavials for the freshwater (river) habitat. Notopuro formation (Upper Pleistocene) : This formation consists of mostly volcanic materials such as volcanic sandstones, conglomerates and breccias with cobble to boulder-size andesite fragments. Notopuro Formation is interpreted as has been deposited in a non marine environment, influenced by heavy volcanic activities during the Upper Pleistocene.

Bovidae and Cervidae migrations from Asian mainland to Indonesia during the Quaternary

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During the Quaternary, there have been some glaciations, inducing a global lowering of the marine level and being able sometimes to create land connections between islands or between mainland and islands. Seeking heater conditions, Cervidae and Bovidae could have taken advantage of those bridges to go more to the South, from Asian mainland to Indonesian Archipelago. The study of faunal succession and evolution on Java shows successive waves of migration of mammals fauna.

There are cervids in the Satir fauna (1.5 My) but it seems to be an island condition. Actually, it has been observed that some cervids can swim for 100 kilometers because of their digestive system which produces abundant gases and make them good floaters. It is not a real immigration.

Few large bovids and lots of deers are observed in the Ci Saat fauna (1.2 My) which means there were a land connection with the Asian mainland and a first little wave of migration. The Trinil H.K.

fauna (1 My) shows more large bovids (like *Bubalus palaeokerabau* and *Bibos palaesondaicus*). Between these two faunas, there is an open woodland palaeo-environment, and also relatively dry conditions.

From Early-Pleistocene to Middle-Pleistocene, important sea level recessions (about -150 meters) created a wide corridor across the Sunda Shelf. The Kedung Brubus fauna (0.7 to 0.8 My) highlights the maximal interchange with Southern Asia mainland with numerous arrivals of bovids (like *Epileptobos groeneveldtii*) and cervids (like *Rusa* sp.).

The Ngandong fauna is close to the Kedung Brubus fauna and also shows an open woodland palaeo-environment.

During the penultimate low sea level of the Saale Glaciation (Late Pleistocene), the Sunda Shelf was fully emerged, allowing dispersal from Southern China and Vietnam, which can be seen in the Punung fauna (60-125 ky). A sea level lowstand of around -50 meters and humid conditions allowed the development of a tropical rainforest (confirmed by palynology and mammals fauna).

And the Wajak fauna (Holocene, 6-10 ky) show the come back of an open woodlands palaeo-environment, in which human factors have certainly influenced the composition of the fossil fauna.

It can be deduced from that faunal succession at least five immigration waves of Bovidae and Cervidae :

Satir, Ci Saat → Trinil H.K. → Kedung Brubus → Ngandong, → Punung → Wajak.

Two ways of migration could have been used by Bovidae and Cervidae, the Sino-Malayan way and the Siva-Malayan way. But The Siva-Malayan way is the most probable Pleistocene route because the exposed Sunda Shelf easily allows migrations from South-Eastern Asia to Java. The Sino-Malayan way could have been an alternative road because of the isolation of the Philippines from the mainland. Endemic species in Sulawesi and others island far from the mainland could have evolve from species which have migrate by the Sunda Shelf and continued their migration more to the South-East.