MASTER “EVOLUTION, PATRIMOINE NATUREL, SOCIÉTÉ
SPÉCIALITÉ « QUATERNAIRES ET PRÉHISTOIRE »
ERASMUS MUNDUS MASTER « QUATERNARY AND PREHISTORY »
ASIA LINK PROJECT « HUMAN ORIGINS PATRIMONY IN SOUTHEAST ASIA »

MASTER MODULE « PREHISTORY OF SOUTHEAST ASIA »

LECTURES ABSTRACTS
An international module about Southeast Asian Prehistory
François Sémah and Christine Hertler

1- Institutional aspect
This module is organized in the frame of both the HOPSEA (Human Origins Patrimony in Southeast Asia) project (Asia-Link Program) and the International Master course “Quaternary and Prehistory” (Erasmus Mundus Program).

Its purpose is to promote, on a regional topic, scientific exchanges between teaching-staff, PhD students, and Master students from various countries, as well as present and future co-promotion of Master and PhD theses.

Validation will be acknowledged by the members of the Erasmus Mundus consortium “Quaternary and Prehistory” and by the Johann-Wolfgang Goethe Universität (Frankfurt/Main). At this stage, the commonly-organized validation of the module is considered as a pioneer action towards mutual acknowledgment of credit between Asian and European universities, as encouraged by the European Commission (cf. the Action 3 application of the Erasmus Mundus consortium, the ASEM DUO Program, the Erasmus Intensive Program to be organized in 2007).

2- Scientific aspect
The module is built every year as seminar series intended to share recent field and laboratory experiences of involved teaching-staff and students, includes some fundamental lectures linking the module with more basic ones taught during the cursus the students originate from, and a limited number of lectures expanding its scope, regionally and methodologically as well. In the future, the coupling with Johann-Wolfgang Goethe Universität should lead to a parting of lectures on Human Evolution and Palaeobiology in Frankfurt, prehistoric behaviour and geological aspects being taught in Paris.

3- Activity examples
The module will comprise as well several open meetings of the Asia Link network meant to prepare and promote its activities : among them are the meetings about the e-learning module on Human Evolution and the debate about the field schools and excursions organized in Asia and in Europe by the members of the network.
**Mojokerto Delta, East Jawa: Paleoenvironment of Homo modjokertensis—First Results**

Frank Huffman and Yahdi Zaim

The hominid have been discovered at Perning in 1936, attributed to *Homo modjokertensis*, is the focus of current research because this fossil is far older than any other from a maritime paleogeographic setting and may be the oldest hominid known outside Africa.

Newly found documents from 1936-1938 support the statements of the discoverers that the discovery was found *in situ* in Plio-Pleistocene bedrock. These documents have allowed us to relocate the discovery site, and examine the stratum in which the hominid was found. The bed formed as a bar in a swift-flowing river channel on a delta plain of the ancient Mojokerto Delta (named herein). The local sedimentary sequence containing the hominid bed provides paleoenvironmental information on the shallow sea, the marine-delta front, the delta plain (flood plain and river channels), and a long-standing delta interfluve (paleosol) where *Homo erectus* might have lived.

Test excavations at the hominid site during 2001 and 2002 field seasons produced 250 fossil vertebrates. The nature of the recovery suggests that additional hominid remains may be found in the bed. Fossils from the excavations and nearby surface collecting suggest that deer, muntjak, bovids, pig, hippopotamus, rhinoceros, *Stegodon*, and large cat inhabited the delta, together with *Homo erectus*. Mollusks, turtle and crocodile were recovered from the excavation, and inhabited the river. The fossil of a giant tortoise was recovered from a nearby locality.

The good state of preservation of *Homo modjokertensis* relative to the high-energy fluvial sediment in which it was found indicates that the skull probably was transported a short distance from its life habitat, and therefore *H. erectus* was likely to have been a member of the community of animals that lived in the Mojokerto Delta. The delta contained a variety of potential hominid foods. Fossil evidence for large terrestrial mammals, mollusks, other aquatic animals, fruit-bearing trees, and an edible fern has been found so far.

**Explosive volcanism and tephrochronology: the examples of Indonesia and Philippine archipelagoes**

Sébastien Nomade

Southeastern Asia and particularly the Philippine and Indonesia archipelagoes correspond to a wide deformation zone that includes subduction zones. Subduction zones are important sites of the earth surface because they are regions of intense volcanism. Volcanism in this tectonic context is essentially explosive and generates deposits of various size fragments named tephra. During the last 600 Ka, climate and human evolution were modified by large eruptions from this region of the world (e.g. the Toba tuff eruption 71 000 years ago). Furthermore, it is now known that more recent eruptions even changed the course of history.

Because this region is one of the most active areas of the world (more than 400 volcanoes in the Philippine archipelago) we could take advantage of the tephrochronology technique to generate a chronological framework in which palaeoenvironmental or archaeological records can be placed. Tephrochronology utilizes discreet layers of widespread tephra—volcanic ash from a single eruption. Each volcanic event has a unique chemical 'fingerprint' that is identifiable in its fallout and that could be dated using radiochronological tools such as C14 and 40Ar/39Ar. These layers provide opportunities to calculate eruption frequencies, volcanic provenance and to date paleoanthropological sites. This technique was applied successfully in several volcanic areas such
as eastern Africa, Iceland, and southern Europe. Unfortunately, because of the poor inland record such tephrochronology is lacking in the Indonesia and Philippine archipelagoes.

In June 2006 the Marco Polo II international cruise (chief scientist Dr. Carlo Laj, CEA, LSCE, France) on board the French oceanographic vessel Marion Dufresne collected more than 17 marine sediment cores all around the Philippine archipelago. These cores probably represent more than 3 Ma of volcanic record. Tephra collected in these cores will be studied using geochemical and radiochronological techniques and will provide the first tephra database to the geological and archeological communities.

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**Imaging methods and fossil and fossil hominid collections**

Friedemann Schrenk and Antoine Balzeau

The limited number of available fossils and their accessibility are two limiting factors for anthropological studies. Imaging methods open new perspectives.

First, we discuss the new opportunities offered by the application of computed tomography, particularly in terms of preservation of the fossil hominid collections, and present some examples of paleoanthropological studies of internal, and previously unstudied, morphological features. The computed tomography permits to register, to preserve and to share our cultural heritage and opens new perspectives of research while giving access to the internal features such as the endocranial morphology, the pneumatization, the tabular tables and the diploe, the internal ear, the conservation, distortion and mineralization states.

Then, we detail a pluridisciplinary approach and discuss the potential of “Occlusal Fingerprint Analysis” for quantifying individual wear pattern of tooth crowns using optical 3-D topometry.

Occlusal fingerprint analysis (OFA) is used to interpret the relief and functional aspects of primate teeth. Information about food ingestion and mastication behaviour during the life span of an individual is encoded in the wear pattern. In order to decode this information we measure structural parameters, like strike and dip of cusp slopes and wear facets. The dental occlusal compass, which indicates the pathways of interaction on antagonistic cusps and basins, can also facilitate the interpretation of growth, fusion and position of wear facets.

The current OFA studies show that modern apes and humans develop a very similar overall wear pattern, referred to as background pattern. This background pattern is formed due to crown shape and relative position of cusps and basins in the lower and upper jaws during occlusion. The foreground pattern is an individual feature, reflecting the pressure distribution due to a distinctive behaviour of the masticatory system. Since the complex wear produced through background and foreground pattern is unique for each individual, it is termed occlusal fingerprint (OF).

The data acquisition is based on high resolution surface models of jaws and teeth generated by an optical sensor system (optoTop). The strike of a region of interest is measured, according to the longitudinal axis of the tooth, and the dip with reference to cervical plane orientation. The average orientation of defined surfaces in three dimensions is presented in stereonet diagrams. Each molar is characterized by its specific stereoplot pattern.
There is more than one century that the importance of biodiversity and knowledge of the humanity story in Southeast Asia is recognized. We are indebted to Eugene Dubois who found the first specimen of *Pithecanthropus erectus* in 1891, which is one of the most prominent discoveries in human palaeontology history. Since that time, the discoveries were developing until present, when it was found the enigma *Homo floresiensis*.

The process of the human evolution in this region was undergone during more than one million years, represented by *Homo erectus* and *Homo sapiens* from Lower Pleistocene up to the Holocene. In this case, *Homo erectus* shows three stages of evolution which are archaic one (Sangiran 4, 6a, 27, 31…) in most ancient layers of Lower Pleistocene, classical *Homo erectus* (Sangiran 2, 10 , 12 , 17, 21, 38 ….) in the early Middle Pleistocene and more evolved one (specimens from Ngandong, Sambungmacan and Ngawi) from the upper part of the Middle Pleistocene.

The presence of *Homo sapiens* in Southeast Asia is identified from the late Pleistocene. They are the specimens from Niah in Borneo (Malaysia), Wajak in Java (Indonesia), Tabon in Palawan (Philippines) and Moh Kiew (Thailand). These human fossils are interpreted to be living during the period of 45 000 to 15 000 BP.

From the beginning of the Holocene, the human remains were dominated by the Australomelanesids, where we can find their existence until the western and southern parts of the Indonesian archipelago. They were assumed to be originated from the mainland Southeast Asia. In the middle of the Holocene, these Australomelanesids were replaced by the new comers, the Mongoloids, interpreted coming from the North, according to the theory of “Out of Taiwan”. The last mentioned are actually occupied a large region in the world from Madagascar in the west, Taiwan in the north, New Zealand in the south, and Pacific in the east.
The main access element of the elearning object “Expeditions to the roots of humans” consists of a world map with time bar. By selecting a specific site in a particular time frame, a respective site card providing brief descriptions of the selected locality including recent datings, hominid fossils discovered and potential other fossil bearing formations pop up. As yet the object contains data on more than hundred fossil localities and/or formations. The database part of the object works basically language-free and is thus already available for non-German speaking users.

All explanatory and teaching modules, i.e. hominid descriptions and side quests, are presently available in German language only. The hominid descriptions are accessible by clicking on the taxa in the site cards. A new window opens and provides information on skull anatomy, dentition, and skeleton of the respective hominid species as well as brief descriptions of their temporal and spatial occurrence. At present, descriptions of seven hominid groups exist: early and gracile Australopithecines, members of the genus *Paranthropus*, early representatives of the genus *Homo*, *Homo erectus*, Neanderthals and anatomically modern humans.

Side quests are accessible via the time bar. Upon first entry (and in general without entering a password on the first page) just the lowermost section of the time bar is accessible. Upper sections are blocked. Blocks are marked by dark blue bars besides the time bar. Those blocks can be unlocked by working on a specific topic. Upon passing a test (usually three to five multiple choice questions) the following section of the time bar is unlocked and the ruler can be moved further on. Moreover, the user receives a password, with which he or she is able to unlock those side quests already passed.
At the moment just a single side quest is working and ready to operate, i.e. the one on Neanderthal biology. If you wish to unlock the time bar as far as the Neanderthal side quest, enter password “8”. If you wish to unlock the complete time bar from the beginning, enter password “12”. The following topics are expected to be treated in the side quests:

- Evolution of bipedality
- Geographical variants in the genus Australopithecus
- Evolution of the genus Homo
- Stepping out of Africa for the first time
- Brain evolution, culture and language
- Pleistocene island hopping
- The first Europeans
- Regional evolution in Zhōngguó
- Neanderthal biology (already available in German!)
- Evolution of modern humans
- First mariners
- Settling the Americas

The side quests are modularly organised, i.e. if desired or required single topics may be exchanged through other topics, i.e. the same template may be also used for the presentation of archaeological sites.

The expeditions were launched mid July 2006. Since then, approx. 1,000 visitors from more than a dozen countries have joined the expeditions. Unlike other web-based programmes on human evolution it enables the user to decide for him- or herself which time slot and/or region he or she wishes to explore. It does not tell a preconceived story. The expeditions allow drawing your own conclusions on human evolution. This elearning object thus demands presentation in different teaching contexts and responsible users.

**Didactical scenarios**

The expeditions may be used in different teaching contexts, some of which critically depend on language capabilities and are thus at present not open for non-German speaking users.

**Scenario 1**: Using the database part of the object for slides in lectures on human evolution. Since the database part of the object works language-free, this option is already open for all users. Internet access during the presentation or local installation of the object is required. A brief presentation of this context will be given during the demonstration.

**Scenario 2**: Practical classes in comparative anatomy of hominids. The hominid descriptions can be used in the classroom as instructions to explore hominid characters. Technically, internet access for single students or small student groups is required. At present, hominid descriptions
do not contain specific advices, which thus have to be provided by the teacher in the classroom. However, it is planned to add worksheets for download and print.

**Scenario 3**: Exploring human evolution from home. In particular the side quests require a lot of attentive reading. Students may also work on those tasks as homework. However, in order to ensure and check intended advances, follow-ups in classes are required.

**Access**

The German version hominid site world map is available online under the following address:


**Technical remarks**

The world map itself has a comparatively small size. All additional information is loaded on demand, i.e. when a specific site or other feature is actually accessed. This ensures short loading periods and usability even with a slow internet connection. However, in case internet access proves too unreliable, offline versions running on local computers or restricted networks are available.

The object can be operated by every common internet browser (e.g. Microsoft Explorer, Mozilla Firefox etc.). As technical prerequisites, Java scripts should be activated and a recent Macromedia flash plugin needs to be installed. The object checks plugin status on access.

The prehistory of Taiwan in the frame of Southeast Asian old settlements

Yi-Chang LIU

Abstract not yet received

Jade in Neolithic continental China

Christophe Comentale

Abstract not yet received

Early Southeast Asian long-distance exchanges

Bérénice BELLINA

This course will present recent data on the early long-distance exchange that developed during the Iron Age. These connected distant Southeast Asian social groups, and also linked those to some of South Asia. The course will present a brief historiographic overview of the topic, the so-called “Indianisation process”, as well as the evidence in hand that allows us to define two main phases in the early exchange: the Iron Age and the Early Historic period.
The Austronesians Migration

Harry Widianto and Truman Simanjuntak

The Austronesia speaking people, known also as the Austronesians, is nowadays occupying a very vast region in the world. Their dispersal is identified from Madagascar in the west, Taiwan in the north, New Zealand in the south, and the Pacific in the east. In the term of bioanthropology, they are classified within certain morphological features defined as the Mongoloid race, the main race living today in that region.

Many theories are colouring their origin and dispersal. One of them is “Out of Taiwan” theory, mentioning that the Austronesians came from Taiwan in 6,000 BP, migrated to the south to Indonesian archipelago in 4,000 BP, then moved eastward, and reached the Pacific in 2,000 BP. Figuring their rapid migration, this theory is also called as “Express Train to Polynesia”.

The second one is “Southeast Asian Homeland”, mentioning that the first Austronesians was of origin of Sunda-land, then dispersed to all directions due to an important marine transgression sometime about 8,000 years ago. These two theories are still the great competition now. This lecture will illustrate the migration of the Austronesians, mainly based on the palaeoanthropological evidence.

The Prehistoric Sites of Obluang (Thailand)

Marielle Santoni
The sites at Obluang were excavated from 1985 to 1988 by the Thai-French Prehistoric Research Project, a long term project to study the culture history and to establish a tentative chronology for the prehistoric periods in a circumscribed area of northern Thailand.

Discovered in 1984 by S. Prishanchit (Fine Arts Department of Thailand), in the National Park of Obluang (17 km northwest of the town of Hot, about 100 km southwest of Chiang Mai), the archaeological remnants of the occupation are spread on the slopes of the hills that border the River Mae Chaem (a tributary of the Mae Nam Ping) that flows there in a deep and narrow gorge which gives its name to the site (Ob-luang = Great Gorge). On the left bank were excavated two areas corresponding to different periods ("Hoabinhian" industry and Bronze Age), and on the right bank, a Neolithic settlement.

The Palaeolithic settlement: Pha Chang Rockshelter

The Hoabinhian settlement is situated under the Pha Chang rockshelter ("Elephant shelter"). The wall of the shelter bears two series of paintings. The more recent ones (white pigment) represent several figurative motifs (elephants, unidentified animals, human shapes). They overlap more ancient paintings (red pigment) erased and no longer recognisable, probably contemporaneous with the prehistoric occupation of the shelter: several fragments of haematite, which had obviously been used, were retrieved from the deepest layers. The material recovered includes mostly broken bones, snail shells and stone implements (fig. 1), mainly quartzite: complete or broken pebbles, pebble tools (core tools and flake tools), waste flakes. Remarkable is the presence of a few flaked rock crystal and other silicious rocks. The raw material is exogenous, but the flaking was carried out under the shelter. On the whole, the lithic material seems homogenous enough. The occupation, not very large, may have been quite long, but represents only one cultural period, the base of which has been dated of 28 000 BP on fragment of burned bones.

The Neolithic settlement: Obluang – Village

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1 The field team included, on the French side, Marielle Santoni, Jean-Pierre Pautreau, Stéphane Vacher, Sylvie Jérémy and on the Thai side, Sayan Prishanchit, Tassna Doy-Asa
The Neolithic settlement is located a few hundred meters upstream from the gorges, at the confluence of a small stream with the river. The material recovered includes polished stone tools (mainly axes-adzes, often re-flaked: fig. 3) made out of a black shale, partly metamorphic, which is not to be found locally at Obluang and may have been imported from Mae Chaem basin (about 60 km north of Obluang); cord marked ceramic, sometimes incised (fig. 2); bone tools, etc. Pebble tools were also found on the bed-rock.
The Bronze Age burial at Obluang

The “Bronze Age” is evidenced by an isolated grave. On the skeleton (dorsal decubitus), badly damaged, was found a necklace of small discoidal-shaped shell beads and a single cylindrical bead of carnelian. The two fore-arms were encircled by bracelets of bronze and marine conch. Above the pubic region were found two broken bronze circlets. Grave furnishings (concentrated near the feet) were exclusively pottery (7 round-bottomed vessels, 7 chalice-shaped bowls with pedestal, cord marked and incised) different in style from the one found in the village (fig. 4 & 5).

Fig. 4 : Chalice-shaped bowls, bronze and conch-shell bracelets from the grave

Fig. 5 : Cord-marked and incised round-bottomed vessels from the grave
Palaeolithic occupation in Asia: continent vs. islands

Claire Gaillard

Human occupation in Asia is attested, right from 2 My, by lithic assemblages as in Longgupo (China) or Riwat (Pakistan). In island South-East Asia, no assemblage is dated to such an early age, but the human fossils, dating to 1.6/1.8 my, are almost as old as the earliest traces of activity. The first lithic industries in Asia are composed of flakes and large trimmed blanks.

From 1 my, increasing remains of human activity occur throughout all Asia, up to Java, and at that moment the first typical Acheulian implements do appear: hand-axes and cleavers. They are more than 1 My old at Isampur (peninsular India), 0.8 My at other sites in India (Morgaon, Didwana), in China (Bose) or Indonesia (Ngebung). This Acheulian tradition, with either hand-axes or cleavers as main large cutting tool (maybe in relation to the raw materials) continues till the end of the Middle Pleistocene (Dingcun, China).

But the Acheulian technical tradition was not adopted by all people during Middle Pleistocene, as shown in some sites. The most significant example is the loess sequence in Tajikistan that covers the entire Middle Pleistocene and never yields any Acheulian artefact from the many occupation floors it contains. In North Asian and North China (Zhoukoudian) the Acheulian tradition also seems to be missing. The Flores island, occupied from more than 0.8 My, is in the same situation.

In certain settings, geographical isolation obviously interferes, but in many situations other factors must be considered to explain the absence of Acheulian, whereas this tradition is so widely spread in the entire Old World during the Middle Pleistocene.

Natural hazards in Indonesia and their Influence on Human Settlement

Franck Lavigne

Indonesia is often called “the country of disasters”. The 26 December 2004 tsunami itself took more than 170,000 lives in Aceh province, and the 16 July 2006 tsunami disaster added 750 deaths on Java. This country is under the threat of multiple natural hazards of geological origin – earthquakes, volcanic eruptions of different types, and tsunami. In addition, the humid equatorial and tropical climate is responsible of heavy rainfalls that trigger landslides, mudflows (lahars), and floods everywhere in the country. During the dry season, from May to October, forest fires are devastating thousands of hectares in Borneo and Sumatra Islands. However, with more than 230,000 inhabitants, Indonesia is one of the most populated countries in the world. Do natural hazards and past disasters influence the population distribution? Through a presentation of the main natural hazards and an analysis of some past disasters, we will show that the human settlements poorly take into account the natural hazards, mainly due to cultural reasons.
The presence of hominids in the Southeast Asia is attested for approximately 1.5 MY, with Homo erectus who colonized the Indonesian Archipelago, following the new land bridges developed during the glacial periods.

From this period, the vegetal environment evolved according to the climate; then, gradually, the hominids played a part on this environment, combining their activities with the climatic impact to change the landscape.

When they arrived, during the Lower Pleistocene, they crossed the equatorial area and lived in a rain forest environment.

And then, during the Middle and the Upper Pleistocene, drier and cooler conditions developed, with the monsoon forest (more seasonal one) until, sometimes, savannah.

The modifications of the landscape by man were underlined very soon, here and here, from 28,000 PB, before clearance of the forest and horticulture.

The climatic change registered after the LGM, during the Holocene, is marked by more humid and warm conditions. At this time, we notice intensification in the climatic variability and, since 5000 BP, intensification in the El Niño events and in the same time the beginning of agriculture.

Many palynological studies associated with micro charcoals analysis, underline the presence of men and their action on the vegetation.

Examples, taken in Central Java, in the Gunung Sewu complex (three swamps near the Song Terus Cave), underlined that since 3500 BP (during the Neolithic period), Homo sapiens progressively encouraged the development of pre existing plants like Arenga or Pandanus, very useful for him. Analysis with pollen, micro charcoals and phytoliths, finally shown that he cultivated rice and then maize.
Archaeostratigraphical study of cave deposits at Java: Song Terus and Goa Tabuhan sites

Marie-Agnès Courty and Xavier Gallet

This presentation intends to give the basic principles of the microstratigraphic study applied to Prehistoric cave and rock-shelter deposits, here illustrated by sites of Song Terus et Goa Tabuhan (Java). These basic principles are articulated as three inter-dependant research interest:

(1) The recognition of archaeostratigraphical units needed to sketch the stratigraphic, microstratigraphic and chronostratigraphic frame based on the integration of field observation and analytical data obtained from a wide range of techniques.

(2) The multidisciplinary approach of all archaeological data within their depositional content with respect to the evaluation of the quality of the archaeological signal and the palaethnographic reconstruction of occupation units.

(3) The recognition of depositional conditions synchronous to phases of human occupation and their interpretation in terms of rhythms and role of palaeoenvironmental changes.

The caves of Song Terus and Goa Tabuhan (Java) are located in Punung region at the Eastern part of Java Island. The combined action of karstification, tectonic uplift, and subsurface weathering on the Miocene coral-reef limestone has resulted into a highly dissected hilly landscape dug with numerous cavities. Under this humid tropical climate with contrasted seasons, the high rainfall has generated on the steep slopes recurrent severe erosion that has not allowed the preservation of quaternary surface deposits, and even less of open air prehistoric sites.

Ten years of archaeological excavation at Song Terus cave have allowed recognising occupation layers culturally related to Keplek and Tabuhan periods, respectively synchronous to the first half of the Holocene and the late Pleistocene. Relicts of occupation floors and diffuse traces of fire places have been observed during the spatial excavation for Keplek and Tabuhan archaeological layers. A similar sequence has been identified in the nearby cave of Goa Tabuhan.

The sequences of Song Terus and Goa Tabuhan display stratified to micro-stratified deposits with variable characteristics depending upon the period considered. These facies express the interaction at short-term time scale between detrital phases and chemical precipitation phases as traced by thin calcitic bands. The contemporary deposits to human occupation are exokarstic, resulting from the trapping into the cave of natural soils that were formed in the surrounding landscapes. Their erosion results from severe destabilisation in response to changes of external factors. The detrital component is mainly derived from pedo-sedimentary materials that were eroded from sub-surface soil horizons due to rapid rejuvenation of the pedogenic cover along the limestone slopes. It is also associated to a volcanic component for which the fresh components relate to direct input from ejecta plume after a short transient transport into the karstic cavities.

The first observations suggest a possible correlation between the fallout of volcanic tephra deposit and episodes of calcitisation. The sudden fallout of massive volcanic tephra might have induced a severe degradation of the vegetation and related soil cover, then followed by regeneration of the soils, at first highly calcareous, before getting thicker and decalciﬁed with intense bioturbation due to forest development. The calcitisation episodes would accompany the first stage of soil regeneration. Other factors may have contributed to the changes in depositional conditions, particularly massive ash plume that is known to have a direct influence on the chemistry of the atmosphere.

Climate fluctuations independent from volcanic episodes (i.e. drought related to extreme El Niño events), or wild-fires of human or natural origin might have also signiﬁcantly contributed to soil destabilisation.
The lower part of the Song Terus sequence is endokarstic with an important alluvial component that has been eroded from former flood plain. A careful microstratigraphic investigation allows making a distinction between archaeological assemblages that have been reworked from their original settings, from the ones that are globally in situ although highly disturbed by post-depositional processes.

Archaeozoological studies of Javanese Pleistocene sites: the open air sites of Sangiran dome (Central Java) and the cave site of Song Terus (East Java)

Anne Bouteaux, Anne-Marie Moigne and Kasman Setiagama

Since the 1960s, the National Indonesian Center for Archaeological Research, in collaboration with the Gajah Mada university, has been organizing field excavations on open-air sites in the Sangiran dome, one of the most famous places of palaeoanthropological discoveries in Southeast Asia. That project led to the discovery of the Homo erectus (more or less fragmentary) fossils, and the collection of numerous mammal fossils in localities such as Tanjung, Sendang Busik, Ngrejeng Plupuh, Grogol Plupuh, Bukuran and Dayu. During the 1990s, a French-Indonesian team excavated the Ngebung 2 locality. Most of the bone assemblages from these sites come from the volcanic-sedimentary Kabuh layers (Early Middle Pleistocene) deposited in a fluvial context. The best-representing mammal species are large bovids like Bubalus palaeokerabau or Bibos palaesondaicus and smaller cervids like Axis lydekkeri. The taphonomical study of the collections, applying several common and also modern methods, is firstly carried out on Javanese sites. The degree of fragmentation is high, as the bone flakes are dominant among the fossils. The teeth and the extremities are prevailing in most of the studied sites. The conservation status and the fragmentation of fossil bones are not the same at all the sites. The water action, either chemical or mechanical, is predominant regarding the origin and the modification of the assemblages. The carnivores are almost absent in the material and the traces of their actions are rare. Some teeth of crocodiles are found in all the sites, suggesting their possible intervention on the bones. Anthropic influence is obvious at Ngebung 2, according to the archeozoological studies and well correlated to the occurrence of lithic artefacts.

Since the 1990s, the franco-indonesian team “Quaternary and Prehistory mission in Indonesia” has been organizing the excavations in different karstic caves in the Gunung Sewu (south Java). In Song Terus cave, the deposits from Middle Pleistocene until Holocene have been identified. Numerous lithic tools and mammals bones were discovered in the three levels. The first one is Terus, dated from 300 000 up to 80 000 y. B.P. The second is Tabuhan, dated from 80 000 up to 40 000y. B.P. and the last one is Keplek, dated from 12 000 up to 5 000y. B.P. No human remains were discovered in Terus and Tabuhan but a burial with one individual and several human remains of another individual of Homo sapiens have been found in Keplek level. From Tabuhan level to Keplek level; the bone modification by human is clearly observed. Furthermore, we report also several traces from carnivores and rodents. The anthropic traces like intentional breakage, cut marks, and fire traces were observed on the mammal bones, for example the bovids and the cervids, from Upper Pleistocene can be taken as the initial evidences of the hunting behaviour of the prehistoric men in Late Pleistocene. It was continued to Early Holocene where monkeys (Presbytis sp.) have become the major objects of systematic hunting. The bone technology indicated by several specimens as “bone utilisation” in Tabuhan, was clearly occurred as a complete bone industry. The association of the animal remains and the human remains in the burial indicates that several skeletal parts of animals were used as a provision in the funerary rites in the Early Holocene. In Song Terus cave, we propose a diachronic image of human-animal relation from the Late Pleistocene to Early Holocene in restricted part of Java, more precisely in terms of faunal exploitations for certain purposes as consumption, raw material, fuel of fire and provisions.
The fossil mammal faunas of the Philippines

Angel Bautista and John de Vos

In the past, four papers were dedicated to the vertebrate fossils of the Philippines. The first paper was from Von Koenigswald (1956) who described some specimens and created a few new species. The second paper was from Beyer (1956), who mentioned new finds of fossil mammals from the Pleistocene without giving descriptions. The third paper is of Lopez (1972) who gives notes on the occurrence of fossil elephants and *Stegodon* in Solana, Cagayan, northern Luzon. The last paper about this topic was from Bautista (1991), who gives, based on the literature, an overview of sites with their species.

Although a lot of genera and species are mentioned, most of them are not based on described specimens. Von Koenigswald (1956) described a few specimens, however, without giving numbers. Most of these described specimens are lost or the storage place is not known. For the rest the presence of a genus or species is only mentioned, based on finds in the field.

The purpose of this lecture is to give an overview of the fossil material present in the collection of the Geological Department of the National Museum, Manila, Philippines and collected in the field by Bautista and de Vos (see de Vos and Bautista, 2003).

![Map of the Philippines](image)

Map of the Philippines with indicated the sites: 1 Cagayan valley, 2 Cabarruyan island, 3 Manila area, 4 Masbate, 5 Visayas (Panay Island), 6 Mindanao Island

From the study of the specimens it is clear that on the Philippines the following Pleistocene genera and species are present:
Based on the molars there is only one species of Stegodon, namely Stegodon luzonensis and a large Elephas sp. Postcranial elements of the proboscidean show that there is a small and large proboscidean.

Based on the morphology and the measurements of the molars, and the postcranial material, Rhinoceros philippinensis is present.

Based on molars a Sus sp., a cervid, probably a small Rusa and a small bovid probably related to the Tamarau. Further there is material from a giant tortoise, Trionyx and Crocodile.

This fauna composition shows clearly that it is an unbalanced endemic island fauna.

If we look per locality than we can observe that the following genera and species are present in:

Luzon Island
1) Cagayan Valley

a large (NMP 261) and a small elephantoid (NMP 242) based on postcranial material Rhinoceros philippinensis Von Koenigswald, 1956, based on NMP 478, NMP 217.

Suid, Sus sp. based on NMP 182a and b, NMP 398. This suid is also indicated as Celebochoerus cagayanensis, which suggests a relation with Sulawesi.

cervid (a small Rusa) based on NMP 211,

bovid (related to the Tamarou) based on NMP 404, 405, 422, 443.

Giant tortoise based on NMP 326, 180

Trionyx based on NMP 406,

Crocodile based on NMP 466, 179
1) Cabarruyan Island, Pangasinan

Cabarruyan Island was visited during 1999, 2000

*Stegodon* sp, too fragmented to give measurements and a specific determination

*Elephas* sp. large, based on NMP B11, figured by de Ocampo, (1983, fig. 10c); also

an *Elephas* molar is figured by Von Koenigswald (1956, Plate VII)

The presence of *Elephas beyeri* Von Koenigswald, 1956, can only be confirmed by Plate V (Von Koenigswald, 1956), the specimen itself is lost.

*Rhinoceros philippinensis* based on a molar fragment (NMP 64) and a scaphoid (no number)

*Cervus* sp. based on right fragment of an antler (no number)

Bovid sp., related to the Tamarau, based on an upper M1/2 (NMP 77)

2) Manila area

The site is not available anymore

The *Stegodon* specimens from Novaliches-Marilao District described by Von Koenigswald (1956) are lost. What are left are the pictures of Plate II, which confirm that a *Stegodon* sp. is present in the area.

The fossil deer, mentioned by Von Koenigswald (1956: 7) cannot be confirmed.

The bone fragments of a large land-tortoise are missing too.

3) Rizal

The site is not available anymore

*Stegodon luzonensis* Von Koenigswald, 1956 near Fort McKinley, can only be confirmed by Plate III and IVa-b (Von Koenigswald, 1956), the specimen itself is not available.

*Rhinoceros philippinensis* Von Koenigswald, 1956 (NMP 105A)

The presence of *Elephas* sp. and the bovid cannot be confirmed.

Visayas (Panay Island)

Was visited during 2002; no fossils were found.
Stegodon sp. based on specimen NMP 150
Elephas sp. based on specimen NMP 104
Mindanao Island
Not visited
Stegodon mindanensis Naumann, 1890
Masbate

This locality was visited during 2005.
In surface layers Homo sapiens, pig and cervid material was found. In a breccia cervid material and a giant rat.