

Discoveries in Thailand tracing Asian ancestry

VADHANA Subhavan, SOMSAK Pramankij
SOOD SANGVICHIEH Prehistoric Museum and Laboratory

SASIPHAN Na Songkhla, CHANCHAI Asvavinijkulchai
SURAPONG Pimjun, SOMPORN Chongkum
Office of Atomic Energy for Peace

Apes and monkeys (including the ancestors of humans) originated not only in Africa, as widely believed, but also in East Asia -- as has been discovered by Asian scientists. Discoveries in East Asia indicate that Asia was the home of the first simians as early as 45 million years ago (while Peking Man in China existed about 1.8 million years ago and Java Man (or *Homo Erectus*) in Indonesia, about 700,000 years ago).

From the fossil evidence, it has been established that the evolution of apes into Modern Humans dates back to the Eocene Epoch of the Cenozoic Era, 60 million years ago. These fossils include the primitive primates (Prosimians), i.e. Tree Shrews, Lemurs, Tarsiers and Lorises. During the Oligocene Epoch (which started approximately 40 million years ago), at approximately 25 million years ago, the cusps of the primates' second lower molar increased from 4 to 5 cusps. This is called the "Y-5" or *Dryopithecus* pattern. It now seems that *Dryopithecus*, the pre-hominid found in many parts of the world (and the ancestor of the Great Apes and Man) may have originated in Asia -- which is supported by the increasingly accepted primate fossil evidence from the region.

For example, many fossils found in China indicate hominids. Primate fossils found in Southeast Asia, especially Thailand, Burma and the southern part of China, are important evidence of (and establish the need for further research into) hominid origin in these areas. A primate tooth, a large adapid, the size of *Notharctus robustus* of the middle Eocene Epoch (60-40 million years ago), was found in the lignite mine of Krabi Province, Thailand, in 1988. In 1995, a new anthropoid named *Siamopithecus Eoceanus* of the late Eocene epoch (35 million years ago), was found in the lignite mine at Bang Mark in Krabi Province. The creature's jaw was about 7 kg. In weight and has anthropoid characteristics and dental fragments of two other types- *Pondaungia Cotteri* Pilgrim and *Amphipithecus Mogaungensis* Colbert -- which can be dated as being from the late Eocene to early Oligocene Epoch (40-35 million years ago) and were found in Burma in 1937. Ten teeth of *Dryopithecus Kaiyuannensis* (25-15 million years old) were found in the Tertiary Period lignite deposits at Xiao-Long-Tan (in Yunnan Province in the Southwest of China). In the northern part of Thailand, Pong District, Payao Province, a lower molar tooth

described as a new species of the genus *Dendropithecus Orientalis* from the middle Miocene Epoch (20-15 million years ago) was found. In Koh Kha District Lampang Province, Thailand, an upper molar tooth was found. It was assumed to be *Dryopithecus* from the middle Miocene Epoch (16⁺ million years ago).

To find out the exact species of the upper molar tooth, the SOOD SANGVICHIEH Prehistoric Museum and Laboratory conducted Palaeoanthropological and Palaeolithic Archaeological research to identify the hominid remains (presumed to be from the Pleistocene Age, i.e. Homo Erectus or Homo Sapiens) associated with stone artefacts. A large number of fossils from the surface (from non-primates and primates) were collected. The prehistoric survey (in 1989) determined that the site in Koh Kha District, Lampang Province in the North of Thailand belongs to the early Miocene Epoch (about 16⁺ millions year ago). In addition, a comparative morphology study was carried out. The upper molar tooth was compared with the *Dryopithecus* (Proconsul) tooth found in Uganda in 1968, as well as other molar teeth from a Suidae (Pig) from the Miocene Epoch, an Anthropoid Ape (Urang Utang) and from the first Hominids and Modern Human. The teeth were found in East Africa, Indopakistan and China, respectively. This study of upper molar teeth indicated a cusp pattern and characteristics of nutrition and molar wear and tear patterns as shown in Table 1.

Further techniques (aided by the Office of Atomic Energy for Peace (OAEP)) were used -- including X-ray Fluorescence Analysis (XRF) and Neutron Activation Analysis (NAA) -- for the examination of primate dental wear, dental pathology and Phylogenetics.

The study of ancient teeth characteristics from samples (22 prehistoric human teeth from sites in 5 provinces in Thailand and 15 ancient animal teeth from Koh Kha District, Lampang Province) was performed by using XRF. Energy dispersive X-ray Fluorescence was applied by using isotope source Plutonium-238. The results show the X-ray K α line ratios of strontium, iron and yttrium to calcium in animal teeth are higher than in normal human teeth (See Table 2). The findings also indicate that one of the suspected teeth (the fossilised tooth believed to be *Dryopithecus*) could have actually come from the *Dryopithecus*-Prehominids (an ancestor of the Great Ape and Man from the Miocene Epoch - 16⁺ - 20 million years ago).

Conclusion

The interpretation of geochronological correlation expressed in millions of year (done for the first time in Thailand in 1980) was possible because stone tools were found dating back two million years before recorded history. The large collections of hominid remains and associated artefacts from the Far East in general, and Thailand specifically, imply that these areas are important sites to the study of the origin of Man. A need for further research studies is indicated, because of new evidence correlating with the sequence of time from the oldest to the newest age, to trace Asian Ancestry.

Table 1. The comparative morphology of molar teeth

| Geochronology | | <u>Specimens</u> Molar teeth (upper) | <u>Cusp</u> <u>Pattern</u> | <u>Characteristics</u> <u>Of Nutrition</u> | <u>Molar</u> <u>Wear</u> <u>Wear</u> <u>Pattern</u> | <u>Total</u> |
|------------------------------|--|---|-------------------------------|---|--|--------------|
| | | | 4 | Omnivorous | Shallow | |
| Tertiary Period 35-20 myrs. | Miocene Epoch 25-5 myrs. | 1. Suidae (Pig) from Lampang Province. Thailand | - | - | - | 0 |
| | | 2. Fossilised tooth (<u>Dryopithecus</u>) from Lampang Province, Thailand | + | + | + | +++ |
| Quaternary Period 20-0 myrs. | Pliocene to Pleistocene Epochs 5-0 | 3. Dryopithecus (Moroto Palate) from Uganda, East Africa. | + | + | + | +++ |
| | | 4. Anthropoid Ape (Urang-Utang). | + | + | + | +++ |
| | | 5. First Hominids to Homo Sapiens (Modern Man). | + | + | + | +++ |

Table 2. The X-ray $K\alpha$ line ratios of chemical elements to calcium

| Sample teeth | Sr/Ca | Fe/Ca | Y/Ca |
|---------------------|--------------|--------------|-------------|
| Human | 0.16 | 0.19 | - |
| Bear | 0.63 | 0.27 | 0.14 |
| Tiger | 0.76 | 0.32 | 0.46 |
| Suidae (pig) | 0.88 | 0.01 | 0.34 |
| Elephant | 0.9 | 0.41 | 0.12 |
| Primate* | 0.96 | 0.86 | 0.84 |
| Deer | 1.51 | 2.28 | 1.65 |
| Crocodile | 1.61 | 0.57 | 0.62 |

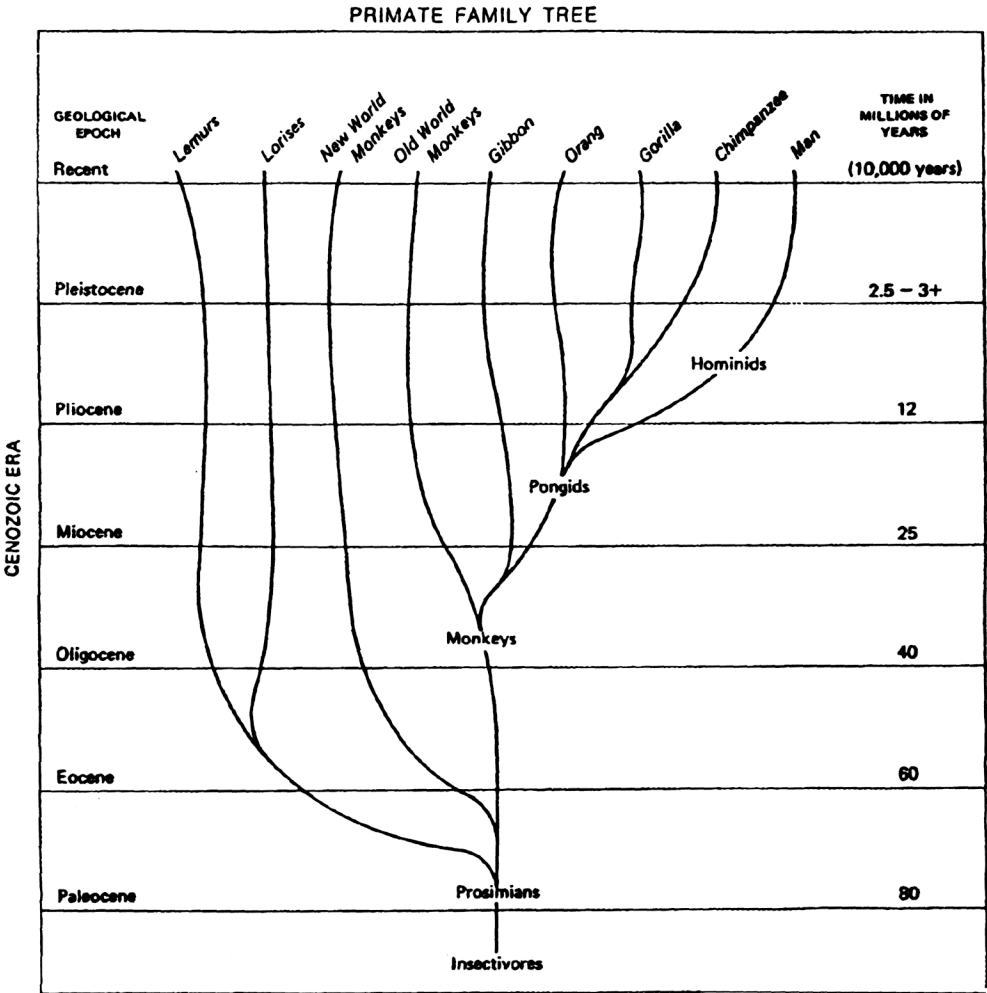
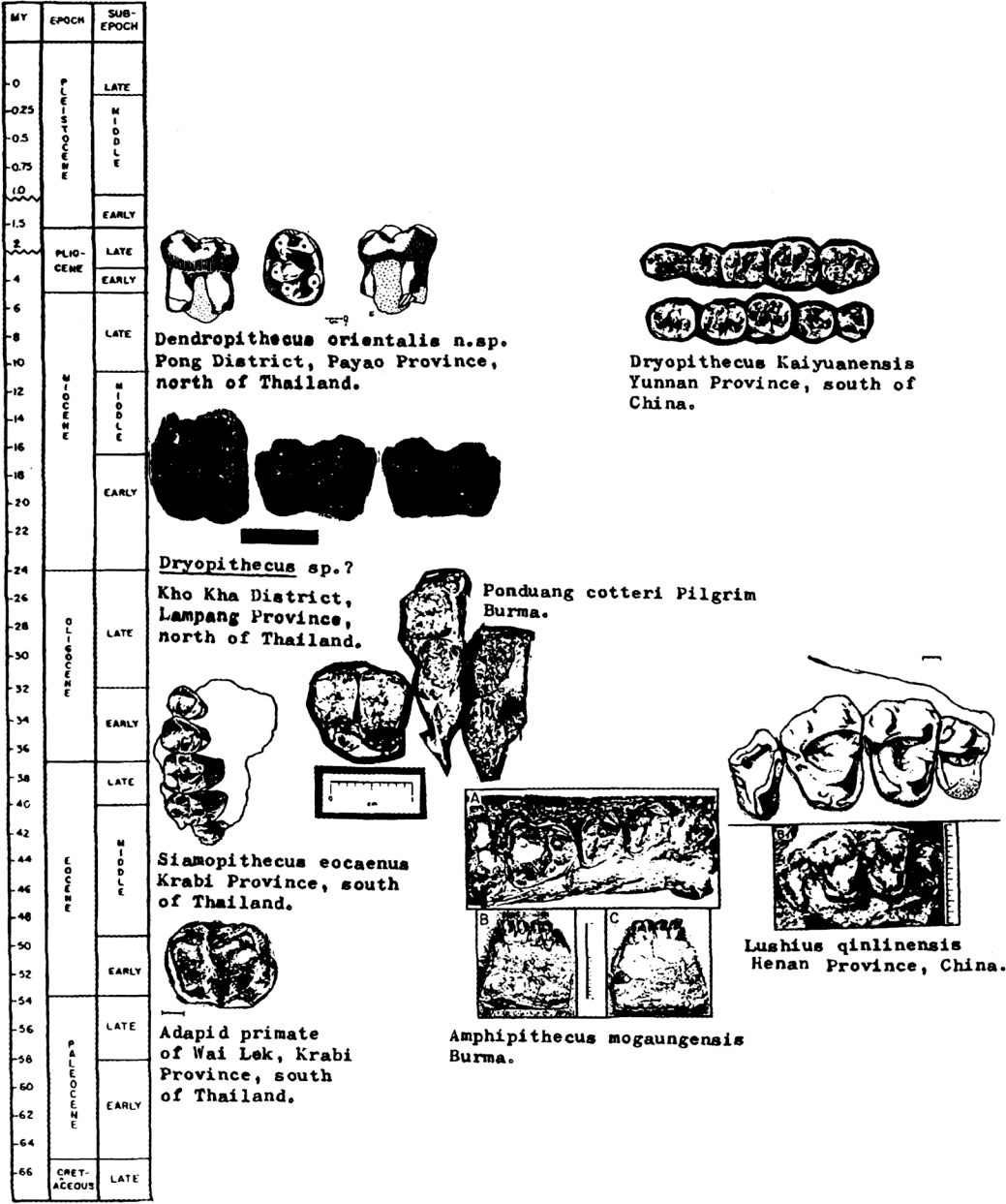


Figure 1. Primate family tree
(From C. L. Brace et al 1971 Atlas of Fossil Man)



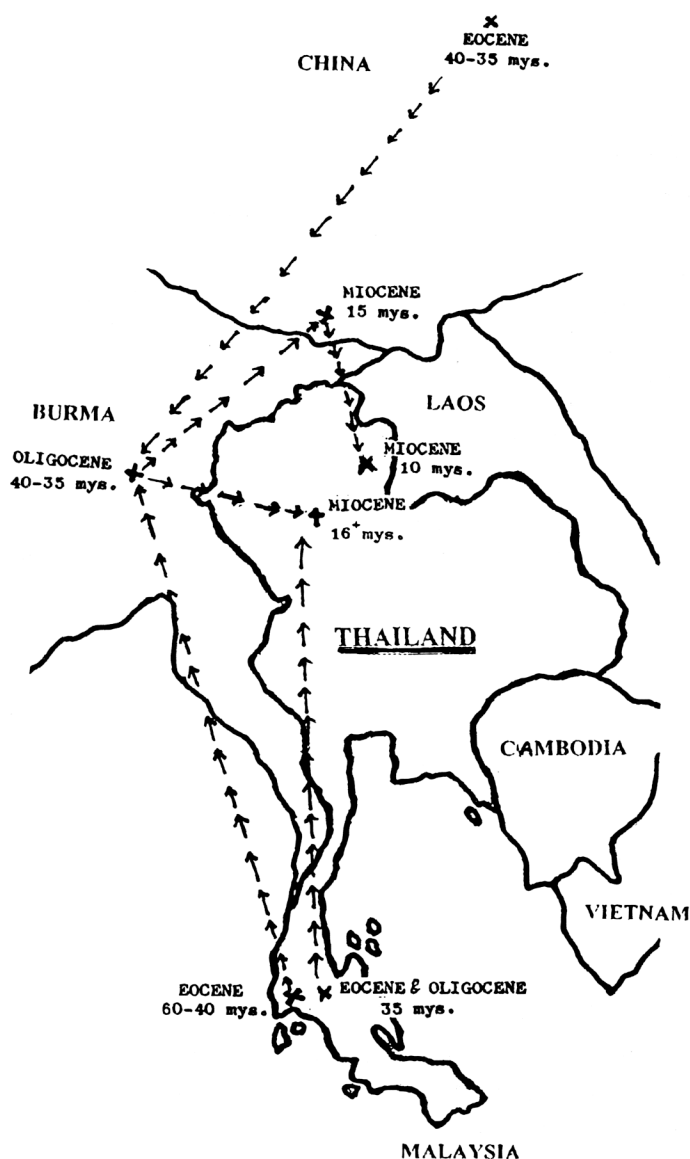


Figure 3. The route of primate fossils found in Asia and Southeast Asia from the oldest epoch.

The southern part of Thailand is adapted primate from the Middle Eocene of Wai lek, Krabi Province. *Siamopithecus Eocenus* from the Eocene to Oligocene Epoch of the same province, then to Burma and the Late Eocene to Oligocene - the *Amphipithecus Mogaungensis* and *Pongduang Cotteri* Pilgrim. In China - Henan Province - *Lushius Qinlinensis* of Eocene Epoch was found - and in Yunnan Province, the *Dryopithecus Kaiyuanensis* from the Middle Miocene Epoch. From there, back to the Northern part of Thailand - Ban San Klang Pong District, Payao Province, where the *Dendropithecus Orientalis* from the Middle Miocene Epoch was found, and Nah Nai Yod, Ban Had Pu Dai, Koh Kha district, Lampang Province, where one *Dryopithecus* upper molar tooth from the Middle Miocene Epoch was found.

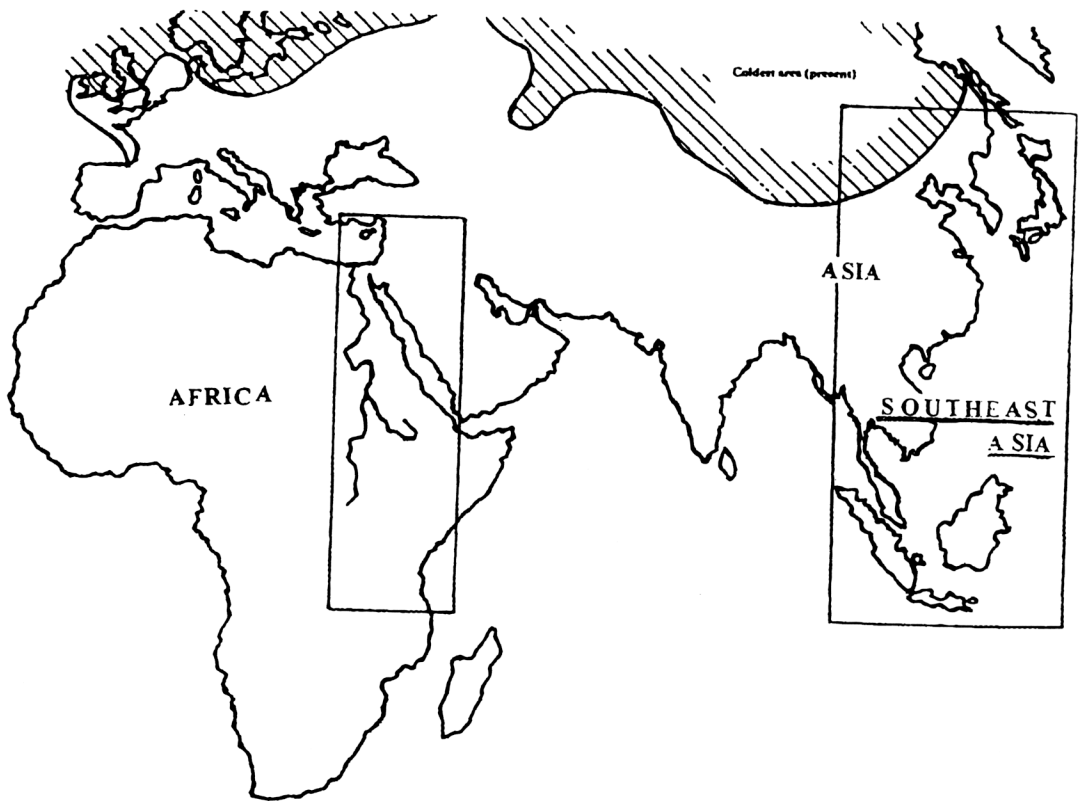


Figure 4. Map of Africa, Asia and Southeast Asia

The squares indicate the areas which have been occupied for more than 14 million years ago. (From John A.J. Gowlett 1993 *Ascent to Civilisation The Archaeology of Early Humans*)

REFERENCES

- A. S. Romer. (2nd ed.) 1955. *The Vertebrate Body*. Philadelphia: W.B.Saunders Comp.
- Atlas of Primitive Man in China*. 1980. Beijing: Litton Educational Publishing Science Press.
- C. L. Brace ed. 1971. *Atlas of Fossil Man*. USA: Holt Rinehart and Winston Inc.
- F. C. Howell. (ed.) 1980. *Early Man in China*. Beijing: Foreign Language Press.
- Gowlett, John A. J. (2nd ed.) 1993. *Ascent to Civilisation: The Archaeology of Early Humans*. London: Roxby Publication Ltd.
- Somsak Pramankij and Vadhana Subhavan. 1993. "Fossilised tooth discovered in Thailand and related to evolution into man." *Paper in the 16th Annual Meeting of the Society of Anatomy of Thailand*.
- Sood Sangvichien and Vadhana Subhavan. 1979. *The Evolution into Man*. Bangkok.
- Surapong Pimjun et al. 1997 *Characterisation of Ancient Teeth From Animal and Pre-Historic Human by X-ray Fluorescence Method*. Physics Division, Office of Atomic Energy for Peace, Bangkok
- Szalay, F.S. and E. Delson. 1979. *Evolutionary History of Primates*. California: Academic Press Inc.
- Varavudh Suteethorn et al 1990. *A Hominid Locality in the Middle Miocene of Thailand*. Palaeontology C.R. Acad. Sci. Paris. 311(11):1449-1456.
- Varavudh Suteethorn et al 1988. *Oldest Known Tertiary Mammals from South East Asia: Middle Eocene primate and anthracotheres from Thailand*. N.Jb. Geol., Palaont., Mh.H.9, 563-570 Stuttgart. September.
- W. E. Le Gros Clark. (3rd ed.) 1953. *History of the Primates: An introduction to the Study of Fossil Man*. Great Britain.
- Yaowalak Chaimanee et al 1997. "A new late Eocene anthropoid primate from Thailand." *Nature* 385.

