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REPRINTED FROM:

*Encyclopedia of Human Evolution and
Prehistory*, 2nd ed; E. Delson, I. Tattersall, J. A.
Van Couvering and A. S. Brooks, eds. Garland:
New York. 2000

WITH THE COMPLIMENTS OF:

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Asia, Eastern and Southern

Region of ca. 20 million km², which has yielded many important hominid and hominoid fossils and an archaeological sequence that, in some parts of the region, differs markedly from those of Europe, Africa, or southwestern Asia. For the purposes of this encyclopedia, the Eurasian continent has been divided into four geographical regions: Europe, west of the Caucasus; Russia (including Siberia); western Asia (including the area commonly referred to as the Middle East and the Central Asian republics of the former Soviet Union); and eastern and southern Asia, from Pakistan and China eastward and southward to the Pacific and Indian oceans, including Malaysia and Indonesia (but not Australasia). The most important fossiliferous areas of eastern and southern Asia are the Siwalik Hills of Pakistan and India, which have yielded an important collection of Miocene and Plio-Pleistocene fossil hominoids and cercopithecoids; China, where both hominins and nonhuman hominoids are known; and Java, which has yielded hominid fossils from throughout the Pleistocene. In mainland Southeast Asia (Burma, Thailand, Laos, Vietnam, Malaysia, and Cambodia), much archaeological evidence has been recovered, but hominin specimens earlier than the latest Pleistocene are limited to finds of individual teeth ascribed to both *Homo erectus* and "archaic *Homo sapiens*." Fossils of *Pongo* and *Gigantopithecus* have also been recovered from this region.

The geography and geomorphology of Asia are best understood in terms of the continuing collision between the Indo-Burmese continent on the Indian plate and the Sino-Malaysian margin of Eurasia, beginning in the Early Cenozoic (or, in new interpretations, in latest Cretaceous). Together with smaller plates carrying the Anatolian and Iranian massifs northward at the same time, resulting in an unbroken mountain wall all across Asia, from the Taurides through the Elburz and the Tibetan Plateau to the Shan-Yunnan Massif. These highlands accentuate and, by and large, define a very sharp divide between tropical and subtropical habitats in the south, and much more seasonal and xeric (dry) conditions to the north. The complex tectonics of northern China and the archipelagos of the Southwest Pacific are also linked

to subduction and transform faulting along this plate boundary.

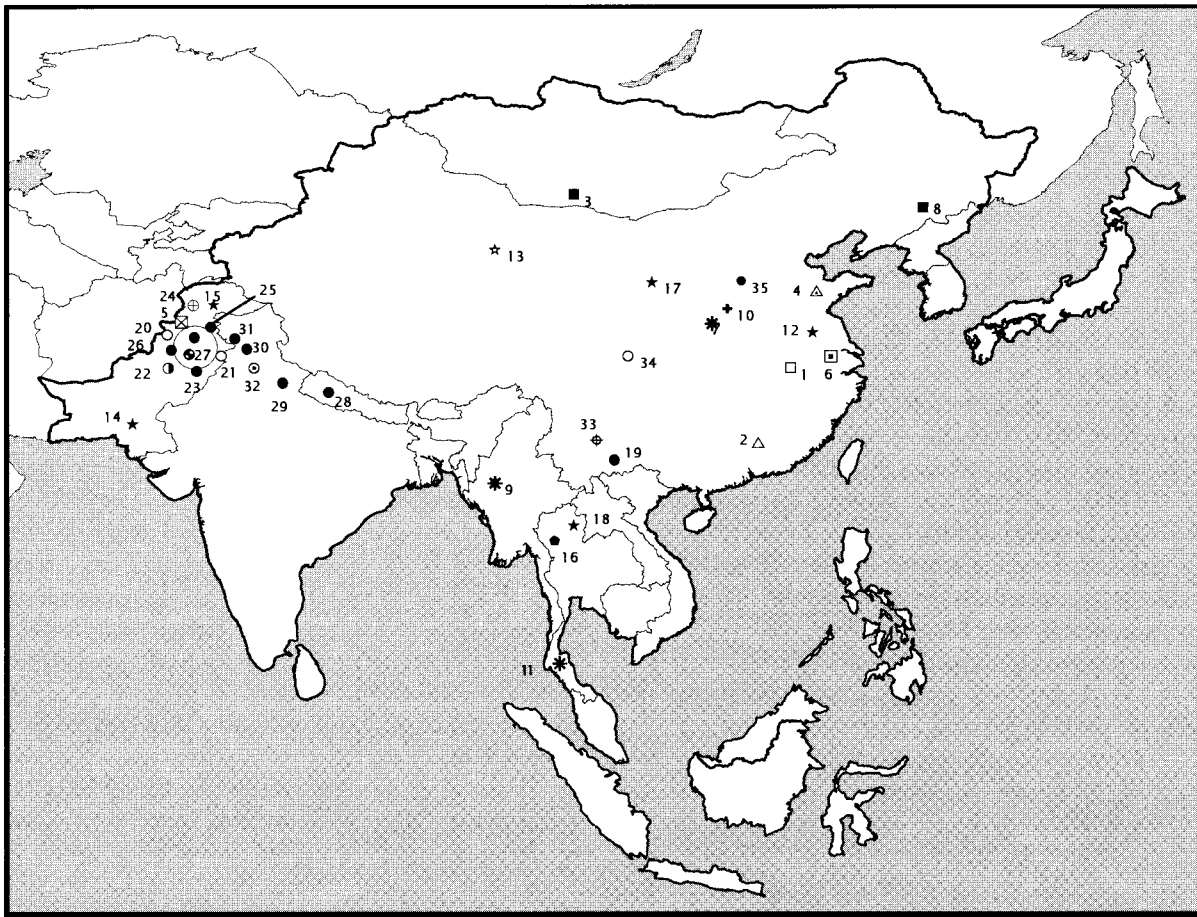
Eocene continental sediments are found in northern India and Nepal with faunas that suggest a biogeographic connection with both Africa and Eurasia. Interestingly, nothing in the Indian Eocene fauna appears to represent a survivor from a postulated endemic population that likely would have inhabited the subcontinent during its passage across the Indian Ocean from Africa during the later Mesozoic. It has been suggested that ancestral strepsirhines might have boarded this "Noah's Ark" from Africa early in the Cenozoic, but there is no fossil evidence for this hypothesis, nor is it likely, given the deep-water isolation of the Indian plate.

Nonhuman Primate History in Eastern Asia

The earliest Asian primate is probably *Petrolemur*, a possible plesiadapiform of Early-to-Middle Paleogene age in South China. *Decoredon*, of comparable age, may be the earliest euprimate and suggests that omomyids, and perhaps adapiforms, might have entered North America from eastern Asia. *Altanius*, an omomyid from the Early Eocene of Mongolia, as well as new Chinese carpolestids, support this view of paleobiogeography. Middle-to-Late Eocene probable adapiforms from southern Asia include *Pondaungia* and *Amphipithecus* from Pondaung (Burma), *Kohatius* from Pakistan, *Hoanghoni* and *Rencunius* from China, some of which have been compared with the enigmatic *Oligopithecus* of Eocene-Oligocene age in the Fayum beds of Egypt. In the 1990s, a whole new suite of Middle Eocene primates has been described from fissure fillings and other sites in southeastern China. These include the adapiform *Adapoides*, the otherwise North American omomyid *Macrotarsius*, the tarsiid *Tarsius eoceanus*, and the probable tarsioid (claimed as an ancient anthropoid) *Eosimias*.

Fortunately for students of early hominoids, the Indo-Asian collision resulted in the uplift of the Potwar Plateau and the Salt Range in the foothills of the Himalayas, which exposed the famous Neogene fossil beds known as the Siwaliks. The most fossiliferous exposures crop out in Pakistan and India, but the beds also extend into Nepal and Bangladesh. The oldest Siwaliklike faunas of late Early and early Middle Miocene age, for example at Dera Bugti (Baluchistan), document the immigration of proboscideans and bovids, among other African groups, via the newly formed Mesopotamian land bridge.

The earliest Middle Miocene levels of the Kamliang beds (ca. 16.1 Ma) yielded a few teeth referred to *Dionysopithecus*, making them the earliest well-dated primates in eastern Asia. More complete specimens from Sihong (eastern China) occur alongside teeth of *Platodontopithecus*; both genera are included in the Pliopithecidae. *Pliopithecus* itself, otherwise known from several European species, has been described from Tongxin in North-Central China. The Siwalik Chinji fauna includes the first Asian hominoids, *Sivapithecus*, dated ca. 13–12 Ma. These are pongines, related to orangutans and perhaps to *Gigantopithecus*. Although fragmentary remains occur at 12.5 Ma in Pakistan and perhaps slightly older in India (Ramnagar) and Southeast China (Xiaolongtan, Yunnan Province), the diagnostic features of the palate are first



- △ Late Paleocene: *Petrolemur*
- △ Early Eocene: Carpolestidae
- * Middle-Late Eocene: ?Adapiformes
- Early-Middle Eocene: Omomyidae
- Middle Paleocene: *Decoredon*
- ⊗ Early Eocene: ?Adapiformes ?Omomyidae
- ⊕ Middle Eocene: Adapiformes, Eosimiidae
- ▣ Middle Eocene: Adapiformes, Omomyidae, Eosimiidae, ?Tarsiidae
- ◆ Middle Miocene: ?Tarsiidae
- ★ Middle Miocene: Pliopithecidae
- ☆ ?Early Miocene: ?Pliopithecidae
- Middle-Late Miocene: *Sivapithecus*
- ⊕ Late Miocene: Lorisidae, *Sivapithecus*
- Middle-Late Miocene: Dryopithecinae
- Middle Miocene: Dryopithecinae, *Sivapithecus*
- ⊙ Late Miocene: "Sivaladapinae," *Gigantopithecus*, *Sivapithecus*
- ⊕ Late Miocene: "Sivaladapinae," Pliopithecidae, Dryopithecinae
- ⊗ Late Miocene: Colobinae
- Late Miocene: Colobinae, ?*Macaca*

Map of Eastern and Southern Asia (heavy outline) showing major fossil localities with Paleocene-Miocene primates. Symbols indicate age and included primates, while numbers represent site names (in approximate chronological order), as follows: 1, Qian-Shan; 2, Nanxiong; 3, Naran Bulak; 4, Wutu; 5, Chorlakkii; 6, Shanghuang; 7, Lushi; 8, Gonglangtou; 9, Pondaung; 10, Yuanqu Basin (incl. "River Section", Rencun, Heti); 11, Krabi; 12, Sihong; 13, Taben Buluk; 14, Manchar; 15, Kamlial; 16, Mae Long; 17, Maerzuizigou; 18, Ban San Khlang; 19, Xiaolongtan; 20, Chinji; 21, Domeli; 22, Kundal Nala; 23, Sethi Nagri; 24, Kaulial Kas; 25, Khaur; 26, Dhok Pathan; 27, Hasnot; 28, Tinau Khola; 29, Dhara; 30, Kangra; 31, Ramnagar; 32, Haritalyangar; 33, Shibueba; 34, Wudu; 35, Yushe. Sites 15 and 20–32 are representative of the Siwaliks; note that the density of Pakistan localities (15, 20–27) required that some site markers be moved to allow separation; Hasnot (site 27) is marked by two symbols inside the small circle, which corresponds to the actual Siwalik/Salt Range region.

documented ca. 12 Ma. Three time-successive species range through to ca. 8 Ma.

Also about 8 Ma, *Lufengpithecus* occurs in great quantity at Lufeng, also in Yunnan Province. Its cranial morphology is more conservative than that of *Sivapithecus*, and it is tentatively included in the Dryopithecinae. Other fossils in that subfamily occur in the Siwaliks ("*Sivapithecus*" *simonsi*, ca. 10 Ma) and western China (*Dryopithecus wuduensis* from Wudu, Gansu Province, ca. 8–6 Ma). Lufeng also yielded a pliopithecid and adapiforms, while adapiforms and a loridid are known from the Siwaliks. The youngest Siwalik hominoid is *Gigantopithecus*, known by a mandible and an isolated tooth estimated at ca. 7–6 Ma. Numerous specimens of a younger species (*G. blacki*) are known from southern China between perhaps 2–0.5 Ma and from northern Vietnam ca. 0.5–0.3 Ma. It is generally assumed that *Gigantopithecus* is an offshoot of the pongine clade, but some *Lufengpithecus* specimens show striking similarities to the premolarized lower canines of the younger taxon. Another enigmatic hominoid occurs in supposedly Early Pliocene levels in Yuanmou County, Yunnan Province. The material has not been well described, but a juvenile face looks somewhat pongine, although the taxon has also been linked to *Lufengpithecus*.

The earliest cercopithecid monkeys in eastern Asia (teeth of a small colobine) appear in the Siwalik record ca. 7–6 Ma, coincident with other indications of faunal change. A few teeth from the latest Miocene of eastern China document a somewhat larger colobine and a macaque, the first Asian cercopithecine. Although the dating is unclear, the large terrestrial cercopithecine *Procynocephalus*, apparently a macaque derivative, appeared in Plio-Pleistocene deposits in the Siwaliks and in China. Its relationship to the generally similar *Paradolichopithecus*, which occurs mainly ca. 2 Ma from Spain to Tadzhikistan, is unclear. An even more enigmatic cercopithecine fossil is the single specimen of *Theropithecus oswaldi delsoni* from Mirzapur, India, perhaps dating to 1.5–0.9 Ma; other than one tooth from Spain, this genus is endemic to Africa. Fossils of the modern Asian genera *Macaca*, *Semnopithecus* (*Trachypithecus*), *Pygathrix* (*Rhinopithecus*), *Hylobates*, and *Pongo* are known from the Pleistocene of China, India, Indonesia, and Vietnam.

Human Paleontology and Archaeology

During the Early Pleistocene, early hominins almost certainly reached eastern Asia from Africa by first passing through southwestern Asia and then South Asia. What are perhaps the earliest fossil hominins in the region have been recovered from the island of Java and the Chinese sites of Gongwangling (at Lantian) and Longgupo (Wushan). In the past, Java and many other Indonesian islands were intermittently united with the mainland by exposure of the now-submerged Sunda Shelf, as the result of low sea levels during glacial periods, which provided dry-land migration routes for hominids and other Pleistocene mammals.

Although there is still no consensus as to how many hominin species are represented in Java, it is clear that the diversity of hominid taxa often has been overestimated. There is growing agreement that most of the adequately preserved speci-

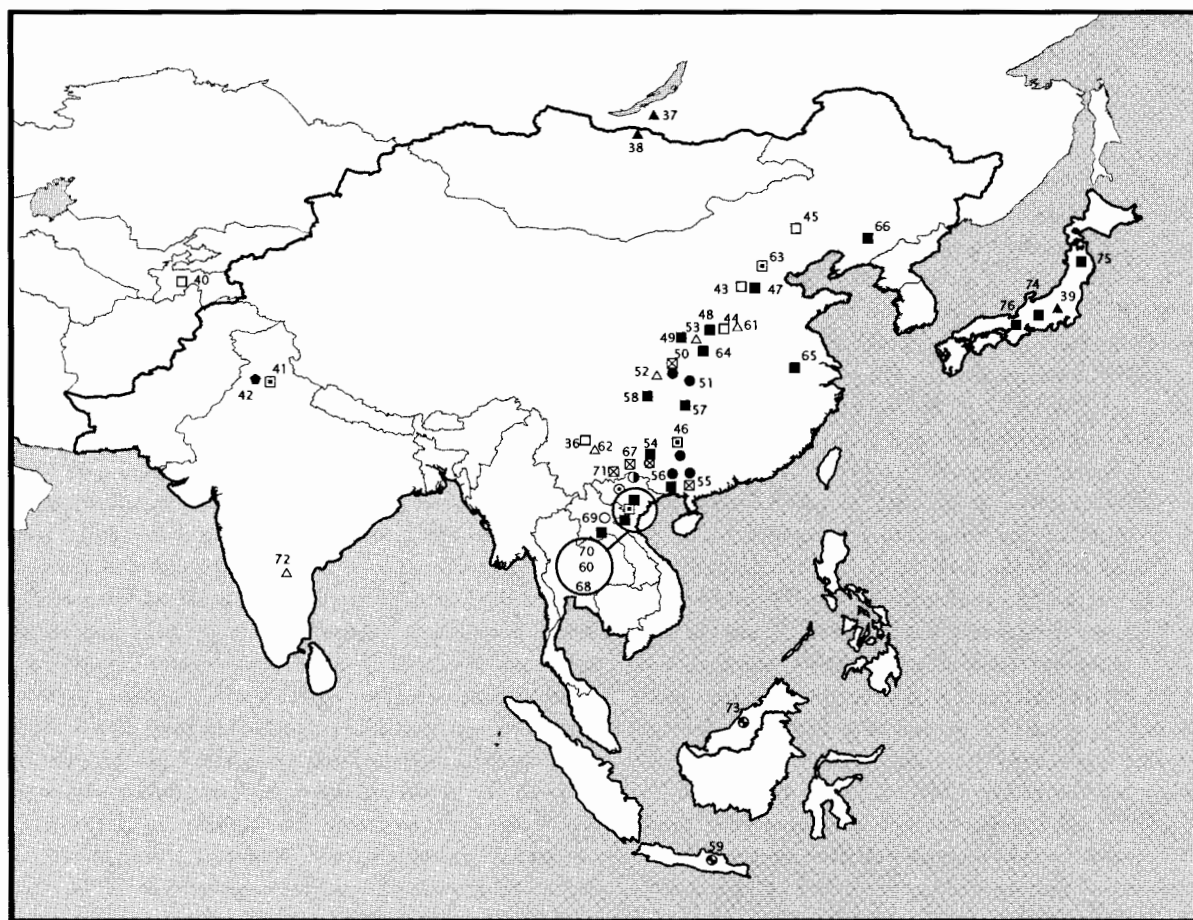
mens, consisting of more than 50 individuals, represent a form of *H. erectus* that first reached Java well before 1 Ma; indeed, the earliest example may date to as much as 1.8–1.6 Ma, just younger than the oldest African specimens assigned to *H. erectus*. One form, *Meganthropus*, has occasionally been hypothesized to represent an Asian form of australopith, but little evidence supports this conjecture. In general, our interpretation of the Javanese forms has been hindered by the specimens' lack of accurate provenance, due in large part to the continuing practice of purchasing fossils from local collectors.

An assemblage of younger forms excavated apparently *in situ* in the 1930s, the so-called Solo hominids (also known as the Ngandong hominids), has remained controversial both because of the claim that they show evidence of cannibalism and because they appear to be morphologically intermediate between *H. erectus* and *H. sapiens*. There has been much debate not only about the species to which they belong, but also about whether they were ancestral to Australian aborigines. Moreover, a 1996 publication dates the Solo finds to 50–25 Ka, far younger than generally thought and contemporaneous with local anatomically modern humans. It is safe to say that much of the controversy that began with Dutch paleoanthropologist E. Dubois's original hominid finds of the 1890s continues unabated today.

Almost all of the other evidence for Early Pleistocene humans in East Asia comes from China, with the earliest and best-documented evidence of *H. erectus* from Lantian in Shanxi, North-Central China. Here a partial cranium (Gongwangling) and mandible (Chenjiawo) may date to the late Early Pleistocene (ca. 0.9–0.7 Ma). The cranium may be slightly older than the mandible, but this is no longer certain; some have even claimed that it dates to ca. 1.2 Ma. The cranium is small by comparison with later Chinese *H. erectus*, and the low cranial capacity, 780 ml, has been explained by its early date and by the interpretation of the specimen as a female; it is also badly crushed, with bones telescoped over one another.

A few other scattered finds from South China also offer tantalizing evidence of earlier Chinese hominids. Three teeth found in a karst cave in Hubei (Jian Shi) were at first thought by Chinese workers to represent a form of *Australopithecus*. At least two of these teeth are aberrant, however, and Chinese and Western workers now place these specimens in the genus *Homo*. The early age of the finds is also perhaps indicated by the fact that they were found in association with *Gigantopithecus*.⁴⁶ The site of Longgupo in South China has also yielded fossils of *Homo* (or perhaps a pongine) and *Gigantopithecus* from the same stratigraphic unit. These are the only such association(s) known in China, but a similar association occurs in Vietnam at the cave sites of Lang Trang and Tham Khuyen.

Although two incisors from Yuanmou (Yunnan Province) were once thought, on the basis of associated fauna and paleomagnetic stratigraphy, to be older than 1.67 Ma, recent geological work and reanalysis of the paleomagnetic stratigraphy now place these specimens at well under 0.6 Ma. Researchers have always recognized that the morphology of the shovel-shaped incisors bears a strong resemblance to that of the Zhoukoudian specimens.



- ▲ Later Pliocene: *?Dolichopithecus*
- Pliocene: *Procynocephalus*
- Pleistocene: *Macaca*
- ▣ Late Pliocene-Pleistocene: *Macaca*, *Procynocephalus*
- ⊕ Pleistocene: Colobinae, *Macaca*, *Hylobates*, *Pongo*
- Pleistocene: *Theropithecus*
- △ Pleistocene: Colobinae
- ⊗ Pleistocene: Colobinae, *Macaca*
- Early-Middle Pleistocene: *Gigantopithecus*
- ⊙ Pleistocene: *Hylobates*
- ⊗ Middle Pleistocene: *Hylobates*, *Gigantopithecus*, *Pongo*
- ⊙ Middle Pleistocene: *Gigantopithecus*, *Pongo*
- Middle Pleistocene: *Pongo*

Map of Eastern and Southern Asia (heavy outline) showing major fossil localities with Pliocene-Pleistocene primates. Symbols indicate age and included primates, while numbers represent site names (in approximate chronological order), as follows: 36, Hudiliangzi; 37, Udung*; 38, Samar; 39, Atsugi; 40, Kuruksay* (taxon is *Paradolichopithecus*, not *Procynocephalus*); 41, Pinjor; 42, Mirzapur; 43, Gudi; 44, Xinan (Pliocene); 45, Dongcun; 46, Liucheng; 47, Chingshibling; 48, Mianchi; 49, Gongwangling; 50, Longgupo; 51, Longgudong; 52, Yenchingku I; 53, Xishuidong; 54, Bama; 55, Heidong; 56, Wuming; 57, Dongpaoshan; 58, Koloshan; 59, Trinil and Sangiran; 60, Lang Trang; 61, Xinan (Mid Pleistocene); 62, Hoshangdong; 63, Zhoukoudian; 64, Dujiagou; 65, Longtandong (Hexian); 66, Miaohoushan; 67, Tham Khuyen, Tham Hai, Keo Leng; 68, Tham Om; 69, Tam Hang; 70, Tung Lang; 71, Hang Hum; 72, Karnul Caves; 73, Niah; 74, Ushikawa; 75, Shiriya; 76, Kanondo. Pairs of symbols stacked vertically with one number relate to a single site. * indicates locality outside geographic area, but included for comparison. Site numbering sequence continues from previous map of earlier primate localities.

The oldest artifacts from stratified contexts in eastern Asia derive from China: in the north the Nihewan Basin (Hebei Province) and Lantian (Shanxi Province) and in the south, the Baise Basin (Guangxi Province). These simple assemblages of cores, chopper-chopping tools, and flakes may date to the Jaramillo Subchron, at ca. 1 Ma, or slightly older in the case of the earliest Nihewan sites. Work in the Nihewan Basin in the 1980s has confirmed that two localities (Xiaochangliang and Donggutuo) contain undoubted artifacts in a lakeside context in association with abundant fauna and chert artifacts, consisting mainly of simple flakes and cores.

Co-occurrence of *Hipparion* and *Equus* confirms the paleomagnetic correlation. The Donggutuo locality appears to be a colluvial deposit that does not document hominid occupation. The Xiaochangliang site is, on the other hand, a hominid-utilization site where cores, flakes, microdebitage and some surprisingly standardized artifact types are associated with a fauna, some of which exhibits signs of butchering. Bifacially worked, roughly pointed cores approximating crude protohandaxes as well as ovates uniaxially shaped on large flakes have been reported from localities in the Baise Basin of South China dating to 740 Ka. Still older deposits

apparently dating to ca. 2 Ma near Riwayat, Pakistan, have produced chipped stones claimed as artifacts but questioned by some archaeologists.

In northern Thailand, a few sites offer archaeological evidence for hominins in mainland Southeast Asia during the late Early Pleistocene. Mae Tha and Ban Don Mun have yielded unifacially and bifacially worked quartzite cobbles that stratigraphically underlie basalts of reversed polarity. Another locality, Kao Pah Nam, has yielded artifacts and a hearth in association with fauna in a rockshelter. The locality remains undated, but the mammalian fauna strongly suggests a Middle Pleistocene age. The only early human fossils in Southeast Asia are a very few isolated teeth from the Vietnamese caves Tham Khuyen and Tham Hai. Two teeth and cranial fragments comparable to those of Chinese *H. erectus* were recovered from the late Early and early Middle Pleistocene contexts at Tan Hang Cave in northern Laos.

Zhoukoudian (formerly Chou-k'ou-tien) Locality 1 is the most famous of the Chinese Middle Pleistocene localities. This cave complex has yielded partial remains of more than 40 individuals from the excavation of more than 40 m of brecciated sediments. The cave, located ca. 45 km southwest of Beijing, has been worked on and off since a few teeth were first recovered in 1927. Unfortunately, the original collection was lost in late 1941, during World War II. The records of careful prewar excavation, accurate casts, precise descriptive analyses by German paleoanthropologist F. Weidenreich, and postwar Chinese work have all helped minimize the loss of information.

We are fairly confident that *H. erectus* occupied the cave intermittently between ca. 0.6 and 0.25 Ma, because of the agreement of a variety of modern dating techniques. Much evidence bearing on the behavior of these hominids has also been forthcoming over the years. Layers of charcoal and "ash" interspersed throughout the middle and upper layers suggested that Zhoukoudian hominids used fire on a regular basis, even if it cannot be shown that they knew how to make it. Chemical analysis in 1996 and 1997, however, showed that ash was not present in these gray-colored lenses, at least in the area of the remaining deposits. Burned hackberry seeds and the charred remains of large mammals like deer and horses have also been put forward as evidence for the diet of "Peking Man." The blackening on some bones may be a result of manganese staining but others are clearly burned. There has also been a renewed recognition of the role that carnivores, which also occupied the cave at times, must have played in the accumulation and modification of the bones that document the Zhoukoudian fauna. Nonetheless, some of the bones are indisputably worked by stone tools. There is much less evidence, however, for the existence of the bone-tool industry once postulated by early workers. The stone-tool industry from the cave consists mostly of simply flaked vein quartz and other substances that are poor natural materials from which to manufacture more standardized artifacts. The fossils of "Peking Man" have at times been taken to show evidence of cannibalism, but, again, this is far from certain. The cranial capacity of Zhoukoudian hominins probably increased through time (from ca. 0.5 to ca. 0.2 Ma), as did

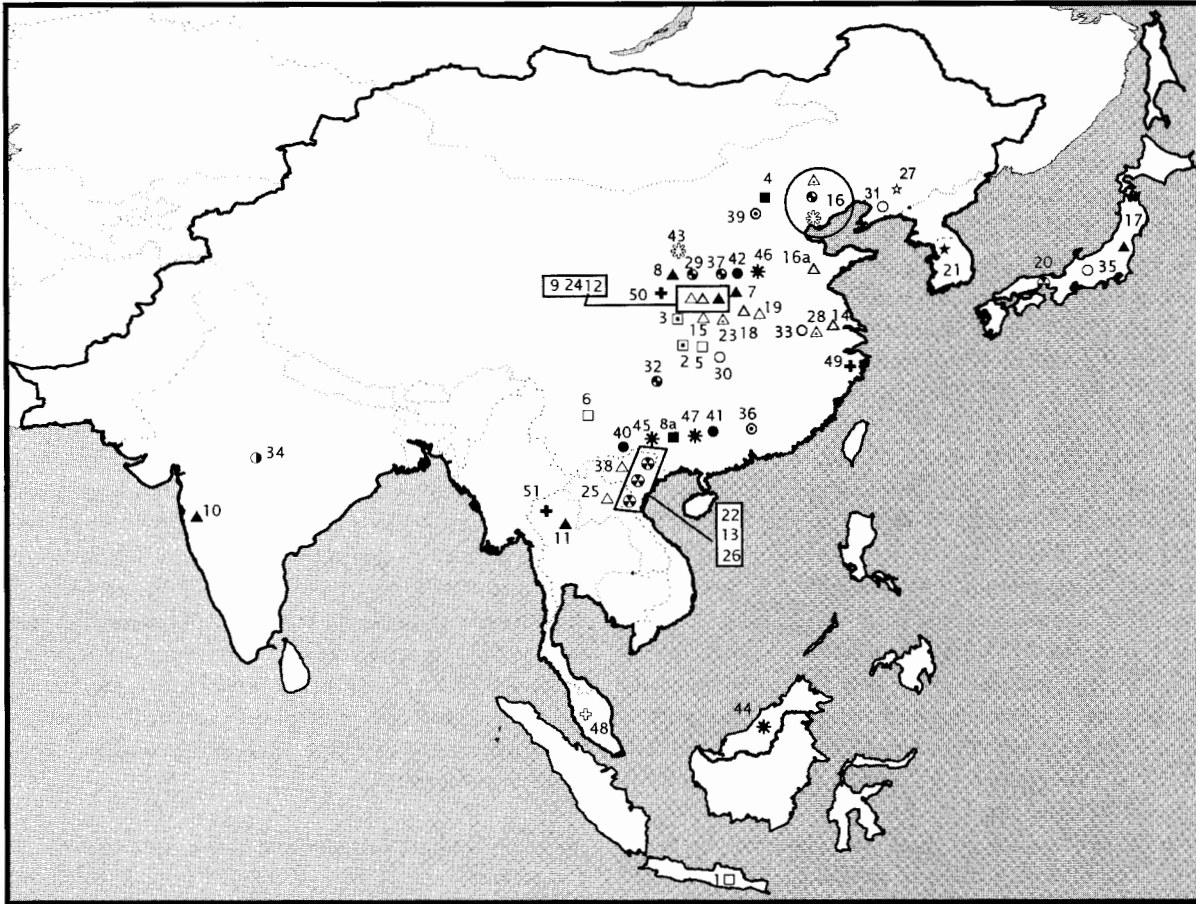
the complexity and standardizations of their tool kits. Further study of this unique locality will enlarge our knowledge of hominid adaptation in the Pleistocene.

Additional cranial remains of Chinese *H. erectus* have been announced, but, as of the late 1990s, inadequately reported from Hexian (Anhui Province), Yunxian (Hubei Province), and Tangshan (near Nanjing, Anhui Province); other sites have yielded teeth. The Hexian cranium may document the latest known *H. erectus* in China. The Nanjing and Yunxian crania may present some morphological characters that recall those of early *H. sapiens*.

The nature and the antiquity of Asian archaeological assemblages continue to spark debate. A major point of contention has been the distributions of Acheulean assemblages and the so-called chopper-chopping tool complex. In 1940, American prehistorian H.L. Movius recognized a difference in the geographical distribution of these assemblages, with Acheulean assemblages occurring in central and southern parts of the Indian subcontinent and more crudely manufactured, nonbifacially worked assemblages occurring farther east. Local variations of the Mode 1 chopper-chopping tool complex have been given various names: Pacitanian (Indonesia), Anyathian (Burma), Fingnoian (Thailand), and Tampanian (Malaysia). Movius further suggested that a line, termed *Movius's line* by his colleague the American anthropologist C.S. Coon, could be drawn between the "cultural backwater" of eastern Asia and the "more developed" cultures of Africa, India, and Europe. Others have suggested that this line may actually reflect different adaptations to contrasting environments, with the East Asian assemblages reflecting the exploitation of decidedly more forested habitats. G.G. Pope has suggested that bamboo provided a versatile raw material that, to a large extent, supplanted a reliance on lithic raw materials.

Debate has been further complicated by the fact that the vast majority of Asian archaeological assemblages, especially outside of China, cannot be shown to be earlier than ca. 60 Ka. Some artifacts have been recovered from Middle Pleistocene contexts in Siberia, India, and Southeast Asia, but they tell us little about the nature and extent of variation of the Early Paleolithic in Asia. Apparently later Middle Pleistocene sites in India have long yielded assemblages with handaxes effectively identical to those from Europe and Africa. S. Mishra and colleagues reported that the Bori site near Pune (Maharashtra state) has yielded numerous flakes and several simple bifaces in association with tephra layers dated to 670 Ka by $^{39}\text{Ar}/^{40}\text{Ar}$. Younger Acheulean sites in South Asia have been dated less securely. Middle Paleolithic (Middle Stone Age) assemblages are also known in quantity.

As in Southeast Asia, no Acheulean or handaxe assemblages have yet been recognized in China. Chinese workers recognize two "tool traditions" in what is probably a highly oversimplified interpretation of the archaeological record there: a large-tool tradition including "protobifaces" and "choppers" and a small-tool tradition composed largely of undifferentiated flakes. Some assemblages, like those from Dingcun, are said to be composed of both traditions. A selection of artifacts from the Lantian region (but not the two sites yielding human remains), Dingcun, and a few other sites have been



- Early Pleistocene: *Homo erectus*
- Early Pleistocene: Early Paleolithic
- ▣ Early Pleistocene: *H. erectus* & Early Paleolithic
- △ Middle Pleistocene: *Homo erectus*
- Middle Pleistocene: "archaic *Homo sapiens*"
- ⊗ Middle Pleistocene: "archaic *H. sapiens*" (or *H. erectus*)
- ▲ Middle Pleistocene: Early Paleolithic
- ★ Middle Pleistocene: Early or Middle Paleolithic
- △ Middle Pleistocene: *H. erectus* & Early Paleolithic
- ☆ Middle Pleistocene: "archaic *H. sapiens*" & Early or Middle Paleolithic
- ⊗ Middle Pleistocene: "archaic *H. sapiens*" & Middle Paleolithic
- ⊙ Late Middle or early Late Pleistocene: "archaic *H. sapiens*" & Early or Middle Paleolithic
- Late Pleistocene: "archaic *Homo sapiens*"
- ⊙ Late Pleistocene: "archaic *H. sapiens*" & Middle Paleolithic
- * Late Pleistocene: *Homo sapiens sapiens*
- ⊗ Late Pleistocene: *H. s. sapiens* & Late Paleolithic
- ⊕ ?Late Pleistocene: Tampanian – probably post-Paleolithic
- ⊕ Holocene: Neolithic or other post-Paleolithic

Map of Eastern and Southern Asia (heavy outline) showing major fossil hominin and archaeological localities. Symbols indicate age and included taxa and/or industries, while numbers represent site names (in approximate chronological order), as follows: 1, Mojokerto, Sangiran, Solo, Trinil, etc.; 2, Longgupo; 3, Gongwangling (Lantian); 4, Nihewan; 5, Longgudong (Jian Shi); 6, Yuanmou; 7, Xihoudu; 8, Xishuidong; 8a, Baise; 9, Chenchiawo (Lantian); 10, Bori; 11, Mae Tha, Ban Don Mun, Kao Pah Nam; 12, Kehe; 13, Lang Trang; 14, Huludong (Nanjing); 15, Yunxian (Quyuanhekou); 16, Zhoukoudian (note 3 symbols of different age); 16A, Qizianshan (Yiyuan); 17, Takamori; 18, Xihuashan (Nanzhao); 19, Dujiagou (Yunxian); 20, Nishiyagi; 21, Chon-gok-ni; 22, Tham Khuyen, Tham Hai, Keo Leng; 23, Bailongdong (Yunxi); 24, Donghe (Luonan); 25, Tam Hang; 26, Tham Om; 27, Miaoboushan; 28, Longtandong (Hexian); 29, Dali; 30, Longdong (Changyang); 31, Jinniushan (Yinkou); 32, Tongzi (Tungtzu); 33, Yinshan (Chaoxian); 34, Hathnora (Narmada); 35, Ushikawa; 36, Maba; 37, Dingcun; 38, Hang Hum; 39, Xujiayao; 40, Xuanrendong (Xichou); 41, Shuiyen; 42, Xigou; 43, Salawusu; 44, Niah; 45, Jtulengshan; 46, Xiaonanhai; 47, Liujiang; 48, Kota Tampan; 49, Hemudu; 50, Banpo; 51, Spirit Cave. Numerous sites in southern Asia yielding only archaeological residues are not indicated. Two sets of symbols boxed because of insufficient space for site numbers, no special relationship implied.

interpreted as bifaces, but they are either of uncertain provenance or younger than ca. 150 Ka. Well-made bifaces are also known from Chon-gok-ni in South Korea, which have been demonstrated to date to the final Middle or early Late Pleistocene. All of these are probably unrelated to the Acheulean tradition of Africa, Europe, Southwest Asia, and India. Clearly, much remains to be done to clarify and define the earlier Paleolithic in East Asia. In the 1990s, however, symmetrical pointed unifacial tools and partially flaked bifacial tools on large flakes have been recovered from the Baise basin in south China. These finds, which predate 0.732 ± 0.039 Ma, together with small well-made bifaces from Takamori in Japan dating to c. 500 Ka, begin to blur the distinctions made by Movius.

Several regions of mainland southern and eastern Asia have provided evidence about the later phases of human evolution. Crania from India (Narmada) and China (Dali, Xujiayao, Mapa, Jinniushan) testify to the presence of various forms of *Homo* morphologically intermediate between *H. erectus* and anatomically modern *H. sapiens*. Like the Ngandong hominids, the Dali specimen has been of particular interest, since its morphology has been claimed to bridge the gap between *H. erectus* and modern regional Asian populations while at the same time diverging from the morphology of the "archaic *Homo sapiens*" known from Africa and Europe. Other researchers consider that it is within the range of such Western fossils as Petralona and Kabwe. No true Neanderthals are known within the areal range of eastern and southern Asia, although they do extend eastward to the margins of western Central Asia (Uzbekistan).

The origin and antiquity of the modern races of Asia are poorly understood. Early workers, such as Weidenreich, discerned contemporaneous racial types—Esquimoid, Melanesian, and Ainu (related to Caucasian)—in a sample from the Upper Cave at Zhoukoudian. Other authors, such as C. Coon, M.H. Wolpoff, and A.T. Thorne, have suggested that even Middle Pleistocene Asian hominids show a regional continuity that allies them with recent and modern populations in the same areas of Asia. On the other hand, based on both paleontological and genetic analyses, it has been suggested that anatomically modern *H. sapiens* were the result of invading populations that replaced the descendants of *H. erectus*. These alternative models of modern human origins often focus on the South and East Asian fossil evidence. A variety of modern human remains discovered in the 1990s in China were reviewed in 1996 by D. Etlar, and detailed studies of these should help to clarify the relationships of early East Asians.

Late Palaeolithic artifacts accompany anatomically modern people in eastern Asia, but the assemblages are characterized by a low frequency of blades. Microliths are also rare in China, except in the north, which also has wedge-shaped cores not unlike those found at a later date in Alaska. Bone needles and harpoons, elaborate jewelry, and grave goods were included with the burials at Zhoukoudian Upper Cave.

Early evidence of agriculture and domestication, established in Southwest Asia by 11 Ka, is also found somewhat later in northeastern Asia (Japan). Although dates as early as ca. 10 Ka have been claimed for horticultural practices at

Spirit Cave in northern Thailand, most workers think that the evidence is equivocal and does not distinguish between food collecting and horticulture. At Jomon sites in Japan, with an economic pattern of sedentism apparently based on fishing, pottery is thought to antedate 12.5 Ka and is followed by the introduction of cereal grains by 9 Ka. By 5 Ka, rice farming was established in several areas, including Thailand and coastal China, where sites such as Hemudu (Zhejiang) suggest a mixture of hunting (deer, rhinoceros, elephant), rice cultivation, and animal husbandry (pigs and water buffalo). By 5000–2500 BP, the coastal Neolithic culture (Longshan) was also characterized by such classic Chinese crafts as jade carving, and scapulimancy (predicting the future from the patterning of cracks in burned animal bones, especially scapulae). Inland sites reflect a different line of Neolithic development: the Yangshao culture. At the site of Banpo near Xian in north China's Shanxi Province, dating to ca. 7000 BP, an elaborate system of defensive ditches and walls protected the settlement of farmers. A very large, centrally located structure and a specialized area set aside for the production of beautifully painted pottery also suggest the early development of economic and social complexity. Fishhooks and barbed points, together with the stylized fish designs on the pottery, suggest the importance of this resource as a supplement to an agricultural economy based on millet and pigs.

See also Acheulean; Adapiformes; Africa; Anthrozoidea; Archaic *Homo sapiens*; Asia, Western; China; Dali; Decoredon; Dingcun; Dryopithecinae; Early Paleolithic; Eosimidae; Europe; Gigantopithecus; Hexian; *Homo*; *Homo erectus*; *Homo sapiens*; Indonesia; Jinniushan; Lang Trang; Lantian; Longuppo; Lorisidae; Lufeng; Lufengpithecus; Meganthropus; Modern Human Origins; Narmada; Neolithic; Ngandong (Solo); Nihewan; Notharctidae; Omomyidae; Paleolithic; Paleolithic Lifeways; Petroleumur; Plesiadapiformes; Pliopithecidae; Pondaung; Ponginae; Raw Materials; Russia; Sivapithecus; Siwaliks; Stone-Tool Making; Xiaochangliang; Yuanmou; Zhoukoudian. [G.G.P., A.S.B., E.D.]

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